Appendix F: Natural Environment Technical Report

for the

I-95 Access Improvements from Caton Avenue to Fort McHenry Tunnel – Environmental Assessment (EA) Baltimore City, Maryland

Prepared for:

Maryland Transportation Authority

dot DEPARTMENT OF TRANSPORTATION BALTIMORE CITY

and

U.S. Department of Transportation Federal Highway Administration

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ACRONYMS AND ABBREVIATIONS

Acronym or Abbreviation	Definition
AASHTO	American Association of State Highway and Transportation Officials
Baltimore City DOT	Baltimore City Department of Transportation
BIBI	Benthic Index of Biotic Integrity
BMP	Best Management Practice
BSID	Biological Stressor Identification
CAC	Critical Area Commission for the Chesapeake & Atlantic Coastal Bay
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulation
COMAR	Code of Maryland
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DBH	Diameter at Breast Height
DOT	United States Department of Transportation
EA	Environmental Assessment
EFH	Essential Fish Habitat
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ESC	Erosion and Sediment Control
ESD	Environmental Site Design
FCA	Forest Conservation Act
FHWA	Federal Highway Administration
FIBI	Fish Index of Biotic Integrity
FIDS	Forest Interior Dwelling Species
HPA	Habitat Protected Area
HUC	Hydraulic Unit Code
I-95	Interstate 95
IDA	Intensely Developed Area
ILF	In-Lieu Fee
ISTEA	Intermodal Surface Transportation Efficiency Act
JD	Jurisdictional Determination
JPA	Joint Permit Application
LDA	Limited Development Area
LOD	Limits of Disturbance
LOS	Levels of Service
MBSS	Maryland Biological Stream Survey
MD	Maryland
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MDTA	Maryland Transportation Authority

MGS	Maryland Geological Society
MHT	Maryland Historic Trust
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
NEPA	National Environmental Policy Act
NETR	Natural Environmental Technical Report
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Non-Point Source
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
PCB	polychlorinated Biphenyls
PEM	Palustrine Emergent
RCA	Resource Conservation Area
ROW	Right-of-Way
RTE	Rare, Threatened, and Endangered
SAV	Submerged Aquatic Vegetation
SWM	Stormwater Management
SWPPP	Stormwater Pollution Prevention Plan
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Loads
TNW	Traditional Navigable Waters
TSS	Total Suspended Solids
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WQMP	Water Quality Management Plan
WUS	Waters of the United States

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1 INTRODUCTION

The Maryland Transportation Authority (MDTA) and the Baltimore City Department of Transportation (Baltimore City DOT), in coordination with the Federal Highway Administration (FHWA), are studying a suite of improvements to Interstate 95 (I-95) ramps and other nearby transportation facilities to support ongoing and planned redevelopment of the Port Covington peninsula in south Baltimore. These improvements are collectively known as the I-95 Access Improvements from Caton Avenue to the Fort McHenry Tunnel (I-95 Access Improvements).

The Port Covington peninsula, as shown on Figure 1: Project Location and Figure 2: Study Area, is surrounded on three sides by the Middle Branch of the Patapsco River, with I-95 running on structure along the northern boundary. Transportation access to the peninsula is currently provided by north-south connections via Hanover Street and east-west connections via local arterials, including Key Highway and McComas Street.

I-95 is part of the Interstate Highway System in the City of Baltimore, and is owned, operated and maintained by MDTA. The Baltimore City DOT is responsible for other arterial and collector roadways in the project area. FHWA has approval authority over any changes to access points on the Interstate Highway System. Approval of any proposed modification to interstate access constitutes a federal action subject to review under the National Environmental Policy Act (NEPA).

This Natural Resources Technical Report (NETR) identifies the existing natural environmental resources within the I-95 Access Improvements study area and documents the potential impact of the construction and operation of the proposed project on those resources. This NETR will support the development of an Environmental Assessment document, which is a requirement for the project's compliance with NEPA.

Figure 1: Project Location

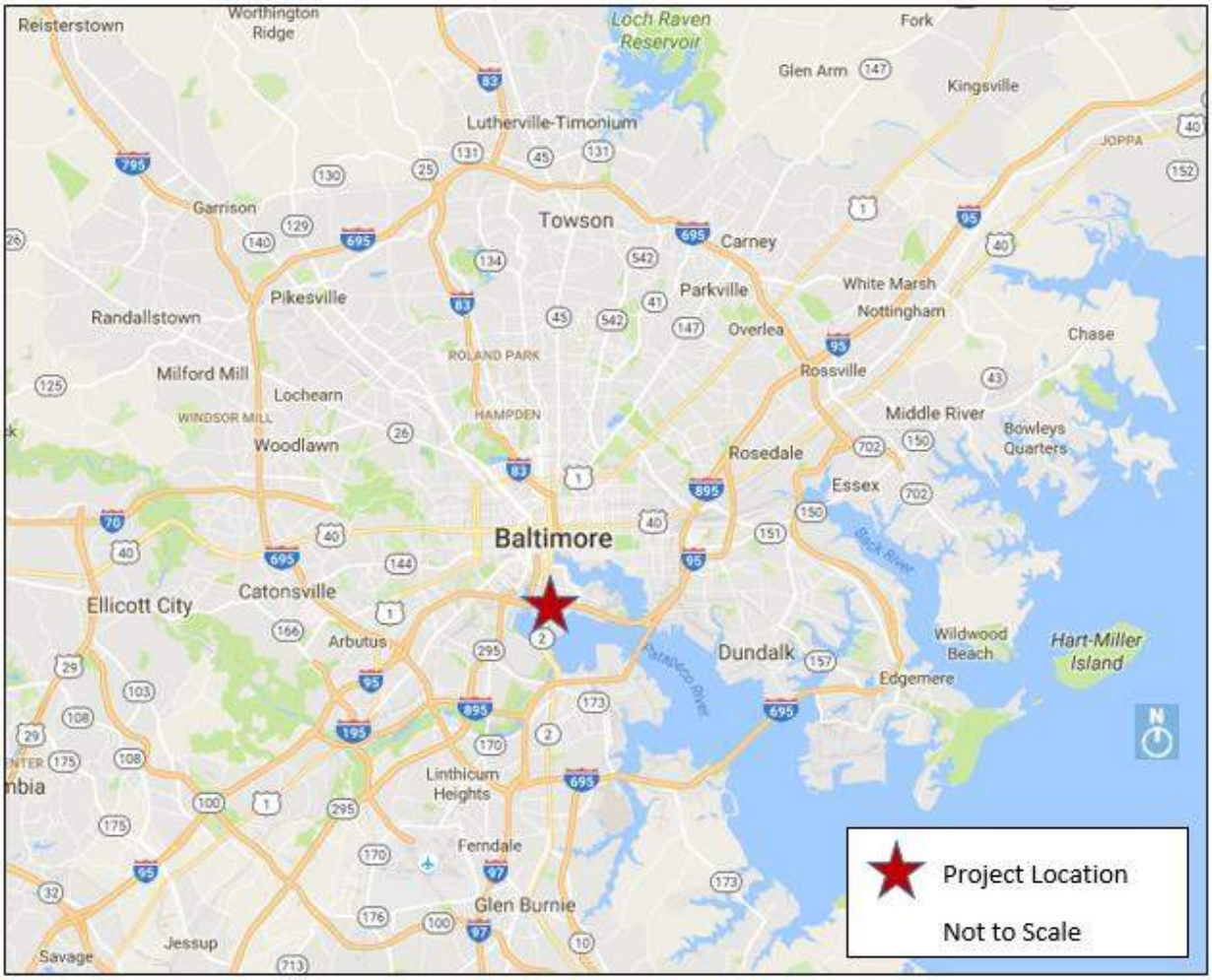
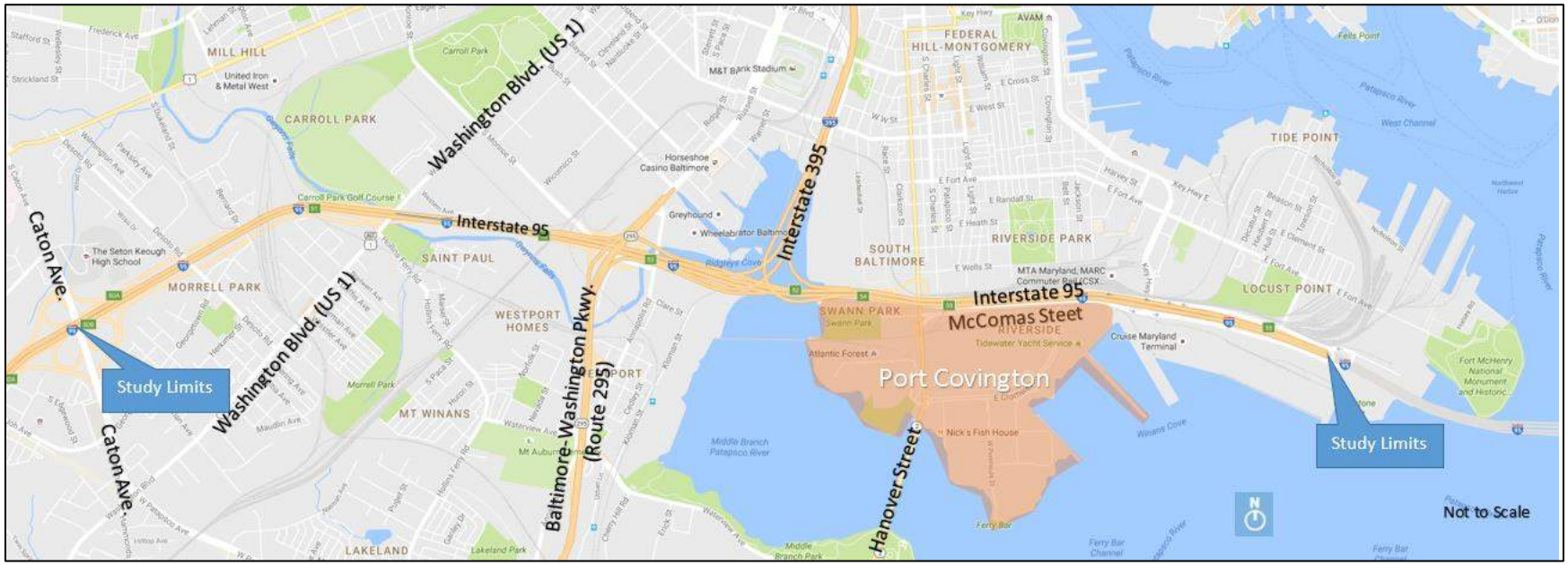


Figure 2: Study Area



2 DESCRIPTION OF ALTERNATIVES

The existing road and roadway capacity are not adequate to meet projected traffic demand, and there are limited multi-modal connections around and across I-95 in the vicinity of Port Covington. The purpose of the I-95 Access Improvements project is to accommodate forecasted increased transportation demand on I-95 and the surrounding transportation network by minimizing effects on mobility and safety, as well as enhancing multi-modal connections to the Port Covington peninsula. To simplify a complex project, the improvements under consideration were broken down into seven elements as follows:

Table 3.1: Design Elements

Designation	Element	Locations
A	I-95 Northbound Off Ramps	I-95 NB to Hanover Street SB I-95 NB to McComas Street
B	I-95 Northbound On Ramps	Key Highway to I-95 NB
C	I-95 Southbound Off Ramps	I-95 SB to Key Highway
D	I-95 Southbound On Ramps	McComas Street WB to I-95 SB Hanover Street NB to I-95 SB
E	Hanover Street	Between Wells and McComas Streets
F	McComas Street and Key Highway	
G	Pedestrian and Bicycle Connections	Hanover Street Key Highway McComas Street Shared-Use Path

Several options were developed for each element. These were combined into four discrete alternatives for analysis purposes – Alternative 1, the No Build Alternative, and three Build Alternatives. These four alternatives were analyzed to determine how well they meet the project's stated Purpose and Need and the effects each has on future traffic operations both on I-95 and on local streets. Key performance measures include travel times, vehicle throughput, queuing, and LOS. Each element's options were also compared against each other to identify which performed to the highest level. Based on the key performance measures results, and how well they meet the Purpose and Need, the highest performing options for each element were combined into Alternative 5, the MDTA/Baltimore City Team Recommended Preferred Alternative.

2.1 No-Build Alternative

The **No-Build Alternative** assumes that no improvements or alteration to the I-95 corridor or the access routes in the vicinity of the Port Covington peninsula are constructed. The No-Build Alternative considers the future planned growth and associated transportation demand. Planned growth within the study area included the full buildout of the approved *Port Covington Master Plan* (2016). Because no construction is associated with the No Build Alternative, there would be no direct effect to water resources and aquatic ecology or terrestrial resources. The increased traffic congestion could exacerbate any existing adverse indirect effects to natural resources associated with the anticipated No Build traffic congestion; however, those effects are not reasonably quantifiable.

2.2 Recommended Preferred Alternative

The following describes the Recommended Preferred Alternative, as approved by MDTA and Baltimore City DOT. For this natural resources impact analysis, the NETR Study Area (Study Area) is comprised of the Limits of Disturbance (LOD) of the Recommended Preferred Alternative (see Figure 3).

Element A: I-95 Northbound Off Ramps

- New Ramps
    - **Spur from Russell Street Ramp** – The existing auxiliary lane between the Caton Avenue On Ramp and the Russell Street Off Ramp would be widened to two lanes. The Russell Street Off Ramp would also be widened to two lanes until it overpasses MD 295, at which point the two lanes would split. One lane would continue along the existing ramp alignment to Russell Street NB. The second would continue east, over the Middle Branch, as a new ramp spur parallel to the existing ramps adjacent to I-95 NB, and merge with the new spur ramp from I-395 SB, connecting to McComas Street at an at-grade intersection with Brown Street, a street proposed in the approved Master Plan, located approximately 1,100 feet west of the intersection of Hanover Street and McComas Street. The alignment of the merged ramps will pass through the north side of existing Swann Park to avoid the parcel located at 2000 Race Street.
    - **Spur from I-395 SB Ramp** – A new ramp spur, splitting off from the existing I-395 SB Ramp to I-95 NB where it overpasses I-95, is proposed. It would run southeast, merge with the new spur ramp from Russell Street and connect to McComas Street at an at-grade intersection on the western side of Port Covington.
- **I-95 NB to Hanover Street SB Ramp** – The existing ramp would be removed. Vehicles traveling from I-395 SB to MD 2 SB would be accommodated by the new ramp Spur from I-395 SB.
- **I-95 NB to McComas Street Ramp** – The existing ramp would remain in a similar location, but would be realigned to accommodate the new I-95 NB On Ramp (Element B), modifications to McComas Street (Element F), and the removal of the existing Hanover Street ramp from I-95 NB. The realigned ramp would extend the existing auxiliary lane that terminates at the Hanover Street exit to a two lane exit gore located approximately 1,600 feet from the existing I-395 SB On Ramp gore. The new two-lane exit ramp would run under I-95 NB, braid through the existing piers, and daylight perpendicular to an at-grade signalized intersection with McComas Street near the existing intersection of McComas and Cromwell Streets.

