6.0 Water Resources and Water Quality

6.1. Introduction

This section defines the water resources and water quality resources pertinent to the Long Bridge Project (the Project), and defines the regulatory context, methodology, and Affected Environment. For each Action Alternative and the No Action Alternative, this chapter assesses the potential short-term and long-term impacts on water resources and water quality. This chapter also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Project.

This section focuses on five water resource categories: water quality, wetlands and other waters of the United States, floodplains, Chesapeake Bay Preservation Areas, and coastal zone management. This section provides an overview and key definitions for each of the water resource categories analyzed in this chapter.

Water quality applies to groundwater and surface water. Groundwater collects and flows beneath the Earth's surface as aquifers, springs, and wells. It originates from rain as well as melted snow and ice. Surface water is water that collects on the surface of the ground such as rivers, lakes, wetlands, seas, and oceans.

Waters of the United States include all waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including but not limited to all waters that are subject to the ebb and flow of the tide; all interstate waters including interstate wetlands; and other waters such as rivers and streams (including intermittent streams), the use, degradation, or destruction of which could affect interstate or foreign commerce; tributary waters; and wetlands adjacent to waters.[1]

Wetlands are jointly defined by the United States Environmental Protection Agency (EPA) and United States Army Corps of Engineers (USACE), as "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." [2] Wetlands generally include swamps, marshes, bogs, and similar areas.

A **floodplain** is any land area susceptible to inundation by floodwaters from any water source.[3] The Federal Emergency Management Agency (FEMA) identifies the 100-year floodplain as the area with a 1 percent chance of being inundated or exceeded by a flood event in any given year and is considered the base flood. FEMA identifies the 500-year floodplain as the area with a 0.2 percent chance of being inundated by a flood event in any given year.

[1] 33 CFR 329
[2] 33 USC 1251. Clean Water Act of 1972. Accessed from https://www.govinfo.gov/app/details/USCODE-2016-title33/USCODE-2016-title33-chap26-subchapI-sec1251. Accessed January 10, 2018.
[3] 44 CFR 59

As defined in the *Arlington County Chesapeake Bay Preservation Ordinance (Chapter 61.5)*, **Resource Protection Areas (RPAs)** "consist of sensitive lands adjacent to water bodies with perennial flow that have intrinsic water quality value due to the ecological and biological processes they perform or are sensitive to impacts which may cause significant degradation to the quality of State waters."[4] The purpose of an RPA is to provide a buffer between development and sensitive water resources such as streams. A natural buffer provides water quality benefits to downstream resources, such as the Chesapeake Bay. RPAs include tidal wetlands, nontidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow, tidal shores, a buffer area not less than 100 feet adjacent to and landward of these water bodies, and such other lands considered by the Arlington County Board to meet some or all the criteria described above.

Coastal zones encompass coastal waters (including the lands therein and thereunder) and the adjacent shorelands, strongly influenced by each other and in proximity to the shorelines of the coastal states. Designated coastal zones include islands, transitional and intertidal areas, wetlands, salt marshes, and beaches.[5]

The Washington Aqueduct is the source of drinking water for both the District of Columbia (the District) and Arlington County, Virginia. USACE manages the Washington Aqueduct, which pulls water from two locations on the Potomac River: Great Falls and Little Falls. Both locations are upstream of the Project Area. The Potomac River flows approximately 100 miles before joining with the Chesapeake Bay; there are likely communities that source their drinking water from downstream sections of the Potomac River. There are no drinking water sources within the Local Study Area.

6.2. Regulatory Context and Methodology

This section describes the most pertinent regulatory context for evaluating impacts to water resources and water quality and summarizes the methodology for evaluating current conditions and the probable consequences of the alternatives. This section also includes a description of the Study Area. **Appendix D1, Methodology Report**, provides the complete list of laws, regulations, and other guidance considered, and a full description of the analysis methodology.

6.2.1. Regulatory Context

Several Federal regulations govern wetlands, floodplains, and waters of the United States to ensure proper consideration of avoidance, minimization, and mitigation of adverse effects. Some of these regulations include the Clean Water Act of 1972 (CWA) and the Water Quality Act of 1987 Sections 401 through 404,[6] the Safe Drinking Water Act of 1974 (SDWA),[7] the United States Ground Water Rule,[8] the National Pollutant Discharge Elimination System (NPDES), the Energy Independence and Security Act of 2007 (EISA),[9] and Executive Order (EO) 13508: Chesapeake Bay Protection and Restoration.[10] The EPA

[4] Arlington County Code Chapter 61
[5] 16 USC 1451
[6] 33 USC 1251-1376
[7] 42 USC 300f
[8] EPA. 2006. U.S. Ground Water Rule. Accessed from https://www.epa.gov/dwreginfo/ground-water-rule. Accessed January 12, 2018.
[9] Public Law 110-140
[10] EO 13508

also offers the Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of EISA.

6.2.1.1. Water Quality

The District and Virginia regulate water quality based on standards set by the District Department of Energy & Environment (DOEE), the Virginia Department of Environmental Quality (VDEQ), and the EPA. States can choose to adopt national water quality standards (SDWA and CWA) or revise and adopt state specific standards.

Water Quality Standards (WQS) establish the environmental baselines used for measuring the success of CWA, to protect aquatic life and wildlife, recreational uses, and sources of drinking water. WQS establish goals for waterbodies and provide regulatory basis for establishing water quality–based effluent limits beyond the technology-based levels of treatment required by the CWA. WQS include:

- Designated use or uses such as "supporting aquatic life" or "recreation;"
- Criteria necessary to protect the designated uses;
- Antidegradation requirements; and
- General policies affecting the application and implementation of WQS that states and authorized tribes may include at their discretion.