Element B: I-95 Northbound On Ramps

- **Key Highway to I-95 NB Ramp** – No modifications to the existing ramp are proposed.
- **McComas Street to I-95 NB Ramp** – A new ramp is proposed from McComas Street at a location approximately 700 feet east of its intersection with Hanover Street. The new ramp would braid with the realigned I-95 NB to McComas Street Ramp (Element A) and modifications to the realigned one-way section of McComas Street WB (Element F).

Element C: I-95 Southbound Off Ramps

- **I-95 SB to Key Highway Ramp** – No modifications to the existing ramp are proposed.
- **I-95 SB to McComas Street WB Ramp** – A new ramp, with a gore located approximately 400 feet west of the Key Highway overpass is proposed. It would provide access to the one-way section of McComas Street WB located directly beneath I-95 SB. The new ramp would braid with the realigned McComas Street WB to I-95 SB Ramp (Element D). The improvements would require the relocation of two CSX storage tracks.

Element D: I-95 Southbound On Ramps

- **McComas Street WB to I-95 SB** – The existing ramp would continue to provide access from the one-way section of McComas Street WB to I-95 SB, but would be realigned to minimize construction cost and duration. It would braid with the new ramp from I-95 SB to McComas Street WB (Element C).
- **Hanover Street NB to I-95 SB** – No modifications to the existing ramp are proposed.

Element E: Hanover Street

- **From Wells Street to McComas Street** – No modifications to this section of Hanover Street are proposed.

Element F: McComas Street & Key Highway

- **McComas Street west of Key Highway** – The existing two-way section of McComas Street and the one-way section of McComas Street EB would be converted to a two-way boulevard from the western side of the Port Covington peninsula to Key Highway. The boulevard would accommodate vehicular and multi-modal connections between South Baltimore, I-95, and the Port Covington development. The median would be designed to accommodate a future light rail spur from Westport anticipated to terminate prior to the existing intersection of McComas and Cromwell Streets. The existing one-way section of McComas Street WB beneath I-95 SB would remain in its current location, but be modified to accommodate the addition of an exclusive right-turn lane at the approach to the Key Highway intersection, the addition of the I-95 SB to McComas Street WB ramp (Element C), and the tie-in to the proposed two-way McComas Street boulevard.
- **Key Highway** – The existing roadway would be widened from a 4-lane section (2 NB & 2 SB) to a 5-lane section (3 NB & 2 SB) between the McHenry Row and McComas Street intersections. Additionally, a 450-foot long southbound right-turn lane will be added at the McComas Street intersection. The CSX Bridge over Key Highway, just north of the McComas Street intersection, would be reconstructed to accommodate the new width of Key Highway.

Element G: Pedestrians and Bicycles

- **Hanover Street** – The existing sidewalks on Hanover Street would remain unchanged on the bridge over the CSX tracks. South of the bridge over the CSX tracks, a new sidewalk is proposed along the west side of Hanover Street, running south to the McComas Street intersection.
- **Key Highway** – An 11-foot wide shared-use path would be provided on the east side of Key Highway between the intersections of McHenry Row and McComas Street.
- **McComas Street** – Sidewalks would be installed along both sides of the new McComas Street Boulevard. Likewise, a shared-use path would be installed along the north side of McComas Street between the Cromwell Street and Key Highway intersections.
- **New Shared-Use Bridge/Path** – A new shared-use path, linking South Baltimore to Port Covington will be constructed. The path would run parallel to the south side of Winder Street, ramping up from the Light Street intersection. A stair case would connect to the path from the Charles Street intersection. At the Charles Street intersection, the ramp would turn south, bridge over the CSX tracks and under I-95, then turn east to connect to the shared-use path proposed along the north side of McComas Street.

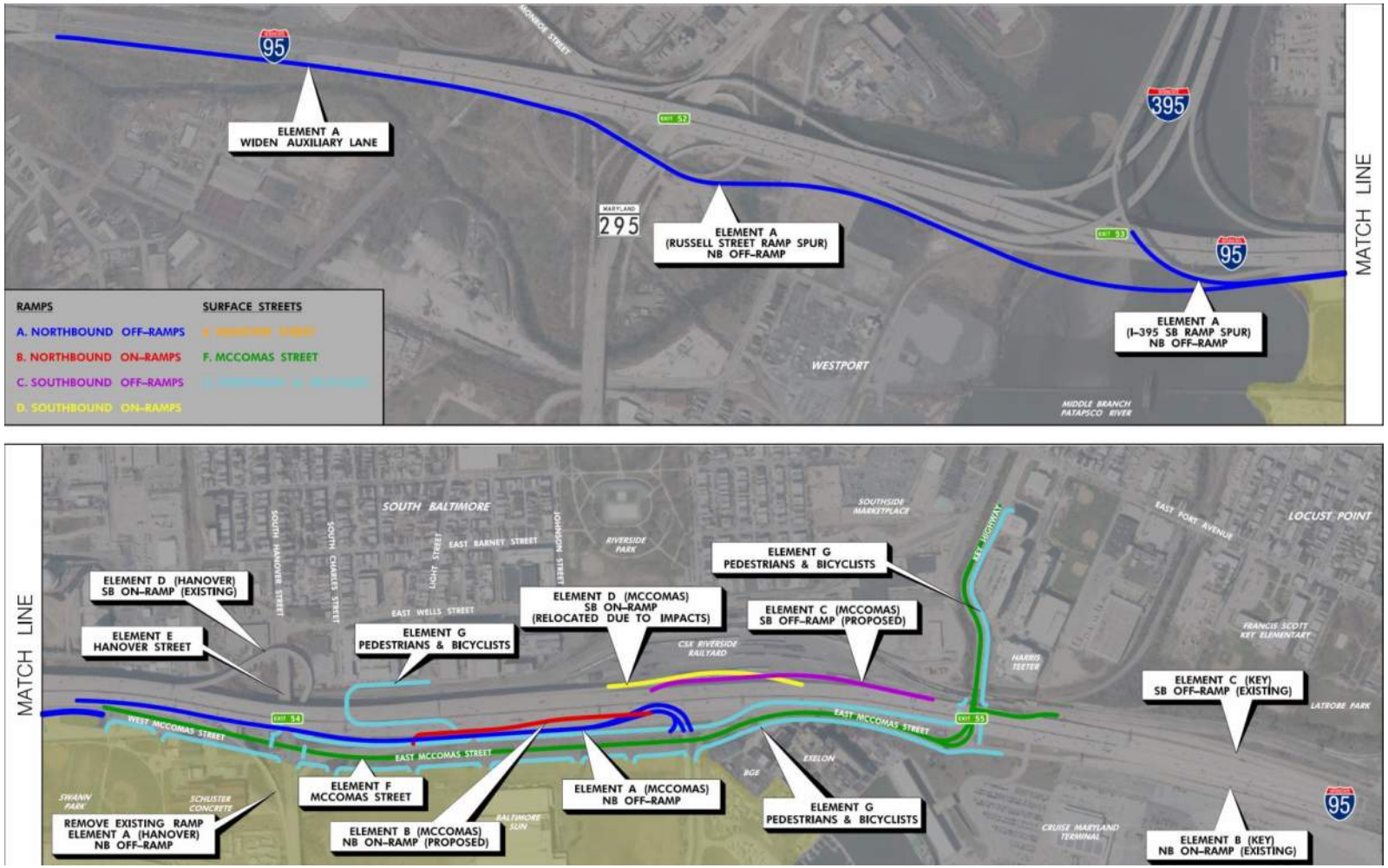


Figure 3: Recommended Preferred Alternative

The **Recommended Preferred Alternative** includes five (5) new I-95 access ramps that would connect grade separated roadways. The Recommended Preferred Alternative's conceptual design of the five (5) bridges would require up to 85 bridge piers throughout the Study Area. Two of the I-95 ramp spurs would be bridged across aquatic resources. The Russell Street NB Ramp would bridge the Gwynn Falls, and the I-395 SB Ramp to McComas Street ramp would span the Middle Branch of the Patapsco River. The conceptual bridge design avoids placement of piers within the Gwynn Falls; however, up to 15 piers would be placed within the Middle Branch of the Patapsco River. In order to construct the piers, it is likely that supplies would be floated in on barges at high tide for use as work platforms, with cranes mounted on them for the pile driving, pier construction, and girder erection. Also, some materials, such as concrete or girders, could be brought via adjacent I-95 ramps and lifted off with the cranes. Cofferdams would be installed for construction of the pier footings and lower section of the pier column, and individual cofferdams could be either temporary or permanent. After erection of the superstructure steel, all construction would be from the deck level. Each pier within the Middle Branch of the Patapsco would be up to 230 square feet. Final design and location of the piers would consider engineering constraints and navigability.

3 REGULATORY CONTEXT

The design and construction of, and mitigation for, the I-95 Access Improvements project must be in accordance with the applicable federal, state, and local environmental and land use laws and regulations. Additionally, the proposed project requires coordination with and permitting approvals from several regulatory agencies, as summarized below.

3.1 Applicable Federal and State Regulations and Guidance

Applicable federal and state regulations, statutes, Executive Orders and memoranda related to natural resources are provided in Table 3.2.

Table 3.2: Regulatory Programs and Statutes Applicable to Natural Resources Permits

Law or Regulation	Statutory Authority
National Environmental Policy Act of 1969	42 U.S.C. 4321-4347
Environmental Quality Improvement Act of 1970	42 U.S.C. 4371 et seq.
Clean Water Act of 1977, as amended	33 U.S.C. 1251 et seq.
The 1998 Transportation Equity Act for the 21st Century	Public Law 105-178, 112 Stat. 107
The Intermodal Surface Transportation Efficiency Act of 1991	Pub. L. 102-240, 105 stat. 1914
Safe Drinking Water Act of 1974, as amended through 1996	42 U.S.C. 300(f) et seq.
Coastal Zone Management Act of 1972, as amended through 1990	16 U.S.C. 145 et seq. (Sections 303 and 307 per 23 CFR 650.211)
Endangered Species Act of 1973, as amended through 1988	16 U.S.C. 1531-1543 7 CFR 355, 50 CFR 17, et. seq. 50 CFR Part 402—Interagency Cooperation
National Flood Insurance Act and Flood Disaster Protection Act	42 U.S.C. 4001-4128
Federal Compensatory Mitigation Rule	33 CFR Part 325 and 40 CFR Part 230
Fish and Wildlife Act of 1956, as amended through 1986	16 U.S.C. 742a-754j-2
Fish and Wildlife Coordination Act, as amended through 1965	16 U.S.C. 661-667e
Bald and Golden Eagle Protection Acts	16 U.S.C. 668-668d
Emergency Wetlands Resources Act of 1986, as amended through 1992	16 U.S.C. 3901-3932
Migratory Bird Treaty Act	16 U.S.C. 703-711
ISTEA: Wetlands Mitigation Banks, Sections 1006-1007	23 U.S.C. 103(i)13 and 23 U.S.C. 133(b)11
Bridge Locations and Clearances, Bridge Construction Permit, U.S. Coast Guard	33 CFR 115
General Bridge Act of 1946	33 U.S. Code 525, 401 et seq.
Rivers and Harbors Act of 1899	33 U.S.C. 403; Chapter 425, March 3, 1899; 30 Stat. 1151
Water Bank Act, as amended through 1994	Public Law 91-559 16 U.S.C. 1301-1311
Water Resources Development Act of 1990	Public Law 101-640
Wild and Scenic Rivers Act of 1968	Public Law 90-542 16 U.S.C. 1271-1287
Executive Order 11990 - Protection of Wetlands	Implemented by DOT Order 5660.1A
Executive Order 11988 - Floodplain Management	Implemented by DOT Order 5650.2, dated April 23, 1979
Executive Order 13186 - Responsibilities of Federal Agencies to Protect Migratory Birds	Effective January 10, 2001
Executive Order 13112 - Invasive Species	Effective February 3, 1999
The Maryland Stormwater Management Act of 2007	Title 4, Subtitle 2 of the Environment Article of the Annotated Code of Maryland
Maryland Tidal Wetlands Act	Title 26, Subtitle 8 of the Environment Article of the Annotated Code of Maryland
Maryland Nontidal Wetlands Protection Act	Title 26, Subtitle 8 of the Environment Article of the Annotated Code of Maryland
Forest Conservation Act 1991	Natural Resource Article, Section 5-1609
Critical Area Act of 1984	Critical Area Act, Title 8, Subtitle 18 of the Natural Resources Article of the Annotated Code of Maryland

Table 3.2: Regulatory Programs and Statutes Applicable to Natural Resources Permits

Law or Regulation	Statutory Authority
Executive Order 13274: Environmental Stewardship and Transportation Infrastructure Project Reviews	Effective September 18, 2002
Executive Order 11514: Protection and Enhancement of Environmental Quality	As amended by Executive Order 11991, May 24, 1977
Department of Transportation Order 5660.1A – Preservation of the Nations Wetlands	Effective August 24, 1978
Waterway and 100-year Floodplain Construction Regulations	Maryland Department of the Environment -Environment Article Title 5, Subtitle 5-501 through 5-514; COMAR 26.17.04.
Location and Hydraulic Design of Encroachments on Flood Plains	23 CFR Part 650, Subpart A
Floodplain Management and Protection of Wetlands	CFR Title 44 Part 9

3.2 Federal and State Permitting Requirements

3.2.1 Wetlands and Waterways

The I-95 Access Improvements are proposed to occur along the southern edge of Baltimore City. A portion of the improvements would consist of a bridge over the Middle Branch of the Patapsco River, a designated Waters of the United States (WUS). The following regulations and guidance apply to jurisdictional waters and associated wetlands:

- **Section 10 of Rivers/Harbors Act and Section 404 of the Clean Water Act (CWA)** — Any project activity that results in the potential discharge of dredged or fill material into WUS, including wetlands, requires authorization from the U. S. Army Corps of Engineers (USACE).
- **Executive Order 11990, Protection of Wetlands, and Department of Transportation (DOT) Order 5660.1A, Preservation of the Nation's Wetlands** — Requires transportation projects and facilities to employ practicable measures to minimize, avoid, and/or reduce impacts to wetlands during the planning and construction phases.
- **Federal Compensatory Mitigation Rule** (33 CFR Part 322) — The Environmental Protection Agency (EPA) and the USACE utilize a hierarchy of preferred mitigation options for authorized unavoidable impacts to WUS and wetlands. The EPA and USACE prefer compensatory mitigation in the following order: mitigation banks, In-Lieu Fee (ILF), permittee responsible mitigation.
- **Section 401 of the CWA** — Before the USACE can issue a Section 404 permit, the Maryland Department of the Environment (MDE) must issue a Section 401 Water Quality Certification, a finding that the project complies with the state's water quality standards.
- **Maryland Nontidal Wetlands Protection Act** — MDE authorizes project activities resulting in impacts to nontidal wetlands and the associated 25 foot or 100-foot expanded wetland buffer.
- **Waterway and 100-year Floodplain Construction Regulations** — Authorization from MDE is required for activities affecting surface waters and their associated 100-year floodplains. These activities may involve bridges or culverts, excavation or filling, channelization, changing the current course or cross section of any stream, and temporary construction within the 100-year floodplain.