In compliance with Sections 303(d), 305(b), and 314 of CWA and SDWA, states develop a prioritized list of water bodies that currently do not meet water quality standards.

6.2.1.2. Wetlands and Waters of the United States

Any unavoidable impacts to wetlands and waters of the United States would be regulated under state and Federal wetlands and waterways permits issued for the project. Permits would be obtained from the USACE, the United States Coast Guard, DOEE, and VDEQ prior to construction activities. USACE would likely issue a Nationwide Permit #15 (subject to regional conditions and impact threshold limits and require the issuance of pre-construction notification with NMFS) for United States Coast Guard Approved Bridges, which covers "discharges of dredged or fill material incidental to the construction of a bridge across navigable waters of the United States, including cofferdams, abutments, foundation seals, piers, and temporary construction and access fills, provided the construction of the bridge structure has been authorized by the United States Coast Guard under Section 9 of the Rivers and Harbors Act of 1899 for construction of a new bridge over a navigable waterway." [11] In addition, a Section 404 permit for CWA would be required for filling causeways and approaches. A permit would also be required under Section 10 of the Rivers and Harbors Act of 1899 for alterations in or over navigable waters. DOEE would issue a permit under Section 401 of the CWA for any impacts to the Potomac River and Washington Channel/Tidal Impoundment. A Section 401 permit acknowledges that USACE issues the Nationwide permit and allows the District to add specific conditions to ensure compliance with all the District's water quality standards. Impacts to Commonwealth of Virginia tidal wetlands and waters would likely require a Virginia Water Protection Permit, a Section 401 Water Quality Certificate, a Virginia Marine Resources Permit, and a Section 404 permit from USACE. The Virginia Department of Rail and Public

[11] 33 CFR 330. USACE Nationwide Permit Program.

Transportation (DRPT), as the project sponsor for final design and construction, would work with appropriate agencies and authorities to obtain applicable permits.

6.2.1.3. Flood Hazards and Floodplain Management

FEMA's National Floodplain Insurance Regulations requires that no new construction, substantial improvements, or other development (including fill) shall be permitted within a Zone AE Special Flood Hazard Area subject to inundation by the 1 percent annual chance flood where base flood elevations have been determined on the community's Flood Insurance Rate Map (as is the case within the Local Study Area) unless it is demonstrated that the cumulative effect of the proposed development, when combined with all other existing and anticipated development, would not increase the water surface elevation of the base flood (100-year floodplain) by more than 1 foot at any point within the community. The National Flood Insurance Program (NFIP) does allow for communities to approve certain development that will increase the water surface elevation of the base flood by more than 1 foot under certain conditions, including an evaluation of alternatives and demonstration of why those alternatives are not feasible.

6.2.1.4. Coastal Zone Management

The Coastal Zone Management Act of 1972 (CZMA) protects coastal areas and the surrounding habitat by defining inland coastal areas and the protection of these buffer zones within CZMA.

Virginia participates in the National Coastal Zone Management Program (CZMP) and has a state coastal zone management plan that includes Arlington County. However, according to the National Oceanic and Atmospheric Administration Office for Coastal Management, the District does not have a coastal zone management plan. Any Federal activities within the coastal zone must be consistent with the criteria set forth in the approved state plan or program. To comply with CZMA, the Federal agency must identify activities that would affect the coastal zone, including development projects, and review them for consistency with the state-specific coastal zone management plan.

6.2.2. Methodology

The Local Study Area boundary for water resource and water quality (**Figure 6-1**) includes the immediate railroad Corridor, bridge superstructure and pilings, abutments, and a corridor width of 500 feet on either side of the Project Area. This Local Study Area allows for evaluation of impacts to surface and groundwater resources and infrastructure both within and adjacent to the Project Area and encompasses all potential direct and indirect impacts to wetlands and other waters of the United States, areas that fall within Special Flood Hazard Areas associated with the Potomac River, and the Coastal Zone. This Local Study Area is also sufficient to capture water resources and the RPA 100-foot buffer of landward tidal wetlands, nontidal wetlands connected by surface flow and contiguous to tidal wetlands or water bodies with perennial flow, and tidal shores. Therefore, a wider Regional Study Area is not necessary for these topics.

Figure 6-1 | Study Area for Water Resources and Water Quality

6.2.2.1. Water Quality

Water quality impacts for the alternatives are compared using Stormwater Retention Volume (SWRv) per the DOEE guidance, proposed mitigation strategies, and qualitative assessment of each alternative's compliance with NPDES Total Maximum Daily Load (TMDL) requirements. The SWRv represents the volume of stormwater that must be retained on-site to mimic pre-development hydrologic conditions and protect District waterbodies. An increase in SWRv from existing conditions would indicate a long-term adverse impact on stormwater infrastructure and water quality, unless the Project included stormwater best management practices (BMPs) to mitigate that increase.

The existing stormwater retention volume sets the baseline for evaluating stormwater impacts to each of the three watersheds.

6.2.2.2. Wetlands and Other Waters of the United States

The study identified wetlands and other waters of the United States in the Local Study Area in coordination with USACE, the National Park Service, VDEQ, and DOEE. They include the Potomac River and associated waterbodies, including Roaches Run, the Washington Channel, and the Tidal Basin.