Wetlands and waterways with a significant nexus to a Traditional Navigable Water (TNW) are regulated by the USACE and/or MDE. Isolated wetlands (wetlands without an identified nexus to a TNW) are not regulated at the federal level. However, MDE does regulate isolated nontidal wetlands and nontidal wetland buffers, as defined in the Code of Maryland (COMAR 26.23.01).

WUS and wetlands were delineated per methodology outlined in the 1987 USACE Wetland Delineation Manual (1987 Manual) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic & Gulf Coastal Plain Region (Version 2.0) (Regional Supplement; USACE, 2010). A wetland delineation identifies the limits of jurisdictional wetlands and waters and the results, upon verification by the USACE and/or MDE, and are used to quantify project-related impacts. A Joint Permit Application (JPA) is then used to apply for federal and State authorization under the Maryland State Programmatic General Permit (MDSPGP) for work in non-tidal waters.

The federal and state review agencies use compensatory mitigation to offset unavoidable impacts to jurisdictional resources by replacing lost functions with replicated functions elsewhere. Appropriate mitigation is determined by the associated review agency and the process is based on established policies, guidelines, and regulations. Compensatory mitigation may include restoration, enhancement, establishment, and/or in certain circumstances, preservation. Restoration should generally be the first option considered because the likelihood of success is greater and the impacts to potentially ecologically important uplands are reduced, compared to establishing new wetlands in previous upland areas and the potential gains, in terms of aquatic resource functions, are greater compared to enhancement and preservation mitigation measures. Compensatory mitigation would be required for permanent impacts to streams and wetlands resulting from the implementation of the Recommended Preferred Alternative. Compensatory mitigation is typically required in the same or adjacent hydraulic unit code (HUC) within the same watershed and physiographic province as the impact. The CWA, as well as MDE and other regulations, requires transportation projects to minimize, avoid, and/or reduce impacts to jurisdictional waters, including wetlands.

Mitigation proposals for unavoidable adverse impacts to aquatic resources must adhere to the preferred hierarchy, as stated in the EPA and Corps Mitigation Rule, as follows:

- Mitigation bank credits from an approved mitigation bank
- ILF program credits from an approved ILF program
- Permittee-responsible mitigation under a watershed approach
- Permittee-responsible mitigation through on-site and in-kind mitigation
- Permittee-responsible mitigation through off-site and/or out-of-kind mitigation

3.2.2 Floodplains

Floodplains are regulated to minimize flooding impacts to upstream and downstream properties, and to avoid or minimize impacts to floodplains. The following requirements apply to floodplains:

- **USDOT Order 5650.2, (Floodplain Management and Protection)** – Prescribes policies and procedures for ensuring that proper consideration is given to the avoidance and minimization of adverse effects to regulated floodplains.
- **Executive Order 11988, (Floodplain Management)** – Requires federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the occupancy and modification of floodplains, and to avoid direct and indirect floodplain development wherever there is a practicable alternative.
- **MDE 100-Year Floodplain and Waterway Construction Regulations** – Assures that activities in a 100-year floodplain do not create flooding on upstream or downstream properties. Authorization from MDE is required for project activities, including bridges or culverts and temporary construction, affecting 100-year floodplains.
- **CFR Title 44 Part 9** – Mandates that no increases in 100-year floodplain water surface elevations would be permitted in floodways, which is a river or channel designated as such by the Federal Emergency Management Agency (FEMA).

3.2.3 Habitat and Species Permits and Coordination

The US Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS), regulate federally-listed threatened and endangered species under the Endangered Species Act of 1973 (ESA) with the primary goal of conserving and recovering listed species. The ESA, with few exceptions, prohibits activities affecting threatened and endangered species unless authorized by a permit. The legal federal status of a species is determined by Congress.

- **Executive Order 13186** (Responsibilities of Federal Agencies to Protect Migratory Birds) directs federal agencies to take actions to further implement the Migratory Bird Treaty Act by approving a Memorandum of Understanding (MOU) with USFWS to promote conservation of migratory birds. The promotion of migratory bird conservation is accomplished by avoiding or minimizing, to the extent practicable, adverse impacts on migratory bird resources when conducting agency actions, and by integrating bird conservation principles, measures, and practices into agency activities. Further goals, as practicable, are to restore and enhance the habitat of migratory birds, eliminate or control pollution or detrimental alteration of the natural environment for the benefit of migratory birds, and design migratory bird habitat and population conservation principles, measures, and practices, into agency plans and planning processes (natural resource, land management, and environmental quality planning), and to coordinate with other agencies and non-federal partners in planning efforts. Agencies must ensure that environmental analyses of federal actions required by NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds, with an emphasis on species of concern. The agency must also inventory and monitor bird habitat and populations within the agency's capabilities and authorities, to the extent feasible, to facilitate decisions about the need for and effectiveness of conservation efforts. Potential impacts to migratory birds are coordinated under jurisdiction of the USFWS.

- **Executive Order 13112** (Invasive Species) requires federal agencies to prevent the introduction of plants and animals not indigenous to the United States, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause. This is executed by a program that, in addition to the creation of federal leadership committees and councils, identifies, monitors, controls, and restores habitats adversely affected by invasive species. In addition, provisions are established to conduct research and disseminate educational materials. Compliance with the order restricts federal agencies, including the Federal Highway Administration (FHWA), from using allocated funds for construction, rehabilitation, revegetation, enhancement, or landscaping that includes use of nuisance, noxious, and invasive plants and animals.

- **The Bald and Golden Eagle Protection Act of 1940** (16 U.S.C. 668-668d, 54 Stat. 250) provides for the protection of the bald eagle, the national emblem of the United States, and the golden eagle, by prohibiting, except under certain specified conditions, the taking, possession, and commerce of such birds. The 1972 amendments increased penalties for violating provisions of the Act or regulations issued pursuant thereto and strengthened other enforcement measures.

- **The Fish and Wildlife Coordination Act** authorizes the Secretaries of Agriculture and Commerce to aid and cooperate with federal and state agencies to protect, rear, stock, and increase the supply of game and fur-bearing animals, as well as to study the effects of domestic sewage, trade wastes, and other polluting substances on wildlife. The Act also directs the Bureau of Fisheries to use impounded waters for fish-culture stations and migratory-bird resting and nesting areas, and

requires consultation with the Bureau of Fisheries prior to the construction of any new dams to provide for fish migration. In addition, this Act authorizes the preparation of plans to protect wildlife resources, the completion of wildlife surveys on public lands, and the acceptance by the federal agencies of funds or lands for related purposes, if land donations received the consent of the state in which they are located.

The amendments enacted in 1946 require consultation with USFWS and the fish and wildlife agencies of states where the waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted or otherwise controlled or modified by any agency under a federal permit or license. Consultation is to be undertaken to prevent the loss of and damage to wildlife resources. The 1958 amendments added provisions to recognize the vital contribution of wildlife resources to the nation and to require equal consideration and coordination of wildlife conservation with other water resources development programs. It also authorized the Secretary of Interior to provide public fishing areas and accept donations of lands and funds.

3.3 Erosion and Sediment Control

During construction activities involving ground disturbance, approved erosion and sediment control plans are required to capture sediment onsite, mitigate onsite soil erosion, and protect against downstream erosion by preventing increases in runoff from the construction area.

Measures to protect soils from erosion are implemented utilizing approved Erosion and Sediment Control Plans prepared in accordance with the "Maryland Standards and Specifications for Soil Erosion and Sediment Control." Control measures include: utilizing vegetation to stabilize sediment; reducing the amount of time and the area of a surface exposed to erosion; and utilizing appropriately sized sediment traps and sediment basins.

Additional protection of surface water quality from impacts associated with soil erosion are reported for highway construction projects in Maryland. Construction contractors are designated as co-permittees on the CWA Section 402 National Pollutant Discharge Elimination System (NPDES) permit. This permit is issued under Maryland's General Permit for construction activities, and implemented with a regular inspection program for construction site sediment control devices, and includes penalties for inadequate maintenance.

For permanent conditions after construction is completed, the Stormwater Management Act of 2007 and Manual by reference requires Environmental Site Design (ESD) to the maximum extent practicable, which entails better site design techniques, alternative surfaces, nonstructural techniques, and micro-scale practices.

3.4 Navigation

The United States Coast Guard (USCG) requires a permit for the construction of a new bridge or causeway, or reconstruction or modification of an existing bridge or causeway across navigable WUS. This authority is derived from the General Bridge Act of 1946, as amended, the Rivers and Harbors Act of 1899, as amended, and the Bridge Act of March 23, 1906, as amended, all of which require that the location and plans of bridges and causeways across navigable WUS be submitted to and approved by the Secretary of Homeland Security prior to construction. The purpose of the Bridge Permit is to preserve the public right of navigation and to prevent interference with interstate and foreign commerce.

The Middle Branch of the Patapsco River is considered a navigable WUS. There is currently a defunct railroad swing bridge crossing the Patapsco River, approximately 550 feet south of the Study Area, and the navigable channel passes on either side of this bridge. The existing I-95 piers are aligned to allow passage within the navigable channel. Likewise, the new piers for the I-95 Access Improvements would be positioned in order to maintain the existing navigable waterway channel from the swing bridge under the I-95 and I-395 bridges.

4 WATER RESOURCES AND AQUATIC ECOLOGY

This section identifies water resource and aquatic ecology characteristics within the NETR Study Area, discusses potential impacts from point and non-point sources, and explains how impacts would be mitigated. Under the CWA Section 303 and 402 NPDES Program, the EPA has implemented pollution control programs and set water quality standards for all contaminants in surface waters. The CWA mandates that states establish total maximum daily loads (TMDL) to bring existing water quality up to minimum established standards in streams categorized as "impaired." A TMDL is an estimate of the maximum amount of a pollutant a given waterbody can absorb without violating environmental water quality standards. The State of Maryland has established water quality standards for the protection of public health and welfare, simultaneously providing enhancement of water resources and protection of aquatic ecosystems.

4.1 Surface Water and Water Quality

Surface water resources and water quality have been identified using available published data sources, online sources, aerial photo-interpretation, and field investigations.

Maryland categorizes surface water bodies according to a Use Class, designating the goal of that water body (COMAR 26.08.02.08). Use Classes range from I (freshwater recreational), II (may or may not support saltwater fisheries), III (natural trout waters), and IV (recreational trout waters), and the designation of P indicates the water body is also a public drinking water supply. Although the water body may or may not qualify to meet the designated use, it should be attainable. Definitions of Use Classes are below in Table 4-1.

Table 4-1: Waterway Use Classes as Defined by MDE

	Use Classes							
Designated Uses	I	I-P	II	II-P	III	III-P	IV	IV-P
Growth and Propagation of fish (not trout), other aquatic life and wildlife	✓	✓	✓	✓	✓	✓	✓	✓
Water Contact Sports	✓	✓	✓	✓	✓	✓	✓	✓
Leisure activities involving direct contact with surface water	✓	✓	✓	✓	✓	✓	✓	✓
Fishing	✓	✓	✓	✓	✓	✓	✓	✓
Agricultural Water Supply	✓	✓	✓	✓	✓	✓	✓	✓
Industrial Water Supply	✓	✓	✓	✓	✓	✓	✓	✓
Propagation and Harvesting of Shellfish			✓	✓				
Seasonal Migratory Fish Spawning and Nursery Use			✓	✓				
Seasonal Shallow-Water Submerged Aquatic Vegetation Use			✓	✓				
Open-Water Fish and Shellfish Use			✓	✓				
Seasonal Deep-Water Fish and Shellfish Use			✓	✓				
Seasonal Deep-Channel Refuge Use			✓	✓				
Growth and Propagation of Trout					✓	✓		
Capable of Supporting Adult Trout for a Put and Take Fishery							✓	✓
Public Water Supply		✓		✓		✓		✓

Within the Study Area, both the Patapsco River and Gwynns Falls are Designated Use Class II, supportive of estuarine and marine aquatic life, shellfish, and submerged aquatic vegetation (see Table 4-1). The Designated Use Class requires that in-stream work be restricted between February 15 and June 15 each year to protect species of fish present in the Study Area.

4.1.1 Existing Conditions

Watersheds in the United States were delineated by the U.S. Geological Survey using a national standard hierarchical system based on surface hydrologic features and are classified into four hydrologic levels: first-field (region), second-field (sub-region), third-field (accounting unit), and fourth-field (cataloguing unit). The Study Area is located within two Maryland sub-basin watersheds, which are part of the larger Patapsco River Basin (021309). The two sub-basin watersheds are the Gwynns Falls Watershed (02130905) and the Baltimore Harbor Watershed (02130903). The watersheds are described below and portions surrounding the Study Area are shown on Figure 4: Surface Water. Both contributing watersheds are highly urbanized, with mainly residential and commercial areas, especially within Baltimore City. The northern portions of the Gwynns Falls Watershed include forested land and some crop use, which has led to increased amounts of sediment and nutrients. Table 4.2 summarizes the TMDLs within the Recommended Preferred Alternative's watersheds and streams.

Table 4.2: Status of the TMDLS within the Project Watershed and Streams

Watershed/Stream	Impairment	Status
Gwynns Falls	E. coli	Approved December 4, 2007
Gwynns Falls	TSS	Approved March 10, 2010
Gwynns Falls	Trash	Approved January 5, 2015
Baltimore Harbor	Nitrogen	Approved December 17, 2007
Baltimore Harbor	Phosphorus	Approved December 17, 2007
Baltimore Harbor	PCB	Approved October 1, 2012
Baltimore Harbor	Chlordane	Approved March 20, 2001
Patapsco River	Nitrogen	Approved December 29, 2010
Patapsco River	Phosphorus	Approved December 29, 2010
Patapsco River	TSS	Approved December 29, 2010
Middle Branch Portion of the Patapsco River	Trash	Approved January 5, 2015

Source: MDE Current Status of TMDL Development in Maryland.

Gwynns Falls (02130905)

The Gwynns Falls waterway enters the Study Area north of the intersection of Washington Boulevard (US 1 Alt) and Hollins Ferry Road, and continues east to the Middle Branch of the Patapsco River near downtown Baltimore. Gwynns Falls flows adjacent to the Study Area, and then crosses the Study Area near the intersection of South Monroe Street and Annapolis Road. At this crossing, the river spans approximately 130 feet. The river continues to flow adjacent to the Study Area until its confluence with the Middle Branch of the Patapsco River.

The Gwynns Falls Watershed is a 66-square-mile sub-watershed of the Patapsco River and consists of just over 40% impervious surface cover. Gwynns Falls was the first river designated for development of a collaborative watershed management plan in the City and County Watershed Agreement. The Gwynns Falls Water Quality Management Plan (WQMP) was prepared by the Baltimore City Department of Public Works and Baltimore County Department of Environmental Protection & Resource Management in October 2004 to identify non-point source stormwater pollution, determine methods to reduce non-point source pollution, evaluate the state of degradation, and provide a planning tool for capital restoration

projects. The WQMP divided the Gwynns Falls watershed into 11 sub-watersheds, and the Lower Gwynns Falls sub-watershed coincides with the Study Area. The WQMP found that the Lower Gwynns Falls sub-watershed had one of the highest nutrient loads of the 11 sub-watersheds designated in the study. These nutrients included total suspended solids (TSS), total Kjeldahl nitrogen (concentration of organic nitrogen and ammonia, abbreviated TKN), nitrate-nitrogen, and total phosphorus. The results of the study indicate a stream system that has been altered due to urbanization, is highly entrenched with unstable banks, but with a somewhat intact riparian buffer.

A Water Quality Analysis of Eutrophication for the Gwynns Falls Watershed in Baltimore City was submitted by MDE in 2009 and approved by the EPA in 2010. According to this analysis, a TMDL for nutrients is not necessary to achieve water quality standards in Gwynns Falls. The nutrient water quality analysis concludes that Gwynns Falls meets some water quality standards; however, there is insufficient data for all impairments to be assessed. A proposed TMDL for fecal bacteria for the non-tidal Gwynns Falls was submitted to the EPA in 2006 and approved in 2007. The United States Geological Survey (USGS) daily flow monitoring data was collected at four representative monitoring stations in Gwynns Falls for one year. Human fecal bacteria were found to be the predominant source category adversely impacting the water quality of the river. Gwynns Falls has also been identified on the EPA list of impaired waters because of suspended sediments and chlorides. There was insufficient data to assess polychlorinated biphenyls (PCBs) in fish tissue.

Baltimore Harbor (02130903)

The Baltimore Harbor and Middle Branch of the Patapsco River is part of the greater Patapsco River Watershed. The Baltimore Harbor Watershed covers approximately 210 square miles in southeast Baltimore City, eventually flowing into the Chesapeake Bay (see Figure 4: Surface Water). At the intersection of the Study Area, the Middle Branch of the Patapsco River is approximately 1,400 feet in width, low in gradient, shallow, and rocky, with scattered deep pools and sandy runs. The Patapsco River is considered a TNW.

The Study Area crosses the Middle Branch portion of the Patapsco River between Annapolis Road and South Hanover Street in Baltimore City. The Baltimore Harbor Watershed includes the industrial areas of Westport and Spring Garden, and both of Baltimore's major sports stadiums. Most of the drainage is from the Gwynns Falls Watershed.

The watershed is comprised of highly urbanized land uses, including tracts with heavy industrial activity. Few parcels of open space exist within the watershed. The Baltimore Harbor and its feeding streams are heavily polluted by sewage leaks, stormwater runoff, and trash. Waterfront communities consist of residential and commercial development, which historically supported heavy industry. Baltimore County completed a Watershed Management Plan for the County's portion of the Baltimore Harbor Watershed in October 2000. The goal of the plan is to provide methods to reduce the level of non-point source pollution, which would ultimately result in an improvement in surface water quality.

Baltimore Harbor was first identified on the state's 1996 list of water quality limited segments submitted to the EPA by MDE as impaired by nutrients. It was listed as impaired by nutrients due to signs of eutrophication, expressed high levels of chlorophyll, and low concentrations of dissolved oxygen. The Baltimore Harbor has also been identified on the EPA list of impaired waters because of bacteria including fecal coliforms; toxics including PCBs; metals including chromium, zinc, and lead; suspended sediments; and impacts to biological communities. TMDLs on the Patapsco River for nitrogen, phosphorus, and total suspended solids were approved on December 29, 2010.

Trash pollution is a significant aesthetic, environmental, and human health concern in the Middle Branch of the Patapsco River. The Middle Branch Patapsco Trash Management TMDL Plan provided an initial assessment of conditions in the Middle Branch and its upland drainage area (MDE, 2015). Table 4.3 summarizes the daily and annual baseline trash loads in the Middle Branch portion of the Patapsco River. The conclusion of the study stated that in order to restore a trash free Middle Branch, cooperation and participation would be required by citizens, government, and businesses. The study recommended 15 overall strategies, including: aggressive educational and public relations campaigns, bottle bill legislation, city funding incentives, enforcement of litter laws, increased coordination of trash clean-ups, hydrodynamic modeling of the Study Area, and watershed plans for target areas.

Table 4.3: Trash TMDLS for Middle Branch/Northwest Branch of Patapsco River

	Wasteload Allocation (lbs./yr. removed)	Load Allocation (lbs./yr. removed)	Margin of Safety (5%)	TMDL (lbs./yr. removed)
Daily Trash TMDLs for Baltimore Harbor Watershed	122.3	8.0	6.5	136.8
Annual Trash TMDLs for Baltimore Harbor Watershed	44,655.6	2,912.6	2,378.4	49,946.6
Daily Trash TMDLs for Gwynns Falls Watershed	474.1	58.3	26.6	559.00
Annual Trash TMDLS for Gwynns Falls Watershed	173,076.5	21,271.1	9,717.4	204,065.0

Source: MDE 2014.

4.1.2 Impacts

Construction of the bridge piers within wetlands or WUS would have a direct and permanent impact to these resources. Although no piers are anticipated to be placed within Gwynns Falls, up to 15 piers would be placed within the Patapsco River, permanently impacting approximately 14,918 square feet of waterway. However, the total area of impact may decrease if fewer piers are installed.

During facility use, major factors in determining concentrations of pollutants in highway stormwater runoff include the extent of impervious area and the volume of traffic. Construction of the I-95 Access Improvements would result in a permanent increase of impervious road surface and traffic volumes. The East-West Gateway Coordinating Council compiled a comprehensive list of the most common pollutants in highway runoff. These include:

> *"…heavy metals, inorganic salts, aromatic hydrocarbons, and suspended solids which accumulate on the road surface as a result of regular highway operation and maintenance activities. Winter time salting and sanding practices, for example may leave concentrations of chloride, sodium, and calcium on the roadway surface. Ordinary operations and the wear and tear of motor vehicles*

also result in oil, grease, rust, hydrocarbons, rubber particles, and other solid materials dropping onto the highway surface. These materials are often washed off the highway during rain or snow storm events."

Table 4.4 provides a summary of the typical pollutants identified in highway runoff and their associated sources.

Table 4.4: Typical Pollutants found in Roads and Highways

POLLUTANT	SOURCE
Particulates	Pavement wear, vehicles, the atmosphere and maintenance activities, snow/ice abrasiveness and sediment disturbance
Rubber	Tire wear
Asbestos	Clutch and brake lining wear (No mineral asbestos has been identified in runoff, however, some break-down products of asbestos have been measured)
Nitrogen & Phosphorus	Atmosphere, roadside fertilizer application and sediments
Lead	Tire wear, lubricating oil and grease, bearing wear and atmospheric fallout
Zinc	Tire wear, motor oil and grease
Iron	Auto body rust, steel highway structures such as bridges and guardrails and moving engine parts
Copper	Metal plating, bearing and bushing wear, moving engine parts, brake lining wear, fungicides and insecticides
Cadmium	Tire wear and insecticide application
Chromium	Metal plating, moving engine parts and brake lining wear
Nickel	Diesel fuel and gasoline, lubricating oil, metal plating, bushing wear, brake lining wear and asphalt paving
Manganese	Moving engine parts
Cyanide	Anti-caking compounds used to keep deicing salt granular
Sodium and Calcium	Deicing salts and grease
Chloride	Deicing salts
Sulphates	Roadway beds, fuel and deicing salts
Bromide	Exhaust
Petroleum	Spills, leaks, antifreeze and hydraulic fluids, asphalt surface leachate and blow-by motor lubricants
PCBs and Pesticides	Spraying of highway right-of-way, atmospheric deposition and PCB catalyst in synthetic tires
Pathogenic Bacteria	Soil litter, bird droppings and trucks hauling livestock/stockyard waste

U.S. Environmental Protection Agency. 1997. Guidance Specifying Management Measurements for Sources of Non-Point Pollution in Coastal Waters. Washington, D.C.
Federal Highway Administration. 1984. Sources and Mitigation of Highway Runoff Pollutants. Washington, D.C.

Some of the critical factors in determining the magnitude of highway runoff on a receiving stream include watershed size, the type of receiving stream, the potential for dilution, and the receiving stream's ecology and biodiversity. Through an increase in the amount of impervious area, stormwater volumes and peak discharge intensities may occur. The result of these stormwater volume increases can be excessive stream bank erosion resulting in greater loads of sediment and other pollutants into the stream. These secondary water quality impacts may exceed the direct impact of highway pollutant runoff. In addition, particulates suspended in runoff may contain insoluble heavy metals. These substances are then transported to receiving waters where they can become a threat to aquatic life. Additionally, an increase in impervious

surface within an area with a high per capita rate of inlet clogging may have the potential to further expand the clogging problem.

During construction, temporary impacts from sedimentation and chemical spills may occur from land disturbing activities. Standard ESC, Stormwater Pollution Prevention Plans (SWPPP), and industry practices including washout areas for concrete trucks would avoid or minimize potential impacts during construction. Fuel and hydraulic spills from construction equipment could also temporarily affect water quality and other aquatic resources if standard best management practices were to experience a failure.

4.1.3 Mitigation

Highway runoff is considered a non-point source pollutant and can be managed effectively by employing proper stormwater best management practices (BMPs). These practices provide means of avoiding or minimizing the negative impacts of various pollutants that can be carried by rainfall into the groundwater and receiving waters. Design and construction techniques that reduce water quality impacts and protect aquatic species, as described in the Maryland Stormwater Management (SWM) and Erosion & Sediment Control Guidelines for State and Federal Projects (MDE, 2015) and the 2000 Maryland Stormwater Design Manual (MDE, 2009), would be followed for all roadway and associated stormwater facilities. Potential techniques include stabilization of slopes, channels, swales, and embankments after construction activities are completed; minimization of excavation; and installation of turbidity barriers and silt fences around the areas of construction.

Due to the highly-developed nature of the watersheds that contribute to surface waters within the Study Area and the proposed SWM facilities that would be required as part of the Recommended Preferred Alternative, the likelihood of the I-95 Access Improvements having a measurable effect on water quality is negligible. Increases in nutrient levels from the implementation of a Recommended Preferred Alternative are unlikely to affect TMDL management. Similarly, while the I-95 Access Improvements project is not listed in the Baltimore City Trash TMDL Implementation Plan for specific mitigation measures, the road surface and inlets would be maintained as part of the Stop Gap measures, including street sweeping and preventative inlet cleaning. Other techniques include infiltration galleries, and SWM ponds and retrofits to address stormwater on site.

4.2 Groundwater

Code of Maryland Regulations (COMAR 26.17.06.02) officially recognizes that the availability of adequate water supplies is essential to health, safety, and economic welfare. MDE implements regulatory and planning programs to reduce the input of pollutants to ground waters of the State. Groundwater, pumped from aquifers, is used for many purposes, including industrial use, drinking water, domestic activities, and irrigation. The USGS defines an aquifer as “a geologic formation that can store and transmit water to wells, springs, and some streams.”

4.2.1 Existing Conditions

The Study Area is within the Patuxent aquifer system of the Coastal Plain Physiographic Province. The Patuxent aquifer system consists of sandy portions of the Lower Cretaceous-age Patuxent Formation. The system is composed of medium to coarse-grained, feldspathic and quartzose sands, and gravels interbedded with layers of clay. The top of the aquifer system ranges from approximately 170 feet above sea level near its outcrop to 4,200 feet below sea level. According to the Maryland Geological Society, the total thickness of the Patuxent aquifer system ranges from 125 feet in southern Maryland to 525 feet in

the upper eastern shore of Maryland (MGS, 2016). The aquifer is overlain by low permeability clay layers that likely prevent surface contaminants from reaching the aquifer.

Drinking water within the Study Area is supplied from the Montebello Filtration Plants, using groundwater from the Loch Raven Reservoir or the Susquehanna River. Both watersheds for these water bodies are outside of the Study Area.

4.2.2 Impacts

Aquifers may be susceptible to contamination depending on drainage patterns, depth, and distance from the alignment. Since the Patuxent aquifer is 125 to 525 feet below the surface, and overlain by clay layers, the likelihood of contamination from the Recommended Preferred Alternative is negligible.

4.2.3 Mitigation

To mitigate for potential groundwater contamination, construction of the Recommended Preferred Alternative would adhere to an approved SWM plan; this plan would address proper slope and soil stabilization techniques for all stages of construction, which would limit the flow of water and the potential transfer of contaminants. SWM BMPs would be installed to contain and treat runoff from the bridge and associated infrastructure.

4.3 Floodplain and Floodway

EO 11988, Floodplain Management, requires avoidance of effects associated with the modification of and development in floodplains when practicable alternatives exists. Floodplains are regulated at the state and local levels and any construction in the floodplain would require a Waterway Construction Permit from MDE and authorization from the Baltimore Floodplain Management Program. The U.S. DOT Order 5650.2, entitled *Floodplain Management and Protection*, contains policies and procedures for ensuring that proper consideration is given to the avoidance and mitigation of adverse floodplain impacts. Development in floodplains may reduce flood storage capacity and places development in the floodplain and downstream properties at risk.

According to Article 7, Subtitle 2 of the Baltimore City Code, the regulatory floodplain for the City is the area inundated by flood waters during a rain event that has a 0.2-percent chance of occurring in any given year, commonly referred to as the “500-year flood event”. The 100-year floodplain is a subset of the 500-year floodplain, and is the area inundated by flood waters during a rain event that has a one-percent chance of occurring in any given year. A floodway, another subset of the 500-year floodplain, is that portion of the floodplain which is effective at carrying flow, and where the flood hazard is generally highest.

Article 7, Subtitle 3-12 of the Baltimore City Code limits the amount of fill within a floodplain to no more than 600 cubic yards. The Article requires that alternative forms of raising a structure be considered, and that the applicant must demonstrate that fill is the only alternative to raising the structure to an elevation above flood level, and that the amount of fill will not affect flooding on nearby properties.

4.3.1 Existing Conditions

The Study Area is located on multiple Flood Insurance Rate Map (FIRM) panels including 2400870024F (effective April 2, 2014), 2400870025F (effective April 2, 2014), and 2400870026F (effective April 2, 2014). According to the FIRMs, approximately 3,300 linear feet of the Study Area is located within Flood Zone AE, an area within the 100-year floodplain, and approximately 1,500 linear feet of the Study Area located

within the floodway of the Middle Branch of the Patapsco River. (see Figure 5: Floodplain and Floodway). Likewise, approximately 7,876 linear feet of the Study Area is located within the 500-year floodplain.

4.3.2 Impacts

Permanent floodplain impacts associated with the Recommended Preferred Alternative would result from placing approximately 37 piers (0.64 acres) within the 500-year floodplain, 35 (0.62 acres) of which would also be within the 100-year floodplain. Pier installation would require drilling, boring, and driving a foundation piling. Three of the piers would be placed within the Gwynns Falls floodway.