The inventory began with a preliminary evaluation of existing mapping and online sources such as the National Wetlands Inventory, soil survey data, topographic surveys, existing reports, gauge data, and aerial imagery prior to field investigations. The analysis obtained submerged aquatic vegetation (SAV) information from the Virginia Institute of Marine Science. **Chapter 5, Natural Ecological Systems and Endangered Species** presents additional information on SAV.

The analysis identified wetlands in accordance with the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region, Version 2.0.*[12] The analysis classified all identified waters of the United States, including wetlands, according to *A Classification of Wetland and Deep-Water Habitats in the United States.*[13] The analysis collected data to support the delineation to include dominant vegetation, soil descriptions, and evidence of wetland hydrology. The study prepared and submitted a request to USACE on December 11, 2018, to inspect and confirm the limits of wetlands and other waters of the United States as delineated in the field.

Using Geographic Information Systems (GIS), the analysis determined the amount of impacts for each alternative in terms of permanent impacts from dredge and fill activities, shading impacts to emergent wetlands and submerged aquatic vegetation, and temporary impacts due to construction. The impacts analysis also evaluated the loss of wetland functions and values.

[12] USACE. 2010. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0), ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-10-20. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

[13] U.S. Fish and Wildlife Services. 1979. Classification of Wetlands and Deepwater Habitats of the United States. eds. Cowardin LM, Carter V, Golet FC, LaRoe ET. Washington D.C. Report #FWS/OBS-79/31.

6.2.2.3. Flood Hazards and Floodplain Management

Resources used to identify floodplains within the Local Study Area include Flood Insurance Rate Maps and Digital Flood Insurance Rate Maps.[14, 15] The analysis mapped the 100-year and 500-year flood zones within the Local Study Area using the National Flood Hazard Data Layer available for download from the FEMA Map Services Center. The analysis compiled an inventory of natural communities and manmade infrastructure within the flood zones to identify any nearby features potentially affecting the extent and intensity of flooding such as finger piers and flood gates. The functional value of the floodplains was assessed based on a literature review and professional judgement.

The impact analysis evaluated the quantitative impacts to floodplain areas for each alternative. The analysis evaluated the impact to the floodplain using methods consistent with the specifications for a FEMA Letter of Map Revision Process.[16]

6.2.2.4. Chesapeake Bay Preservation Areas

To assess impacts to RPAs, the analysis used GIS mapping to identify those resources that overlap with the permanent limits of disturbance for the Action Alternatives. The evaluation of impacts relied on the analyses conducted for impacts to wetlands, ecological systems, and water quality.

6.2.2.5. Coastal Zone Management

To assess impacts to coastal features, the analysis used GIS mapping to identify those resources that overlap with the permanent limits of disturbance for the Action Alternatives. The evaluation of impacts relied on the analyses conducted for impacts to wetlands, ecological systems, and water quality.

6.3. Affected Environment

This section summarizes the existing conditions of the water resources, including water quality. For a complete description of the Affected Environment, see **Appendix D2, Affected Environment Report.**

6.3.1. Water Quality

This section describes the Local Study Area's ground and surface water quality.

6.3.1.1. Groundwater

The geology of the Local Study Area (see **Chapter 7, Geologic Resources**) allows for many local aquifers to exist; however, similar hydrological characteristics lump these into six regional aquifers separated by four regional confining units within the Northern Atlantic Coastal Plain aquifer system. These aquifers are hydraulically interconnected to some degree, as water can leak through the confining units and move more readily. These aquifers, in descending order by proximity to the surface beginning with the

[14] FEMA. 2015. Federal Flood Risk Management Standard. Accessed from http://www.fema.gov/federal-flood-risk-management-standard-ffrms. Accessed May 3, 2018.
[15] DOEE. 2010. Digital Flood Insurance Rate Map. Accessed from http://maps2.dcgis.dc.gov/dcgis/rest/services/DCGIS_DATA/Environment_WebMercator/MapServer/8. Accessed May 3, 2018.
[16] FEMA. 2017. FEMA Letter of Map Revision Process. Accessed from https://www.fema.gov/flood-map-revision-processes. Accessed June 20, 2018.

shallowest, are the surficial aquifer, the Chesapeake aquifer, the Castle Hayne-Aquia aquifer, the Severn-Magothy aquifer, the Peedee-Upper Cape Fear aquifer, and the Potomac aquifer.

There are no private or public water supply wells or springs in the Local Study Area. The Local Study Area consists of shallow discharges to groundwater in the unconfined surficial aquifer that flows toward the Potomac River.

Based on the Natural Resources Conservation Service Soil Survey, the soils within the Local Study Area have a depth to groundwater of more than 80 inches. Most of the unconfined groundwater near the ground surface flows relatively short distances and discharges to nearby streams. A small amount of groundwater flows downward to recharge the deeper, confined aquifer.[17]

Groundwater is the source of about 33 percent of the water that county and city water departments supply to households and businesses (the public supply). In 2005 and 2008, USGS found residues of 19 types of pesticides in the shallow groundwater of the nearby Anacostia River and Rock Creek watersheds.[18] Some of the reported pesticides included banned or restricted-use substances in concentrations exceeding human health or aquatic health guidelines.