Temporary floodplain impacts would result from excavation within the floodplain required for the construction of the Recommended Preferred Alternative (Table 4.5). Additionally, the Recommended Preferred Alternative would require the placement of an unknown quantity of fill material in the floodplain, and may require temporary occupancy of equipment during construction. The temporary construction impacts within the 500-year floodplain would be 26 acres, of which 20.2 acres are also within the 100-year floodplain. Fill would be placed within the floodplain along I-95 northbound between the Caton Avenue on ramp and the Russell Street off ramp. Both the fill and permanent piers have the potential to increase base flood levels, but the level of increase at this time cannot be determined until a detailed hydrologic and hydraulic study has been conducted.

Table 4.5: Floodplain and Floodway Impacts

Impact Type	100-Year Floodplain (includes Floodway)		500-Year Floodplain (includes Floodway)		Floodway	
	# of Piers	Acres	# of Piers	Acres	# of Piers	Acres
Operation (Permanent)	35	0.62	37	0.64	3	0.07
Construction (Temporary)	35	20.2	37	26	3	2.9

4.3.3 Mitigation

Roadway design would focus on avoiding and minimizing floodplain encroachment to ensure that the design is consistent with 23 CFR Part 650, Subpart A and any other state or local requirements. However, final location and number of piers would be determined by engineering constraints and channel navigability. MDTA will prepare a detailed hydrologic and hydraulic study for the Recommended Preferred Alternative during final design to identify the existing 100-year storm discharge and floodplain. SWM and hydraulic structures will be designed to accommodate the 500-year flood.

Up to three piers may be placed within the Gwynns Falls floodway. Development in a floodway will require preparation of a hydrologic and hydraulic analysis, and coordination with the state and local floodplain managers. If it is determined that the piers or other floodplain occupancy associated with the project may potentially increase flood elevations or velocities upstream or downstream, additional coordination with the Floodplain Manager and permitting may be required.

Up to 85,000 cubic yards of fill is to be placed within the Study Area, with approximately 6,000 cubic yards to be placed within the floodplain. Fill amounts greater than 600 cubic yards in the floodplain will require

a variance from the City of Baltimore. MDTA may be required to demonstrate the that fill is the only option to raise the structure and that the fill will not affect neighboring properties. A hydrologic and hydraulic analysis may be required to demonstrate the anticipated effects of the proposed fill.

Generally, equipment and/or materials would be staged and stored outside the floodplain, minimizing the chance for flood-related impacts.

4.4 WUS and Other Wetlands

Impacts to WUS and wetlands may result from the Recommended Preferred Alternative (see Section 2: Regulatory Context for detailed regulations). A review of published information was conducted to identify wetlands and waterways within the Study Area. GIS data from the National Wetland Inventory was obtained to identify wetlands and waterways within the Study Area (NWI; USFWS, 2016). A field investigation was conducted to confirm the published information and to document the presence of jurisdictional wetlands and waters within the Study Area.

Wetland delineation field investigations within the Study Area were conducted in August and November of 2016. All fieldwork was performed according to the *1987 Corps Wetland Delineation Manual* (Environmental Laboratory, 1987) and the *Atlantic & Gulf Coast Regional Supplement* (USACE, 2010). The manual outlines a three-parameter approach to delineating wetlands that includes hydrophytic vegetation, hydric soils, and hydrology. Data was collected for each delineated system to determine the jurisdictional resource boundary. WUS were identified by the limits of the ordinary high water mark while delineated wetlands consisted of those areas meeting the three parameter criteria. Wetlands were classified into a system, subsystem, and class, according to the Cowardin Classification of Wetlands and Deep Water Habitats of the United States (Cowardin et al, 1979). The Cowardin Classification consists of a series of letter and number codes that correspond to the classification nomenclature that best describes the system and habitat. For example, a forested wetland with a broad-leaved deciduous habitat would be assigned an alpha-numeric designation of PFO1.

In cases where one or more wetland parameter was significantly disturbed by unauthorized human activity, a determination of whether the disturbed parameter(s) existed prior to the disturbance was made based on other evidence. In such cases, the conditions that previously characterized the site are considered to be present.

Wetland functions and values are determined using the USACE Method as presented in *The Highway Methodology Workbook Supplement - Wetland Functions and Values; A Descriptive Approach* (USACE, 1999). This method provides a framework for assessment that relies on the presence of certain physical characteristics broadly understood to indicate the presence of related functions, along with the best professional judgment of an experienced wetland scientist. Functions of the wetlands depend on their physical, geographic, and environmental characteristics. Influencing factors can include size and proximity of wetlands to ongoing development activity, geologic setting, soil characteristics, presence and duration of hydrology, landscape position, vegetation cover type, and dominant ecological community type.

4.4.1 Existing Conditions

Field investigations were conducted within the Study Area between August 3 and August 11, 2016, and again on November 11, 2016. Of the multiple systems identified, two waterways and one wetland are located within the Study Area. The location of each delineated resource is presented on Figure 6: Wetlands and Waterways, Sheets 1-7. The delineated systems, as described below, ultimately convey flow to the Patapsco River Basin. At the time of the site visit, all waterways were flowing. All the delineated systems

have a significant nexus to a TNW (Patapsco River) and would likely would be regulated. However, the USACE and MDE would make the final determination concerning the jurisdictional status of delineated features. Wetland data forms are included in Appendix B, and photos can be found in Appendix C.

Waterway WL001 (Gwynns Falls)

Waterway WL001 (Gwynns Falls) is a perennial waterway that conveys flow east to the Patapsco River. The waterway parallels I-95 eastbound on the south side of the Study Area, and then turns north to cross under South Monroe Street and I-95. Waterway WL001 measures approximately 117 linear feet and is approximately 130 feet wide within the Study Area boundary, with a bed composed of mainly cobble and gravel. The NWI Map for the City of Baltimore, Maryland (USFWS, 2016) identified Waterway WL001 as riverine, tidal, unconsolidated bottom, permanently flooded – tidal (R1UBV) westward from the I-95 overpass; and as estuarine, subtidal, unconsolidated bottom, subtidal (E1UBL) from the I-95 overpass east to its outlet at the Patapsco River. The waterway is also identified on the *Soil Survey of the City of Baltimore, Maryland* (USDA-NRCS, 2017).

Wetland WP003

Wetland WP003 is a tidally-influenced palustrine emergent (PEM) wetland that abuts the west bank of the Patapsco River, south of the I-95 and I-395 intersection. Data were collected from Sample Plot WP003-WET to characterize the wetland; however, an upland sample plot was not collected due to the steepness of the surrounding terrain.

Vegetation within WP003-WET is dominated by common reed (*Phragmites australis*). Hydrologic indicators include surface water, high water table, saturation, sediment deposits, drift deposits, water stained leaves, and hydrogen sulfide odor. The soils in this area meet the hydric soil indicator F3: Depleted Matrix.

On the NWI Map for the City of Baltimore, Maryland (USFWS, 2017), Wetland WP003 is identified as part of an estuarine, intertidal, emergent, persistent, irregularly flooded (E2EM1P) waterway. The wetland is not identified on Soil Survey of the City of Baltimore, Maryland (USDA-NRCS, 2017).

Waterway WL004 (Patapsco River)

Waterway WL004 is the Patapsco River, a perennial waterway that measures approximately 748 linear feet within the Study Area. Waterway WL004 is located in the central portion of the Study Area, entering just north of I-95 and continuing south, ultimately flowing to the Chesapeake Bay. The river is approximately 1,600 feet wide at the I-95 bridge crossing. On the NWI Map for Baltimore City, Maryland (USFWS, 2017), Waterway WL004 is identified as estuarine, subtidal, unconsolidated bottom, subtidal (E1UBL). The waterway is also identified on the *Soil Survey of the City of Baltimore, Maryland* (USDA-NRCS, 2017).

4.4.2 Impacts

The potential impacts associated with the Recommended Preferred Alternative on wetlands and waterways within the Study Area are summarized in Table 4.6 and described below.

Table 4.6: Wetland and Waterway Impacts

System	Temporary Impacts (acres)	Permanent Impacts (acres)
WL001 (Gwynns Falls)	0.27	0
WP003	0.17	0.02
WP003 Buffer	0.05	0.01
WL004 (Patapsco River)	5.63	0.34

Waterway WL001 (Gwynns Falls)

The Recommended Preferred Alternative would result in no permanent impacts to Waterway WL001 (Gwynns Falls). Any support structures for the proposed I-95 bridge over the Gwynns Falls would be installed on either side of the waterway, and no grading or fill would occur within the waterway. However, temporary impacts may occur during construction. The surface area of the Recommended Preferred Alternative bridging the waterway would be approximately 0.27 acres. The proposed bridge over Gwynns Falls would be constructed approximately 50 to 100 feet above the water surface. At that height, the roadway would still allow sunlight to reach much of the water's surface, resulting in minimal disturbance to the existing habitat within the channel.

Wetland WP003

One pier may be placed within either Wetland WP003 or its buffer, resulting in 230 square feet of permanent impacts. Temporary, construction impacts would be associated with erecting the bridge and roadway from the overhead superstructure. Also, the placement of the pier would require temporary construction impacts around the pier footer and along access paths needed to construct the pier. Impacts could include grading or temporary matting to prevent permanent damage to the wetland and buffer. The surface area of the Recommended Preferred Alternative bridging over the wetland would be approximately 0.17 acres and approximately 0.05 acres over the wetland buffer.

Waterway WL004 (Patapsco River)

The Recommended Preferred Alternative would result in approximately 15 piers to support the overhead roadway, which would result in up to 0.34 acres of permanent impacts to WL004. Additionally, there would be roughly 5.6 acres of temporary impacts that would occur during construction. Impacts could occur from the use of floating barges for equipment and material transport; use of a water jet to release the barge should it become lodged in the streambed; and the construction of cofferdams that would likely be removed after construction, but may be retained permanently.

4.4.3 Mitigation

A JPA authorization would be required before construction commences in any regulated wetland or waterway. Additionally, any boring activity to conduct geological, hazardous materials, or other exploratory drilling within the waterways, wetlands, buffer, or floodplain would require a separate JPA authorization in advance of the authorization associated with the Recommended Preferred Alternative. Throughout the design and permitting process, alternative construction and design measures would be investigated to avoid and minimize potential impacts to waterways, wetlands, and buffers.

Unavoidable impacts to waters or wetlands that cannot be minimized using practicable measures require mitigation through the purchase of mitigation banking credits, payment of ILF, or on-site and in-kind mitigation by the permittee. The determination of mitigation measures for waterway impacts by federal

and state regulatory agencies typically considers the size, stream order, and location. The compensatory mitigation package would be designed to comply with the Federal Compensatory Mitigation Rule (33 CFR Part 325 and 40 CFR Part 230), as well as stipulations from federal and state resource agencies. Compensatory mitigation would be required for permanent impacts to streams and wetlands resulting from the implementation of the Recommended Preferred Alternative. Compensatory mitigation is typically required in the same or adjacent watershed and physiographic province as the impact. MDTA would coordinate with the regulatory agencies to develop a project-wide compensatory mitigation strategy to offset unavoidable impacts to WUS.

Mitigation ratios vary depending on type of resource impacted and proposed mitigation. The preferred method for determining a mitigation site is to use a watershed approach to establish/create, enhance, and/or preserve aquatic resource functions. The preferred hierarchy, as stated in the EPA and USACE Mitigation Rule, for the forms and location of compensatory mitigation is as follows:

- Mitigation bank credits from an approved mitigation bank
- ILF program credits from an approved ILF program
- Mitigation under a watershed approach
- Mitigation through on-site and in-kind mitigation
- Mitigation through off-site and/or out-of-kind mitigation

4.5 Aquatic Species

Aquatic wildlife refers to fish species and associated habitat, benthic communities, waterfowl, and other water-dependent migratory birds. Fish species include mollusks, crustaceans, and other aquatic animals. Associated habitat refers to areas permanently or intermittently covered by water and/or submerged aquatic vegetation (SAV). The benthic community refers to macroinvertebrate organisms found on the bottom of a water body; waterfowl refers to duck, geese, and swan populations; and water-dependent migratory birds consist of species which rely on water bodies for food or habitat.

MDE water quality research and information from DNR biological surveys was reviewed to determine the types of aquatic species present within the Study Area. Additionally, correspondence was initiated with Maryland Department of Natural Resources – Wildlife Heritage Service (DNR-WHS), DNR – Environmental Review Unit (DNR-ERU), USFWS, and NMFS.

4.5.1 Existing Conditions

The *Watershed Report for Biological Impairment of the Gwynns Falls Watershed* suggests that degradation of the biological communities of Gwynns Falls is due in large part to urban land use and the associated impacts of altered hydrology, elevated ammonia levels, chlorides, and conductivity (MDE, 2012). The report also suggests that the biological communities of Gwynns Falls are likely degraded by flow and sediment related stressors and the anthropogenic channelization of streams.

The *Watershed Report for Biological Impairment of the Baltimore Harbor Watershed* suggests that degradation of the biological communities of the Middle Branch of the Patapsco River is due in large part to urbanization of the watershed. The report cites high chloride and sulfate levels from urban runoff, increased total suspended solids and channel erosion from increased urban runoff, stream channelization, and loss of riparian buffer zones as the main causes of degradation to biological communities (MDE, 2014).

Fish Species, Benthic Communities, and Associated Habitat

According to DNR, common benthic invertebrates in Maryland waterways include mayflies, stoneflies, caddisflies, craneflies, damselflies, dragonflies, riffle beetles, crayfish, scud, black flies, non-biting midges, aquatic worms, ramshorn snails, and pouch snails. The Gwynns Falls Watershed report states that approximately 79 percent of stream miles in the Gwynns Falls Watershed have a Benthic Index of Biotic Integrity (BIBI) and Fish Index of Biotic Integrity (FIBI) in the poor to very poor categories (MDE, 2012). In 2016, four sampled sites on Gwynns Falls averaged a BIBI score of 2.67, which is categorized as poor (DNR, 2016). In 2014, MDE noted that eight sites sampled on the Patapsco River averaged a BIBI score of 3.0, which is categorized as fair.

Based on information provided by DNR (see Appendix D; Byrne, 2016) and USFWS (2016; see Appendix D), no state or federally listed RTE species, critical habitats, refuges or fish hatcheries are known to occur within the project vicinity. According to a letter dated January 13, 2017 from DNR-ERU, anadromous fish species, including herring, white perch, and yellow perch, are documented to spawn and migrate in the vicinity of the Study Area (see Appendix D). These fish may migrate toward riverine habitat near the mouths of Gwynns Falls and the Patapsco River, or areas upstream. There are also various resident and transient fish species. Based on correspondence from DNR-ERU (Golden, 2017; see Appendix D) SAV have not been documented in the area for over ten years. The tidal waters of the Patapsco River and Gwynns Falls are designated as Use II waters. Nontidal tributaries in the surrounding area are designated as Use I waters.

A search of the online NOAA Essential Fish Habitat (EFH) Data Query Tool indicated that habitat is available for the window pane flounder, summer flounder, and bluefish. In correspondence from NOAA, dated April 20 and May 3, 2017, it was confirmed that this habitat is not preferred by these species, but consideration should be given to the prey species.