6.3.1.2. Surface Water

The Local Study Area lies within the Potomac River-Pimmit Run watershed, which drains into the Potomac-Anacostia-Occoquan watershed. The entire Local Study Area drains to the Potomac River. The only identified tributary is Roaches Run, which joins the Potomac River from the east, just south of the Local Study Area. Other water features within the Local Study Area include the Tidal Basin and the Washington Channel, on the northwest side of the Potomac River, which are man-made impoundments within the existing Potomac River channel. **Table 6-1** indicates the different categories of surface water impairments for Roaches Run, Potomac River, Washington Channel, and Tidal Basin, as well as pollutants causing the impairment. Waters are categorized based on whether they meet water quality standards (Categories 2, 3, 3a, 4a, 4b, 4c, 5).[19] As shown in **Table 6-1**, the Tidal Basin, Washington Channel, and Potomac River do not meet water quality standards for a range of pollutants. **Figure 6-2** shows water quality and storm sewer systems.

[17] E. Randolph McFarland, USGS, Design, Revisions and Considerations for Continued Use of a Ground-Water-Flow Model of the Coastal Plain Aquifer System, WRIR 98-4085. Accessed from https://va.water.usgs.gov/online_pubs/WRIR/98-4085/g-wfmcpasys_va.html. Accessed April 20, 2018.

[18] Koterba, M.T., C.A. Dieter, and C.V. Miller. 2010. Pesticides in groundwater in the Anacostia River and Rock Creek watersheds in Washington, D.C., 2005 and 2008. Scientific Investigations Report 2010–5130. United States Geological Survey. Baltimore, MD.

[19] 33 USC 1315

225 **Table 6-1** | Surface Water Impairments

Surface Water	Designated Uses	Impairment Status	Pollutants Causing Impairment Status
Roaches Run	• Recreational • Propagation and growth of a balanced indigenous population of aquatic life • Wildlife • Production of edible and marketable natural resources	Cat. 3A[1]	Not applicable[2]
Potomac River	• Navigation • Primary contact recreation • Secondary contact recreation and aesthetic enjoyment • Protection and propagation of fish, shellfish, and wildlife • Protection of human health related to consumption of fish and shellfish	Cat. 4A supporting navigation use only[3]	*E. coli*, pH, and polychlorinated biphenyls (PCBs)[4]
Washington Channel	• Navigation • Primary contact recreation • Secondary contact recreation and aesthetic enjoyment • Protection and propagation of fish, shellfish, and wildlife • Protection of human health related to consumption of fish and shellfish	Cat. 3 & Cat. 4A - supporting navigation use only	*E. coli*, pH, and toxic organics (PCBs, chlordane, DDD, DDE, DDT, Dieldrin, Heptachlor epoxide, and polycyclic aromatic hydrocarbons [PAHs]) [5]
Tidal Basin	• Navigation • Primary contact recreation • Secondary contact recreation and aesthetic enjoyment • Protection and propagation of fish, shellfish, and wildlife • Protection of human health related to consumption of fish and shellfish	Cat. 4A - supporting navigation use only	*E. coli*, pH, and toxic organics (PCBs, chlordane, DDD, DDE, DDT, Dieldrin, Heptachlor epoxide, and PAHs)[6]

[1] A Category 3 or 3A water body has insufficient or no data and information to determine if any use is attained.

[2] VDEQ. 2018. Virginia Water Quality Assessment Report 305(b)/306(d) Integrated Report 2016. Accessed from https://www.deq.virginia.gov/Portals/0/DEQ/Water/WaterQualityAssessments/IntegratedReport/2016/

[3] Category 4A is a water body category that is impaired or threatened for one or more uses and for which a TMDL has been completed.

[4] DOEE. 2016. District of Columbia Water Quality Assessment 2016 Integrated Report to the US Environmental Protection Agency and Congress Pursuant to Sections 305(b) and 303(d) Clean Water Act (P.L. 97-117). Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/2016%20Final%20IR.pdf. Accessed December 21, 2017.

[5] DOEE. 2016. District of Columbia Water Quality Assessment 2016 Integrated Report to the US Environmental Protection Agency and Congress Pursuant to Sections 305(b) and 303(d) Clean Water Act (P.L. 97-117). Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/2016%20Final%20IR.pdf. Accessed December 21, 2017.

[6] DOEE. 2016. District of Columbia Water Quality Assessment 2016 Integrated Report to the US Environmental Protection Agency and Congress Pursuant to Sections 305(b) and 303(d) Clean Water Act (P.L. 97-117). Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/2016%20Final%20IR.pdf. Accessed December 21, 2017.

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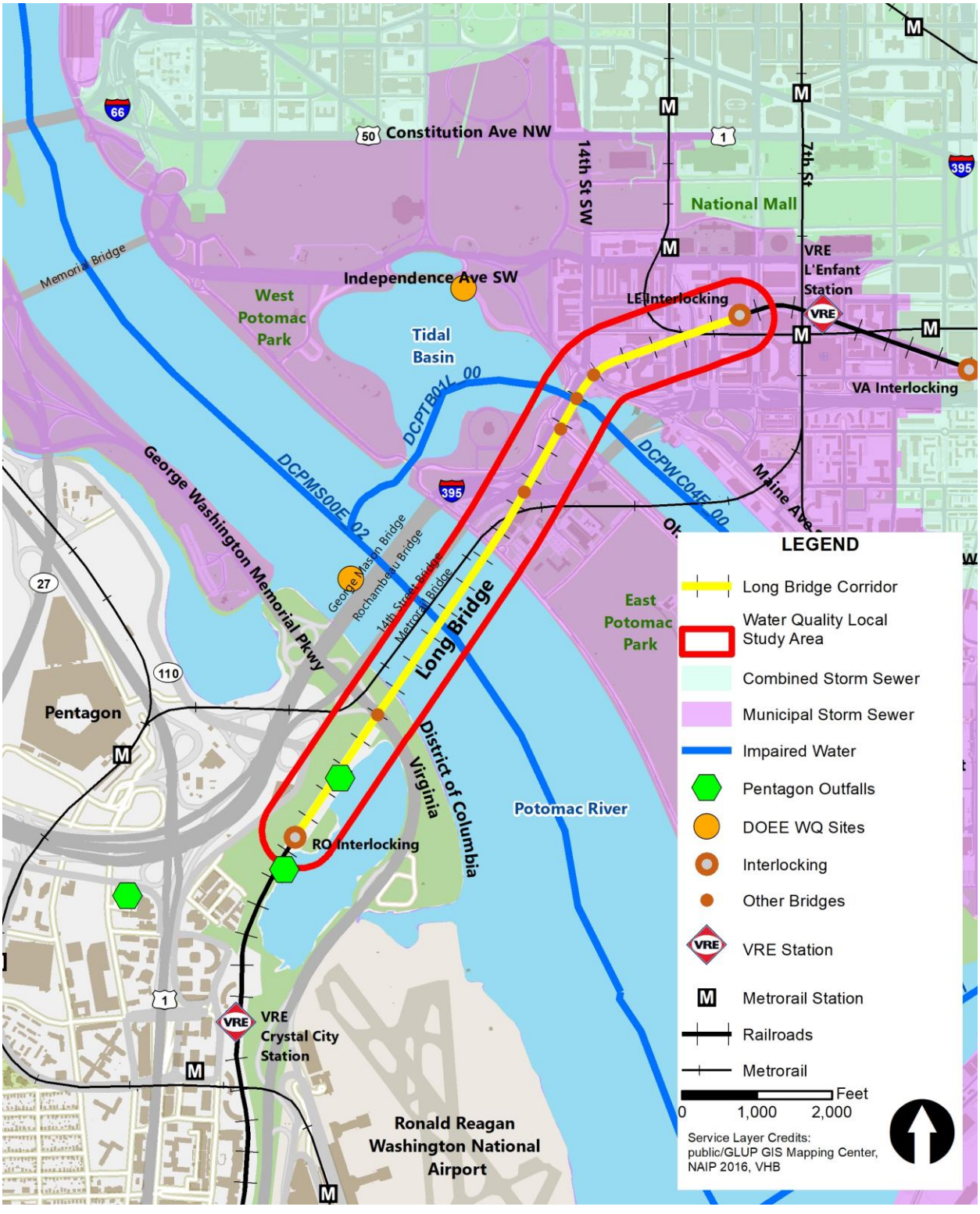
Figure 6-2 | Surface Waters, Sewer Systems, and Water Quality in the Local Study Area



Chesapeake Bay Watershed

The entire Project Area lies within the Chesapeake Bay Watershed. In 2010, the EPA established the Chesapeake Bay TMDL encompassing the 64,000-square-mile watershed. The TMDL identifies the necessary pollution reductions from major sources of nitrogen, phosphorus and sediment across the District and large sections of Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia, and sets pollution limits necessary to meet water quality standards in the Chesapeake Bay and its tidal rivers.[20]

Virginia and the District have been partners of the EPA's Chesapeake Bay Program since the Chesapeake Bay Agreement in 1983 (revised 2000). The National Park Service (NPS) is a Federal agency partner. Virginia and the District are also signatories to the 2014 Chesapeake Bay Watershed Agreement.[21] The Chesapeake Bay Agreement establishes goals and actions for protection and restoration of living resources, vital habitats, and water quality, as well as sound land use, stewardship, and community engagement. By 2025, the Chesapeake Bay Agreement partners aim to have all practices and controls installed to achieve the Bay's dissolved oxygen, water clarity, submerged aquatic vegetation, and chlorophyll-*a* standards, as articulated in the Chesapeake Bay TMDL document.

6.3.1.3. Stormwater

The following sections summarize stormwater runoff from the Project Area.

Existing Stormwater Infrastructure

Stormwater runoff from the entire Project Area eventually flows to the surface waterbodies discussed in the previous section. The majority of the Project Area consists of railroad track and ballast. Portions of the project corridor have drainage swales parallel to the railroad tracks to collect runoff. Runoff would infiltrate through the ballast and into the subsurface soils or be collected by a closed drainage system. Since Long Bridge has an open grated bridge deck, rainfall runs through the bridge directly to the Potomac River below. The existing railroad does not have drainage; since there is no separate drainage system for the railroad, runoff from the railroad likely enters the surrounding District drainage infrastructure or flows directly toward the river.

In Virginia, the railroad west of the George Washington Memorial Parkway (GWMP) is adjacent to Roaches Run and runoff from the railroad likely flows overland to this waterbody. In the District, the Project Area is within the District Municipal Separate Storm Sewer System (MS4) watershed and discharges to a surface waterbody. Stormwater runoff from the Project Area reaches the Washington Channel, Tidal Basin, or the Potomac River, depending on the existing drainage infrastructure in place. The Project Area spans over the GWMP and the associated NPS MS4.

[20] EPA. Undated. Fact Sheet: Chesapeake Bay Total Maximum Daily Load (TMDL). Accessed from https://www.epa.gov/sites/production/files/2015-07/documents/bay_tmdl_fact_sheet.pdf. Accessed December 21, 2017.
[21] Chesapeake Bay. 2014. Chesapeake Bay Watershed Agreement. Accessed from https://www.chesapeakebay.net/what/what_guides_us/watershed_agreement. Accessed November 16, 2017.