Correspondence from NOAA, dated April 21, 2017, indicated that Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and Shortnose sturgeon (*Acipenser brevirostrum*) were listed as species that may be present in the Study Area. Due to the potential occurrence of these sturgeon, consultation pursuant to Section 7 of the ESA may be required (see **Section 5.4 : Rare, Threatened, and Endangered Species**).

Waterfowl and Other Water-Dependent Migratory Birds

According to USFWS, around one million swans, geese, and ducks winter in the Chesapeake Bay region. This represents approximately one-third of all wintering waterfowl along the Atlantic coast. During spring and fall migrations along the Atlantic Flyway, the Chesapeake Bay is an interim stop for migratory songbirds, shorebirds, and raptors. The Bay also provides an important spring breeding location (USFWS, 2016). A list of common waterfowl and other water-dependent migratory birds found in the Baltimore area is provided in Table 4.7 below. The Habitat Protection Area (HPA) on Figure 7 is listed as a Waterfowl Staging Area.

Table 4.7: Common Waterfowl and Other Water-Dependent Migratory Birds in Baltimore, Maryland

Common Name	Scientific Name
Canada Goose	*Branta canadensis*
American Black Duck	*Anas rubripes*
Lesser Scaup	*Aythya affinis*
Common Goldeneye	*Bucephala clangula*
Pied-billed Grebe	*Podilymbus podiceps*
Great Blue Heron	*Ardea herodias*
American Coot	*Fulica americana*
Spotted Sandpiper	*Actitis macularius*
Bonaparte's Gull	*Chroicocephalus philadelphia*
Great Black-backed Gull	*Larus marinus*
Forster's Tern	*Sterna hirundo*
Mallard	*Anas platyrhynchos*
Ring-neck Duck	*Aythya collaris*
Bufflehead	*Bucephala albeola*
Ruddy Duck	*Oxyura jamaicensis*
Double-breasted Cormorant	*Phalacrocorax auritus*
Osprey	*Pandion haliaetus*
Killdeer	*Charadrius vociferus*
Solitary Sandpiper	*Tringa solitaria*
Herring Gull	*Larus argentatus*
Caspian Tern	*Hydroprogne caspia*

Source: Baltimore Bird Club (2016), Cornell University (2015)

4.5.2 Impacts

Because the Study Area is located within an already highly-urbanized area, the Recommended Preferred Alternative is anticipated to have few impacts on aquatic wildlife and associated habitat during construction or operation of the Recommended Preferred Alternative. While there may be a temporary increase in barge boat traffic and audible above-ground and below-ground disturbances during construction, the effect of noise levels on the aquatic community after construction would likely remain similar to existing conditions. Details on specific aquatic communities are discussed below.

Fish Species, Benthic Communities, and Associated Habitat

Fish species, benthic communities, and associated habitat would be impacted due to the construction of the Recommended Preferred Alternative. The Recommended Preferred Alternative requires a roadway to be constructed over a waterway or wetland and piers to be installed throughout the waterway. A temporary increase in erosion and sediment within the waterbody is also anticipated. Per MDE's 2012 report, impacts associated with erosion and sedimentation include smothering of benthic communities, reduced survival rate of fish eggs, and reduced habitat quality from embedding of the stream bottom. These processes cause an unstable stream ecosystem, impacting habitat, structure, and abundance of these organisms.

Up to 15 piers would be installed in the Patapsco waterway, resulting in up to 0.34 acres square feet of permanent waterway impacts. Noise from drilling and pile driving would cause audible disturbances above and below the surface of the water, potentially leading to behavioral and psychological effects on fish species. These effects range from avoidance of a foraging area or migration route to death. Localized changes to the topography and composition of the bed of the waterbody may also occur due to the installation of piers, which could have localized impacts on habitat.

Construction would also lead to additional boat traffic within the vicinity of the Study Area, resulting in surface disturbances, additional noise, and potential water pollution from traveling vessels. Hazardous materials could be present in the soil that may be disturbed during construction activities and mobilized hazardous materials could potentially enter the water column. Both the Atlantic and shortnose sturgeon may be affected by the construction of the Recommended Preferred Alternative because they may be present in the maintained deep-water shipping channels. Foraging areas of benthic invertebrates or shellfish would be impacted, but the affected area constitutes a very small portion of available foraging areas.

Waterfowl and Other Water-Dependent Migratory Birds

The Recommended Preferred Alternative would result in 11.1 acres of permanent, long-term impacts to Habitat Protection Areas. This would reduce the area available for bird nesting and breeding. Fewer bird species are anticipated to stay near the LOD due to activities associated with construction and long-term operation of the Recommended Preferred Alternative. Migratory birds are likely to avoid the area until disruptive activity subsides.

Because of the existing structures, the shading impacts on waterfowl associated with proposed piers and bridge decks are anticipated to be negligible. Flight patterns are unlikely to be altered as the proposed bridge structures are adjacent the existing roadway. Noise aboveground and below the water's surface may cause audible temporary disturbances during construction.

4.5.3 Mitigation

During construction of the Recommended Preferred Alternative, applicable BMPs would be employed to minimize impacts to aquatic habitats and associated wildlife. In addition to adhering to all guidelines for the Critical Area (Section 5.7), an Erosion and Sediment Control (ESC) Plan would be developed for the I-95 Access Improvements project, as clearing and grading would disturb more than 5,000 feet of land area. MDE has the authority to establish requirements and approve the ESC Plan. This project qualifies as a combination of new development and redevelopment, which determines the level of applicable SWM requirements. The ESC plan would address the potential contamination from construction runoff, including concrete washout. More details about the ESC Plan can be found in Section 6.1, Physiographic Resources. A Hazardous Spill Prevention Plan would also be developed in addition to a Phase I Environmental Site Assessment to prevent hazardous materials, including equipment fuel and lubricants, from contaminating waterways and associated aquatic habitats.

Construction would adhere to the required MDE and USACE time-of-year restrictions. To protect species of fish present in the Study Area, in-stream work is restricted between February 15 and June 15 each year in Use II streams. Should SAV be documented in the future, additional in-stream restrictions during the SAV growing season would be applicable. Work would also be prohibited within 500 yards of the proposed in-stream construction within tidal waters. For Use II waters, an analysis would be performed to determine whether construction activities would increase suspended sediments within the water column. As mentioned above, proactive sediment and erosion control measures would be implemented to guard aquatic habitat and the health of fish species. Other protection measures include avoidance of pH spikes from the curing of concrete materials and BMPs for pile driving and other activities that could cause in increased noise and vibration levels.

As the project design develops, additional BMP measures will be incorporated as necessary to reduce impacts to aquatic species, including the listed Atlantic and shortnose sturgeon. An example would be to

place new piers outside of the deep-water shipping channels in order to maintain deep water sturgeon habitat. To minimize underwater noise levels during drilling or pile driving, NMFS recommends the use of cushion blocks, bubble curtain, and other noise attenuating tools. The amount of barge traffic for hauling equipment and materials, as well as the speed at which the vessels travel, would be restricted to reduce the possibility of collision incidents while reducing the intensity of ecological disturbances.

Direct impacts to aquatic wildlife could be avoided or minimized through project design considerations, including bridging, countersinking of culverts, and minimizing the bridge footprint. Shading from the additional roadway could be addressed by constructing at a similar height to the current roadway, allowing sunlight to reach under the corridor. To protect migratory birds and maintain compliance with the Migratory Bird Treaty Act of 1918, trees and nesting sites would not be disturbed during the recognized breeding period.

4.6 Wild and Scenic Rivers

A Scenic River is a free-flowing river, with shorelines or watersheds still largely primitive and undeveloped. A Wild River is a free-flowing river whose shoreline and adjacent areas are undeveloped, inaccessible except by trail, or predominantly primitive in a natural state for a least four miles of the river length. There are no federally-designated wild and scenic rivers in Maryland, and no state-designated wild and scenic rivers in the Study Area. Therefore, there would be no impacts to state or federal wild and scenic rivers.

4.7 Chesapeake and Atlantic Coastal Bays Critical Area

The Critical Area is an area of land within 1,000 feet of Maryland's mean high tidal waters and is associated with the tidal waters of the Chesapeake Bay and Atlantic Coastal Bays, their tidal tributaries, and lands underneath these tidal areas. The Critical Area Buffer is the area of at least 100 feet located directly adjacent to tidal waters, tidal wetlands, and tidally-influenced tributary streams, and is extended when intersecting sensitive resources are present (e.g. hydric or highly erodible soils, non-tidal wetlands, and steep slopes) (Critical Area Commission, 2016). HPAs are additional areas within the Critical Area that mandate increased protection for important plant, fish, wildlife species, and their habitat. There are ten types of HPAs, including colonial waterbird nesting sites, historical waterfowl staging areas, and anadromous fish propagation waters.

In Maryland, the Critical Area Law protects waterfowl, fish, and other aquatic biota, habitat near waterways, and water quality; sets limits for development and construction; and establishes a minimum 100-foot vegetated buffer. COMAR 27.02.05 provides the complete listing of stipulations for activities within the Critical Area. Land within the Critical Area is divided into three separate classifications: Intensely Developed Areas (IDA), Limited Development Areas (LDA), and Resource Conservation Areas (RCA). These classifications are based on predominant land use and intensity of development (Critical Area Commission, 2016). Baltimore City provides additional IDA subclasses of Waterfront Industrial Area and Waterfront Revitalization Area. IDA areas are also subject to additional SWM pollutant reduction requirements.

Development activities within the Critical Area's protected resources are authorized only if there is no feasible alternative and development must be constructed to prevent increases in flood frequency and severity. Development activities must also retain tree canopy, maintain stream water temperatures within normal variation, and provide a natural substrate for affected streambeds.

State agencies proposing development in the Critical Area on state-owned lands must seek review by and obtain approval from the Critical Area Commission (CAC) per COMAR 27.02.05. While MDTA has a

Memorandum of Understanding (MOU) to allow for minor development projects, impacts from the Recommended Preferred Alternative do not qualify under this MOU. The submittal process involves several steps including: (1) correspondence and consultation with CAC staff to develop and complete the application package; (2) presentation of the project at a CAC meeting; and (3) advertisement of project details in accordance with COMAR 27.03.01.03 at least two weeks (14 days) in advance of the scheduled CAC meeting.

Project coordination with the CAC should occur as early as practicable regarding COMAR 27.02.05, in order to address how requirements would affect the Recommended Preferred Alternative and factors related to climate resiliency (e.g., extreme weather events and sea level rise). Relevant information for the CAC at this stage of engagement include preliminary project plans, proposal details, and COMAR 27.02.05 requirements. It is the CAC's role to provide feedback and guidance, along with details on mitigation stipulations.

COMAR 27.03.01.03 requires public notification in accordance with Notice Requirements for state agency and local agency development, prior to the scheduled CAC meeting. Public notice must be published in a newspaper of general circulation near the study area; and an allowance of fourteen days must be provided for public comment in the local jurisdiction. Affected land must also be posted in concurrence with requirements set forth in COMAR 27.03.01.03 D. A complete submittal package would include the completed checklist and related documentation, figures of the area and site plans, and evidence to show public notice compliance (i.e., a copy of the newspaper ad, comments received, and photograph of posting of affected property). The checklist include requirements for general project information, mapping features, mitigation planting plans, and recommendations from state and federal agencies. To complete the checklist, a site visit from the CAC must occur. Documentation must also be provided with the application to demonstrate compliance with the 10 percent pollutant reduction rule (i.e., a copy of the CAC's Stormwater Spreadsheet and SWM plans). Other applicable documentation may also be requested, including Buffer Management Plans, Forest Mitigation planting plans, and Planting Agreement Forms, approval from MDE for ESC and SWM practices, and tidal and nontidal wetland authorizations, and correspondence with the DNR and Maryland Historic Trust (MHT).

To protect the Critical Area Buffer, the CAC established Buffer Regulations in COMAR 27.01.09.01, which set forth standards and procedures for sensitive ecological zones. These regulations aim to limit impacts to water quality and improve habitat. Buffer planting would be specified within an approved Buffer Management Plan, unless the local government collects an ILF in place of mitigation.

4.7.1 Existing Conditions

The Critical Area is shown on Figure 7: Critical Area. The Critical Area extends nearly the entire length of the Study Area along Gwynns Falls and the Middle Branch of the Patapsco River. Only the area along East McComas Street, between South Hanover Street and East Cromwell Street, is not within the Critical Area. The HPA extends along Gwynns Falls and includes the Middle Branch of the Patapsco River at the bridge crossing. There is no HPA within the eastern portion of the Study Area.

4.7.2 Impacts

There would be both temporary and permanent impacts due to infill, vegetation removal, and pier placement. Figure 7 identifies the anticipated location of impacts to Critical Areas identified as the RCAs and IDAs associated with the Gwynns Falls and the Middle Branch of the Patapsco River. The anticipated impacts quantified within the 1,000-foot Critical Area buffers provided are in addition to the anticipated impacts quantified within the 100-foot Critical Area buffers. Figure 7 also identifies impacts to the HPA,

which is a subset of the Critical Area that includes the 100-foot Critical Area buffers and the Middle Branch of the Patapsco River. The Recommended Preferred Alternative would temporarily impact approximately 44 acres of Critical Area, of which 4.7 acres are within the 100-foot buffer. Vegetation removal in the Critical area would comprise 8.7 acres of the temporary impacts due to construction activities, and vegetation would be restored according to mitigation standards. Varying portions of 40 piers would be permanently placed within the Critical Area, of which 7 piers are within the 100-foot buffer. The area of the 40 piers would be nearly 24,000 square feet.

Authorization from the City of Baltimore, CAC, MDE, USACE, and DNR must be received prior to initiating any construction activities within the Critical Area. Up to 15 piers would be placed in the Middle Branch to accommodate construction equipment and workers. New piers would be aligned with existing I-95 piers to the north and the swing bridge piers to the south, therefore they would be spaced to span the existing navigable waterway channel and positioned to maintain the existing navigable waterway channel.

The I-95 Access Improvement project necessitates a Major Buffer Management Plan because the area of buffer establishment and mitigation required is more than 5,000 square feet. The Major Buffer Management Plan must include limits of disturbance, quantification and measurement of trees expected to be removed, a landscape schedule, a maintenance plan with financial assurance, an inspection agreement with the local government, and determination of area calculations related to buffer establishment and mitigation. Final use and occupancy permits would only be issued after the complete implementation of the Major Buffer Management Plan, or once financial assurance is established.

Furthermore, implementation of the I-95 Access Improvements requires certification from the CAC to confirm the actions associated with the Recommended Preferred Alternative are in concurrence with the Critical Area program. Coordination with the CAC will occur during final design, prior to construction.

4.7.3 Mitigation

Under the Critical Area Law and COMAR Title 27, several mitigation efforts are likely. The I-95 Access Improvements project would adhere to mitigation actions set forth in these regulations, and may require additional mitigation from Baltimore City Department of Recreation and Parks (BCRP). Project activities fall within the variance category; therefore, the Critical Area Buffer mitigation requirement is a 3:1 ratio for permanent disturbances. Plantings designated in the Major Buffer Management Plan would consist of native species. Until plantings are established, temporary vegetative stabilization or mulch will provide soil stability. Planting credits would be accrued for proposed vegetation. Further coordination with the Critical Area Commission would be required to determine final mitigation requirements.