Typical Pollutants

Stormwater runoff can pick up any pollutants on the ground surface and carry them to waterbodies downstream. Pollutant sources in the Project Area include trains, aerial (atmospheric) deposition, and surrounding land uses.

Train operation may generate hydrocarbons from spills, drips, or exhaust. Additionally, lubricant and grease applied to the rails may contribute hydrocarbons to stormwater runoff. Train operation may also generate metals from the wear of wheels, brakes, and rails. Metals can collect on surfaces from aerial deposition and be washed off by stormwater in rain events. Birds nesting on bridges, underpasses, or other structures can be a source of pathogen pollutants.

Ballast consists of stable, non-hazardous materials and is not a source of stormwater pollution. The track and associated ballast are pervious surfaces and may allow for some infiltration of stormwater and filtering of pollutants. The surface of the stone ballast can adsorb (hold) pollutants. Each of these processes would limit the amount of pollutants in stormwater reaching downstream waterbodies. During larger storm events, when the storage capacity of the ballast is exceeded, the potential exists for some pollutants trapped in the ballast to be resuspended and conveyed to downstream water bodies.

Existing Stormwater Retention Volume

The existing stormwater retention volume provided a baseline for evaluating stormwater impacts to each of the three watersheds, which include the District MS4 watershed, the Potomac River, and Roaches Run in Arlington County. The analysis used land covers for areas within each watershed to calculate runoff associated with a 1.2-inch rainfall event based on the DOEE *Stormwater Management Guidebook* guidance for calculating stormwater retention volume for major land-disturbing activity.[22] As ballast contains voids and pores that retain and reduce the velocity of stormwater runoff, the analysis classified these areas as compacted. To consider pollutant buildup and wash off on existing open-deck bridges over water, the analysis considered existing open-deck bridge areas over water to be impervious for the SWRv calculations.

As it is anticipated that the project will not connect to the NPS MS4 in the vicinity of the GWMP, this watershed was not included in the analysis.

Table 6-2 shows the area within the Local Study Area and an estimation of SWRv associated with 1.2 inches of rainfall for the Local Study Area.

[22] DOEE. 2013. *Stormwater Management Guidebook*. Accessed from https://doee.dc.gov/swguidebook. Accessed August 24, 2018.

Table 6-2 | Stormwater Retention Volume for the Local Study Area

	Existing Local Study Area					
Watershed	**Paved[1] (acres)**	**Open-Deck Bridge Over Water[2] (acres)**	**Compacted[3] (acres)**	**Natural[4] (acres)**	**Total Area (acres)**	**Existing SWRv[5] (cf)**
District MS4	90.3	0.0	21.1	0.0	111.4	396,702
Potomac River	3.7	1.8	7.6	0.0	13.1	31,074
Roaches Run	9.3	0.0	20.2	19.5	48.9	60,263
TOTAL	103.3	1.8	48.9	19.5	173.4	488,039

[1] As the bridges over the Washington Channel and Tidal Basin are closed-deck, their footprints are counted as impervious area for calculating SWRv.

[2] Open-deck bridge over water counted as impervious area for calculating SWRv.

[3] Compacted Area: Land disturbed and/or graded for use as managed turf or landscaping.

[4] Natural Area: Land that is undisturbed and exhibits hydrologic properties equal to or better than meadow in good condition.

[5] Calculated using 1.2 inches of rainfall as required for Major Land Disturbing Activities.