Mitigation for impacts to HPAs would require coordination with DNR-WHS Waterfowl Program Manager. A habitat assessment and mitigation plan may be required. Because the project is anticipated to be greater than 375 linear feet, it may be subject to a restriction from in-stream construction between November 15 and March 1, inclusive, to avoid impacts to overwintering waterfowl.

During construction, permanent signs would be posted every 200 linear feet of the shoreline to demarcate the buffer. Signs would note the prohibition of clearing or disturbance. Shoreline erosion protection would be added, where required, to minimize the depletion of the shore's mass in the Critical Area.

SWM practices and site planning would be implemented to mimic the natural hydrologic conditions to the maximum extent practicable, with the following goals:

- Channel stability
- 100 percent of the annual predevelopment groundwater recharge
- Minimization of non-point source pollution
- Implementation of structural SWM practices

No construction vehicle wash plants or equipment would be kept inside of the 100-foot buffer zone. To reduce adverse water quality impacts, an ESC plan would be developed. The design of SWM facilities would accept runoff caused by development in excess of that which would come from the site in its predevelopment state (MDE, 2015).

Additional policies apply to the IDA portion of the Critical Area including the conservation of fish, wildlife, and plant habitats; improvement of the quality of runoff into waterways; stormwater pollution reduction of 10 percent; maintenance or establishment of public access to the shoreline; and the advantageous location of ports and industries which use water for transportation and derive economic benefits from shore access (CAC, 2012).

5 TERRESTRIAL RESOURCES

5.1 Physiographic Resources

This section identifies the geology, soils, biological resources, and physiographic provinces within the Study Area, and impacts to these resources that may result from construction or operation of the Recommended Preferred Alternative. Documentation and GIS data from the Maryland Geological Survey and aerial photography were reviewed. Additionally, correspondence was conducted with USFWS and DNR to determine the extent of sensitive terrestrial habitats within the Study Area. Agency correspondence was also conducted with USFWS, DNR, and NMFS to determine if any state or federal listed threatened or endangered species occurred within the Study Area.

The underlying geology of an area determines soil and surface physiography. A physiographic province is a landform region shaped by a similar geologic history and characterized by similar elevation, relief, climate, and geologic structure. General geologic information was obtained from the Physiographic Map of Maryland (Figure 8).

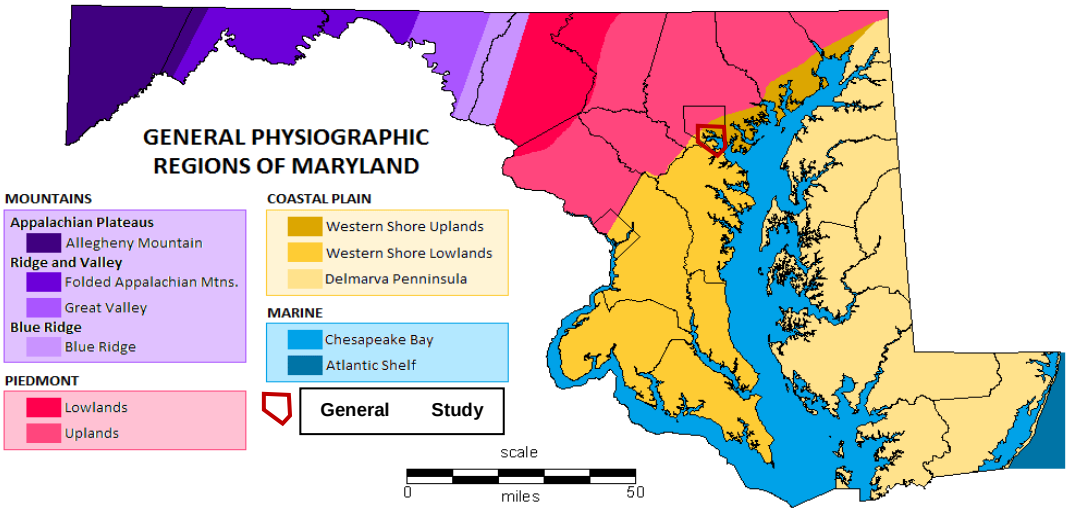


Figure 8: Physiographic Regions of Maryland from Maryland Geological Survey (MGS, 2008)

Physical properties of soils within the Study Area influence the evaluation of the alternatives regarding soil/ground settlement, subsidence, erosion, ease of excavation, and the potential for soil contamination. Soils in Maryland are characterized by their parent material and are formed in the following four general types: (1) residual material derived from the weathering of Piedmont rocks; (2) unconsolidated Coastal Plain sediment consisting of sand, silt, clay, and rock fragments deposited over long periods of time; (3) recent alluvial sediment and associated river dredgings eroded from the Piedmont and Coastal Plain; and (4) rock fragments, saprolite, sand, silt, clay, and organic and inorganic objects that have been deposited over time from human activity.

5.1.1 Existing Conditions

The Study Area is underlain by the Atlantic Coastal Plain Physiographic Province and is directly adjacent to the Piedmont Plateau Province, as seen on Figure 8. The Piedmont Plateau Province consists of hard, crystalline igneous and metamorphic rocks. The transition between the two provinces, known as the Fall

Zone or Fall Line, crosses central Maryland from southwest to northeast, approximately along the I-95 corridor. Soils in the Coastal Plain consist of unconsolidated, stratified sandy, silty, clayey, and loamy sediment that also contain lignitized or other carbonaceous materials. Most of the soils formed in material weathered from the Coastal Plain formations retain many of the particle-size and mineralogy characteristics typical of the sediment.

The National Resource Conservation Service (NRCS) publishes soil survey maps which were used to identify the soil associations within the Study Area. The Web Soil Survey (2016) from NRCS indicates that the following soil series occur within the Study Area (see Table 5.1):

- Udorthents, 0 to 35 percent slopes (42E) – very deep, well drained, contains loamy and clayey soil material and varying amounts of rock fragments. Depth to hard bedrock varies from a few inches to more than five feet. Areas range from slightly compacted to severely compacted.
- Urban land-Udorthents complex, 0 to 3 percent slopes and occasionally flooded (43U) – on the Atlantic Coastal Plain Province. It consists mainly of areas that have been smoothed, where the original soil has been disturbed, filled over, or otherwise destroyed prior to construction.
- Urban land, slopes range from 0 to 15 percent (44UC) – soils where more than 80 percent of the surface is covered with asphalt, concrete, buildings or other impervious surfaces. Slopes are generally gentle to moderate.

Table 5.1: Soils within the Study Area

Soil Name	Map Unit Symbol	Area (ac.)
Udorthents, smoothed, 0 to 35 percent slopes	42E	22.9
Urban land-Udorthents complex, occasionally flooded	43U	12.2
Urban land, 0 to 15 percent slopes	44UC	41.7
Water	W	6.32

USDA, NRCS. 2016. *Web Soil Survey*. http://websoilsurvey.nrcs.usda.gov/. Accessed [09/14/2016].

The NRCS database does not identify any highly erodible or hydric soils within the Study Area. A hydric soil is formed under conditions of saturation, flooding, or ponding for at least 21 consecutive days during the growing season to develop anaerobic conditions in the soil layers closest to the surface. Urban land-Udorthents complex (43U) is predominantly non-hydric, with a hydric rating of three percent. Soils within the Study Area are shown on Figure 9: Soils.

5.1.2 Impacts

Soil disturbances would occur throughout the Study Area during construction, including cutting, filling, and grading. Approximately 85,000 cubic yards of fill is anticipated, and would be considered permanent soil impacts. Fill would occur along the following locations:

- I-95 northbound auxiliary lane between the Caton Avenue on ramp and the Russell Street off ramp,
- Prior to the abutments of the shared-use path bridge over CSX tracks,
- The McComas Street two-way boulevard,
- The ramp from I-95 southbound to westbound McComas Street,
- The ramp from westbound McComas Street to I-95 southbound,
- The ramp from I-95 northbound to the McComas Street two-way boulevard, and

- The end of the ramp from Russell Street/I-395 ramp to the western end of McComas Street.

Cutting or grading of soil would occur along both the eastbound and westbound side of I-95, between Gould Street and Key Highway, resulting in potential impacts to drainage patterns within the Study Area. These changes would be associated with redirecting surface runoff and localized changes in shallow groundwater movement. Cutting, filling, and grading is anticipated for the many stormwater facilities planned within the Study Area.

Outside of the waterway, up to 75 piers would be constructed. During construction, each pier would require drilling, boring, driving a foundation piling, or other excavation of the soil and bedrock. There would be approximately 41,430 square feet of impact to soil during operation of the Recommended Preferred Alternative due to the permanent installation of the piers.

There are several known hazardous materials sites near the Study Area that have been capped as part of remediation activities (for detailed information, please refer to the I-95 Access Improvements Hazardous Materials Technical Report). Due to the industrial history of the area, additional areas of soil contamination may be possible, and any earth moving activities could expose these contaminants to air and water resources. These contaminants may include lead, heavy metals, PCBs, pesticides, petroleum, chlorides, or polycyclic aromatic hydrocarbons among others.

As indicated by the soil series, soils in the Study Area were previously smoothed, compacted, filled, manipulated, covered by development, or otherwise disturbed due to prior urbanization. In most cases, project-induced changes to the existing nature of the soils would be compatible with current and surrounding conditions.

5.1.3 Mitigation

Erosion and sediment management would include an MDE approved ESC Plan and implemented in its entirety for the Recommended Preferred Alternative. ESC and SWM facilities would be placed in the Study Area in accordance with the Environment Article, Title 4, Subtitle 1; Stormwater Management Act of 2007; MDE 2000 Maryland Stormwater Design Manual, Volumes I & II; 2011 Maryland Standards and Specifications for Soil ESC (MDE, 2011); COMAR (Title 26); and Maryland SWM and ESC Guidelines for State and Federal Projects (MDE, 2015). Mitigation activities would be specified within the ESC and SWM Plans and may include reduction of impervious surface, treatment of runoff, and ESD. ESD encourages the conservation and integrity of natural resources within the vicinity of the Study Area.

During operation of the Recommended Preferred Alternative, impacts from sediment or contaminants on the roadway would be reduced by required SWM facilities. Currently, 20 SWM facilities of various sizes are planned within the Study Area, with additional BMPs to be evaluated as design continues.

Detailed investigations would be conducted to determine specific soil characteristics along the Recommended Preferred Alternative as part of a Phase I Environmental Site Assessment so that construction techniques and environmental safeguards could be developed to address any identified contamination or limitations. To minimize potential effects from soil disturbances, proper slope and soil stabilization techniques would be used in work areas, both during and after construction, to prevent potential sedimentation of nearby waterways. The project would also follow guidelines established for the Critical Area, as discussed in Section 4.7.

5.2 Terrestrial Habitat

The Study Area follows the highly-urbanized corridor of I-95, thereby presenting few natural settings. The eastern portion of the Study Area is located outside the Critical Area, and therefore, subject to regulations and mitigation requirements set forth by BCRP. The Roadside Tree Law would apply to those areas with trees in the road right-of-way (ROW).

The western portion of the Study Area is located within the Critical Area (see Figure 8: Critical Area, and Section 5.7). , which will determine the level of field investigation, mitigation, and specimen tree diameter. Additionally, a Buffer Management Plan would be required to be submitted with the JPA. The Buffer Management Plan should depict the proposed work and specify location, type, and amount of mitigation.

Preliminary field investigations were conducted to identify vegetative communities and perform vegetation assessments within the Study Area. Vegetative community characterizations include:

- Common canopy, understory, and herbaceous species;
- Health of the community;
- Successional stage;
- Local topography;
- Size class of tree species; and,
- Presence of invasive species.

Specimen trees are determined by measuring tree diameter at breast height (DBH), which is the diameter of the tree at approximately 4.5 feet above ground. Trees determined to be of specimen size are afforded additional protections and require additional agency coordination for trimming, root pruning, or removal, regardless of their native status. In the state of Maryland, specimen trees are those that have a DBH of 30 inches or greater, or 75 percent the size of the State Champion, which is the largest tree of its species in the state. Within the City of Baltimore, a tree with a diameter of 20 inches or greater is considered a specimen tree. Because the Study Area is located within the Critical Area, and not subject to the requirements of the FCA, specimen trees are not generally surveyed. For information purposes, trees with a DBH of 20 inches or greater were identified within the Study Area.

The perimeter around a tree that protects a majority of the roots is referred to as the Critical Root Zone (CRZ). The perimeter is determined as one foot of diameter for every inch of tree DBH. Construction activities can remove no more than 30 percent of the calculated CRZ in order to retain the tree. If construction activities would damage or remove 31 percent or more of the CRZ, the tree must be removed.

5.2.1 Existing Conditions

Land cover within the Study Area was assessed via aerial imaging and field investigations conducted on August 17 and November 11, 2016. A patchwork of vegetated areas, labeled Vegetative Community A, consists of fragmented areas of trees, shrubs, and/or herbaceous plants throughout the length of the Study Area. This vegetated land provides a number of important environmental benefits to the surrounding urban settings, including improving air quality, pleasing natural aesthetics, reducing stormwater runoff volumes and temperatures, and providing an oasis of habitat for birds, insects, and other wildlife. Figure 11: Terrestrial Resources and photographs in Appendix C identify these features.

The largest tract of potential terrestrial wildlife habitat within the Study Area is limited to the remnant vegetative community along Gwynns Falls. The remainder of Vegetative Community A contains small

fragments of vegetation associated with city parks, undeveloped private parcels, landscaped areas, hedgerows, and street trees around residential yards and commercial properties. Five specimen trees were located within or immediately adjacent to the Study Area (see Table 5.2 and Figure 10).

Table 5.2: Specimen Trees Within Study Area

Identifier	Species	Scientific Name	Diameter at Breast Height (DBH)	Condition
T1	American sycamore	*Platanus occidentalis*	35 inches	Good
T2	princess tree	*Paulownia tomentosa*	30 inches	Fair
T3	princess tree	*Paulownia tomentosa*	24 inches	Poor
T4	eastern cottonwood	*Populus deltoides*	20 inches	Fair
T5	slippery elm	*Ulmus rubra*	24.5 inches	Fair

The most apparent threats to the health and vitality of Vegetative Community A (see Figure 10) were forest fragmentation, climbing vines, trash, and non-native, invasive species. Several non-native, invasive species were recorded in the Study Area. These species spread quickly and have few natural controls. Vectors for non-native invasive species include waterways, trails, soil and canopy disturbance, animals, people, and other methods of dispersing seeds, fruits, and plant fragments. Non-native, invasive species displace native vegetation and compete for resources, disrupting habitat and specialized food webs of native ecosystems. Documented non-native, invasive species include tree of heaven, princess tree, white mulberry, porcelainberry, wineberry, mile-a-minute, multiflora rose, callery pear, thistle sp., *Lonicera* sp., Norway maple, Asiatic bittersweet, Chinese lespedeza, and Japanese knotweed.