6.3.2. Wetlands and Other Waters of the U.S.

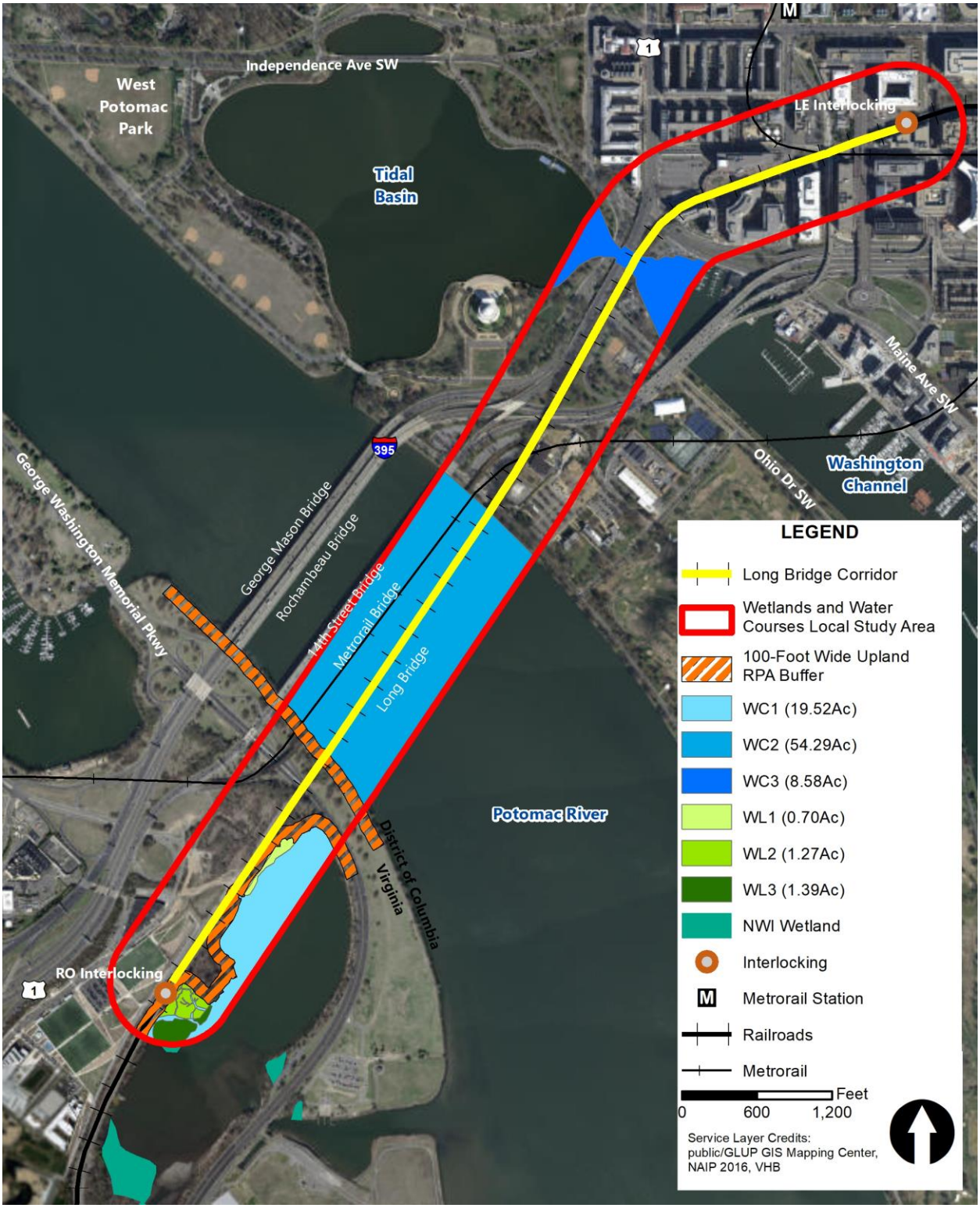
On November 8 and 22, 2017, the analysis field investigated the Local Study Area to identify and survey the boundaries of waters of the U.S., including wetlands. The field investigation identified three tidal waters and three tidal wetlands. The tidal waters include Roaches Run, Potomac River, Washington Channel, and the Tidal Basin. The Potomac River, Washington Channel, and the Tidal Basin extend upstream and downstream of the Local Study Area. Roaches Run also continues downstream of the Local Study Area. The analysis classified all tidal waters as riverine tidal (R1). Tidal wetlands include one palustrine scrub-shrub (PSS) wetland and a single palustrine forested (PFO) wetland, and a palustrine emergent system contiguous to Roaches Run in the southern portion of the Local Study Area. **Figure 6-3** shows the locations of the delineated wetlands and watercourses. **Chapter 5, Natural Ecological Systems and Endangered Species** describes wetland vegetation.

Wetland 1 totals approximately 0.70 acres in size. It is a fringe wetland that abuts a narrow strip of early-successional forest located south of the railroad tracks in the southwestern portion of the Local Study Area. The analysis classified this system as palustrine scrub-shrub broad-leaved deciduous, seasonally flooded tidal (PSS1R).

Wetland 2 totals approximately 1.27 acres in size. It is a floodplain wetland fragmented by several tidal guts contiguous with Roaches Run. Wetland 2 lies southwest of Wetland 1 in the southwestern portion of the Local Study Area. The analysis classified this system as palustrine forested broad-leaved deciduous, seasonally flooded tidal (PFO1R).

Wetland 3 is a freshwater tidal marsh classified as a palustrine, non-persistent emergent system (PEM2R). It is at the southern end of the Local Study Area and contiguous with the western shoreline of Roaches Run. Approximately 1.39 acres of this wetland occurs within the Local Study Area, and the remainder of the marsh extends further south, outside of the Local Study Area.

Figure 6-3 | Wetlands and Watercourses in the Local Study Area



6.3.3. Flood Hazards and Floodplain Management

Figure 6-4 shows the mapped 100-year (1 percent annual chance floodplain) and 500-year floodplains (0.2 percent chance annual floodplain) within the Local Study Area along Roaches Run, the mainstream of the Potomac River, the Washington Channel, and the Tidal Basin.[23,24] The majority of the Local Study Area contains 100-year and 500-year floodplains. Ranging from less than 200 feet to more than 3,000 feet in width, these floodplains fall within densely developed or grassy maintained areas. The base flood elevation, which is the computed elevation that floodwater reaches during the 100-year flood (the base flood), within the Local Study Area is between 11 and 12 feet. This puts the existing Long Bridge's bottom girders approximately 6 feet above 100-year floodwaters.

Given the size of the water body and its contributing watershed, the immediate surroundings do not affect the intensity of flooding. The Potomac River at the Local Study Area is a large river basin with a drainage area of more than 11,560 square miles, and a 100-year flood discharge of more than 475,000 cubic feet per second.[25] The infrastructure and natural areas near, upstream, and downstream of the Project shape the extent of flooding.

Floods along the Potomac River generally result from a combination of tidal effects and fluvial flows upstream of the District. Due to the heavily urbanized nature of the District and adjacent Arlington County, the shoreline is a mosaic of natural areas and hardened shorelines. Flood control infrastructure built under the Flood Control Act of 1936 includes the 17th Street levee system, upstream of the Local Study Area.[26] This levee system includes an approximately 12-foot-high earthen levee that runs along the Lincoln Memorial Reflecting Pool, a floodwall closure at 17th Street NW, and temporary sandbag closures at 23rd Street and Constitution Avenue, and along P Street SW. The levees and closures function as a system to provide flood-risk management. USACE regulates the levee system; NPS operates and maintains it. In 2016, FEMA "accredited" the levee system and issued a revised flood insurance rate map for the District. This map includes localized flooding hazards in the Federal Triangle Area, and other vulnerable low-laying areas of the District, but it does not revise the flood hazard at the Local Study Area.[27]

[23] For floodplain information for the DC and Potomac to the Virginia Shoreline: FEMA. 2010. Flood Insurance Rate Map 110001 0018C, 0049C, 0056C, and 0057C dated effective September 27, 2019; and FEMA. 2016. Letter of Map Revisions Case No 15-03-2388P, Issued May 26, 2016.