Table 5.3 lists the plant species present within the Study Area separated by the associated forest layer each inhabits. Dominant tree species are defined by the DNR as "trees that extend above surrounding individuals" to receive sunlight from both the top and sides of the crown. Co-dominant trees extend into the upper forest canopy, just below the dominant canopy layer, to receive sunlight from the top, but are prevented by dominant trees from receiving sunlight from the side. Understory species consist of shrubs, small trees, and vines that lie beneath the co-dominant tree layer, with a height between three and twenty feet. The herbaceous layer consists of all species typically found on the ground and up to three feet from the surface, and may consist of both woody and non-woody plant species.

Table 5.3: Plant Species Within Study Area

Vegetative Layer	Common Name	Scientific Name
Dominant Canopy Species	black oak black walnut eastern cottonwood green ash honey locust princess tree* slippery elm southern red oak sycamore	*Quercus velutina* *Juglans nigra* *Populous deltoides* *Fraxinus pennsylvanica* *Gleditsia triacanthos* *Paulownia tomentosa* *Ulmus rubra* *Quercus falcata* *Platanus occidentalis*

Table 5.3: Plant Species Within Study Area

Vegetative Layer	Common Name	Scientific Name
	tree of heaven*	*Ailanthus altissima**
	white ash	*Fraxinus americana*
Co-dominant Canopy Species	black locust	*Robinia pseudoacacia*
	black walnut	*J. nigra*
	boxelder	*Acer negundo*
	callery pear*	*Pyrus calleryana*
	chokecherry	*Prunus virginiana*
	eastern cottonwood	*P. deltoids*
	honey locust	*G. triacanthos*
	princess tree*	*P. tomentosa*
	red mulberry	*Morus rubra*
	southern red oak	*Q. falcate*
	sycamore	*P. occidentalis*
	white mulberry *	*Morus alba*
Common Understory Species	Asiatic bittersweet	*Celastrus orbiculatus*
	black cherry	*Prunus serotina*
	black walnut	*J. nigra*
	boxelder	*A. negundo*
	Chinese elm*	*Ulmus parvafolia*
	green ash	*F. pennsylvanica*
	mimosa*	*Albizia julibrissin*
	mockernut hickory	*Carya tomentosa*
	northern catalpa	*Catalpa speciosa*
	Norway maple*	*Acer platanoides*
	persimmon	*Diospyros virginiana*
	princess tree*	*P. tomentosa*
	river birch	*Betula nigra*
	silver maple	*Acer saccharinum*
	slippery elm	*U. rubra*
	staghorn sumac	*Rhus typhina*
	sycamore	*P. occidentalis*
	Virginia creeper	*Parthenocissus quinquefolia*
	white mulberry*	*M. alba*
Common Herbaceous Species	Asiatic bittersweet*	*Celastrus orbiculatus*
	American pokeweed	*Phytolacca americana*
	eastern baccharis	*Baccharis halimifolia*
	Chinese lespedeza*	*Lespedeza cuneata*
	creeping bentgrass	*Agrostis stolonifera*
	evening primrose	*Oenothera biennis*
	smallspike false nettle	*Boehmeria cylindrica*
	grass	Gramineae sp.
	Chinese yam*	*Dioscorea oppositifolia*
	Japanese honeysuckle*	*Lonicera japonica*
	Japanese knotweed*	*Reynoutria japonica*
	jewelweed	*Impatiens capensis*
	tartarian honeysuckle*	*Lonicera* sp.
	mile-a minute	*Persicaria perfoliata*
	mullein*	*Verbascum thapsus*
	multiflora rose*	*Rosa multiflora*
	poison ivy	*Toxicodendron radicans*
	porcelainberry*	*Ampelopsis brevipedunculata*

Table 5.3: Plant Species Within Study Area

Vegetative Layer	Common Name	Scientific Name
	goldenrod	*Solidago* sp.
	Canada thistle	*Cirsium arvense*
	low false bindweed	*Calystegia spithamaea*
	Virginia creeper	*Parthenocissus quinquefolia*
	wineberry*	*Rubus phoenicolasius*

* Indicates invasive species

5.2.2 Impacts

Approximately 8.7 acres (378,972 square feet) of vegetative community would be removed during construction. Most of the clearing would occur within the constricted wildlife corridor along Gwynns Falls. The corridor is narrow and subject to wind, sun, and temperature effects associated with non-contiguous forest areas, and to invasion by non-native species. Remaining vegetation, both native and non-native species, in these areas are already tolerant of disturbance and harsh weather conditions, so impacts are anticipated to be minor.

Specimen Tree T3 would have 69 percent of CRZ impacted and therefore would be removed for a staging area and subsequent SWM facilities. Specimen Tree T5 would have 29 percent of CRZ removed for staging area and SWM facilities. As only 29 percent of CRZ would be impacted, the trees would be retained with protection measures described in the mitigation section below. No impacts to the CRZ are anticipated for Specimen Trees T1, T2, and T4 so these trees would also be retained (see Table 5.4).

Table 5.4: Specimen Tree Disposition

Identifier	Critical Root Zone (CRZ) (sq. ft.)	Temporary CRZ Impacts (sq. ft.)	Permanent CRZ Impacts (sq. ft.)	CRZ impacted (%)	Disposition
T1	3,848	0	0	0	Retain
T2	2,827	0	0	0	Retain
T3	1,810	0	1,251	69	Remove
T4	1,257	0	0	0	Retain
T5	1,886	0	541	29	Retain

5.2.3 Mitigation

To mitigate impacts to terrestrial habitat, land disturbed during construction of the Recommended Preferred Alternative would be amended and improved according to applicable Grading Permits and ESC Plans. For the areas outside the Critical Area mitigation requirements would be determined by BCRP, and for the areas within road ROW mitigation requirements would be determined by DNR Roadside Tree Law. Mitigation plans generally include a maintenance agreement for care and replacement of the trees, an inspection agreement, and may include a long-term protection plan.

For the areas within the Critical Area, final Buffer Management Plans would be coordinated between MDTA and the CAC (refer to Section 5.7 of this report). Further coordination with the CAC would be required to determine final mitigation requirements. Moreover, BCRP may or may not accept the level of mitigation required from CAC, and may impose mitigation in addition to that required by CAC. Impacts to habitat resulting from tree removal would be partially offset by replanting efforts in the Study Area, although vegetation density would change during and post-construction.

BMPs, including gear and equipment cleaning, would be implemented to avoid introducing and/or dispersing existing non-native invasive plant materials during construction and mitigation activities. Additionally, an Invasive Species Management Plan may be developed according to standards set by Executive Order 13112.

To retain specimen trees and protect CRZ, avoidance and minimization techniques would be employed to retain the tree and/or impact 30 percent or less of the CRZ. Protection measures including root or branch pruning would be implemented by a certified arborist. Other protection techniques include:

- Fencing, signage, trunk planking, root mulching and matting to protect from compaction;
- Preventing spills of toxic materials near the root system;
- Preventing equipment and foot traffic from traversing the root system;
- Considering the root system if dewatering operations are required; and
- Refraining from placing staging areas on root systems.

5.3 Terrestrial Wildlife

This section identifies potential impacts to terrestrial wildlife resulting from the construction and operation of the Recommended Preferred Alternative. Wildlife populations located within the Study Area were determined by land use and available habitat. The Study Area consists predominately of remnant forest areas, Gwynns Falls riparian buffer, and fragmented vegetation, and follows the highly-urbanized I-95 corridor, thereby presenting few natural settings for terrestrial wildlife.

5.3.1 Existing Conditions

A desktop review for Forest Interior Dwelling Species (FIDS) and Sensitive Species Project Review Areas was performed and neither were identified within the Study Area. In correspondence dated August 3, 2016, USFWS stated that no Critical Habitat Areas or Wildlife Refuges occur within the Study Area.

The largest tract of potential terrestrial wildlife habitat within the Study Area is limited to the remnant riparian buffer along Gwynns Falls. The remainder of the study area contains small fragments of vegetation associated with city parks, undeveloped private parcels, landscaped areas, hedgerows, and street trees around residential yards and commercial properties.

Due to the highly developed and fragmented conditions associated with the Study Area, only those wildlife species adapted to these disturbed habitats can be expected to occur. Table 5.5 below provides a list of common terrestrial wildlife and birds likely to occur within the Study Area.

Table 5.5: Common Terrestrial Wildlife Species in the City of Baltimore

Common Name	Scientific Name
MAMMALS	
Virginia opossum	*Didelphis virginiana*
White-tailed deer	*Odocoileus virginianus*

Table 5.5: Common Terrestrial Wildlife Species in the City of Baltimore

Common Name	Scientific Name
Eastern cottontail	*Sylvilagus floridanus*
Red fox	*Vulpes vulpes*
Eastern chipmunk	*Tamias striatus*
Groundhog	*Marmota monax*
Eastern gray squirrel	*Sciurus carolinensis*
Striped skunk	*Mephitis mephitis*
Raccoon	*Procyon lotor*
Muskrat	*Ondatra zibethicus*
BIRDS	
House finch	*Carpodacus mexicanus*
House sparrow	*Passer domesticus*
European starling	*Sturnus vulgaris*
Mourning dove	*Zenaida asiatica*
Common grackle	*Quiscalus quiscula*
Northern cardinal	*Cardinalis cardinalis*
Blue jay	*Cyanocitta cristata*
Carolina chickadee	*Poecile carolinensis*
Chipping sparrow	*Spizella passerine*
Dark-eyed junco	*Junco hyemalis*
American goldfinch	*Spinus tristis*
Mallard	*Anas platyrhynchos*
Great blue heron	*Ardea herodias*
Black vulture	*Coragyps atratus*
Turkey vulture	*Cathartes aura*
Red-tailed hawk	*Buteo jamaicensis*
Killdeer	*Charadrius vociferous*
Various gull species	Laridae family
Common ground dove	*Columbina passerina*
American robin	*Turdus migratorius*
American crow	*Corvus brachyrhynchos*
Common raven	*Corvus corax*
Gray catbird	*Cumetella carolinensis*
Northern mockingbird	*Mimus polyglottos*
HERPETILES	
Eastern ratsnake	*Pantherophis alleghaniensis*
Eastern garter snake	*Thamnophis sirtalis sirtalis*
Northern water snake	*Nerodia sipedon sipedon*
Eastern box turtle	*Terrapine Carolina Carolina*
Eastern painted turtle	*Chrysemys picta picta*
Eastern snapping turtle	*Chelydra serpentine serpentina*
Red-eared slider	*Trachemys scripta elegans*
American bullfrog	*Lithobates catesbeiana*
Northern green frog	*Lithobates clamitans melanota*
Northern spring peeper	*Pseudacris crucifer*
Eastern american toad	*Anaxyrus americanus americanus*
Common five-lined skink	*Plestiodon fasciatus*
Eastern six-lined racerunner	*Aspidoscelis sexlineatus sexlineatus*

5.3.2 Impacts

The Recommended Preferred Alternative would follow existing roadway alignments; therefore, impacts to wildlife resources are anticipated to be minor. The largest areas of potential impact to terrestrial wildlife would occur as a result of construction fill activities and the installation of piers within the Gwynns Falls riparian buffer. The fragmented habitats throughout the remainder of the corridor are expected to incur minor impacts as wildlife species are already highly tolerant of disturbance in this urban setting.

5.3.3 Mitigation

Most mobile species, such as mammals and migratory birds, would be able to vacate the disturbed area. To protect migratory birds, tree clearing restrictions for forest stands are in effect from April 1 through August 31, inclusive. This prevents tree clearing during the critical nesting periods.

5.4 Rare, Threatened, and Endangered Species

Rare, threatened, and endangered (RTE) species are protected under federal and state legislation. Endangered species are defined as plant or animal species in danger of extinction throughout all or a significant portion of their range. Threatened species are defined as plant or animal species likely to become endangered within the foreseeable future throughout all or a significant portion of their range. Rare species are those which are seldom observed.

The USFWS and NOAA Fisheries regulate and protect federally-listed threatened and endangered species under the ESA and through coordination with the NEPA, Critical Area, and JPA permitting processes. Primary goals of the ESA are conserving and recovering listed species. The ESA requires federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any federal agency.

Section 7 of the ESA requires that federal agencies coordinate with the USFWS and/or NMFS to ensure a project would not endanger a listed species or impact critical habitat. If it is determined that a listed species or habitat is threatened by the proposed project, a biological opinion would be issued. This opinion would include “reasonable and prudent measures” and possibly “reasonable and prudent alternatives” that the project must implement to reduce impacts to the species or habitat. These measures and alternatives would allow the project to proceed without excessively compromising the species and habitat (USFWS, 2017).

In Maryland, the 1975 Nongame and Endangered Species Conservation Act (Annotated Code of Maryland 10-2A-01) governs the legal listing of threatened and endangered species. COMAR 08.03.08 defines the listing criteria for species of concern, discusses the purpose and intent of research and collection permits, and enumerates prohibited activities. MDNR maintains a listing of all species considered endangered, threatened, or in need of conservation (COMAR 08.02.12).

5.4.1 Existing Conditions

The largest tract of potential terrestrial wildlife habitat within the Study Area is limited to the remnant riparian buffer along Gwynns Falls. The remainder of the Study Area contains small fragments of vegetation associated with city parks, undeveloped private parcels, landscaped areas, hedgerows, and street trees around residential yards and commercial properties. Because of the highly developed and fragmented conditions associated with the Study Area, only those wildlife species adapted to these disturbed habitats can be expected to occur.

To determine the existence of RTE species within the Study Area, correspondence was submitted to the state regulatory agencies, DNR-WHS and DNR-ERU (Appendix D). In a letter dated November 23, 2016, the DNR-WHS confirmed that there are no state or federal records for RTE species within the Study Area (see Appendix D). In a letter dated January 13, 2017, the DNR-ERU did not identify any RTE within the Study Area (see Appendix D). This correspondence includes confirmation that no known eagle populations are residing within the Study Area.

Section 7 coordination was initiated in August of 2016 to determine the potential presence of federal RTE species within the Study Area. NMFS Protected Resources and Habitat Conservation Divisions stated that both the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) and the shortnose sturgeon (*Acipenser brevirostrum*), and/or suitable habitat for these species, may occur within the Study Area although it is not a preferred habitat (see Appendix D). Both species are on the Federal and State Endangered Species List under the ESA, and are at moderate risk of extinction. However, on August 3, 2016, USFWS Information for Planning and Consultation (IPaC) service confirmed there are no federal endangered or threatened species within the Study Area (see Appendix D).

5.4.2 Impacts

The Recommended Preferred Alternative would not impact RTE species, as none are documented within the Study Area.

5.4.3 Mitigation

There are no document RTE species within the Study Area. However, SWM BMPs would be employed during and after construction to reduce or eliminate impacts to any species during construction and operation or the Recommended Preferred Alternative. Important BMP's for the Recommended Preferred Alternative include the use of cofferdams and silt curtains to reduce suspended sediment. In addition, an ESC plan would be developed, approved, and implemented to reduce potential adverse impacts to land and waterways.

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APPENDIX A 11x17 Figures