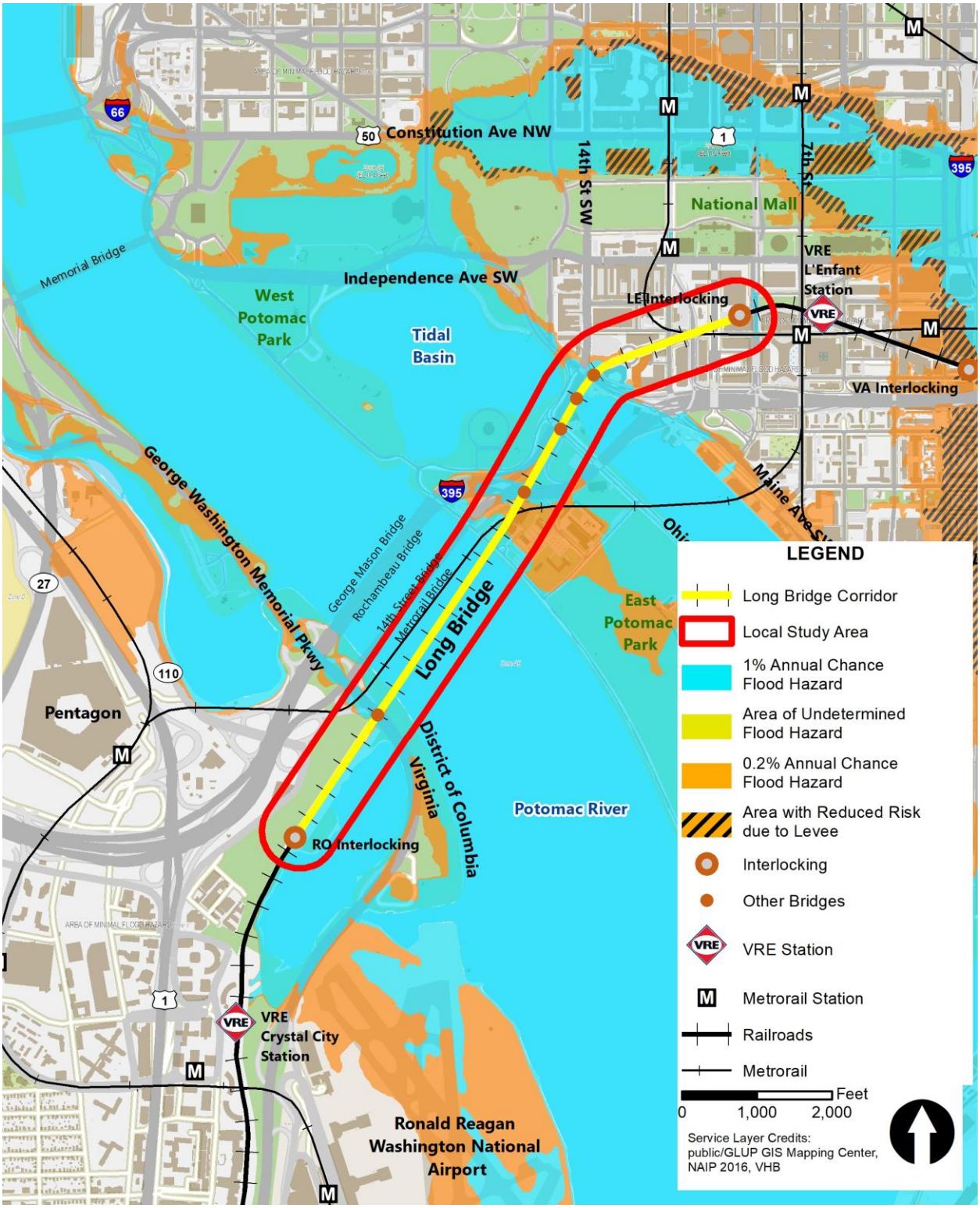
[24] For floodplain information for Virginia: FEMA. 2013. Flood Insurance Rate Map 51013C 0081C, 0043C, dated effective August 19, 2013.

[25] FEMA. Undated. Flood Insurance Study (FIS), District of Columbia, 110001V00A, Revised September 27, 2010.

[26] Flood Insurance Study, District of Columbia.

[27] USACE. October 31, 2014. D.C. Levee closure construction completed at 17th street – improvements will better protect Federal Triangle and residents. Accessed from http://www.nab.usace.army.mil/Media/News-Releases/Article/547399/dc-levee-closure-construction-completed-at-17th-street-improvements-will-better/. Accessed May 3, 2018.

342 **Figure 6-4** | Flood Hazard Zones in the Local Study Area



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6.3.4. Chesapeake Bay Preservation Areas

In addition to the waterbodies and wetlands, several RPA buffers are present in Arlington County within the Local Study Area along the west boundary of the Potomac River, on the northern boundary of Roaches Run, and along tidal wetlands contiguous to Roaches Run, as shown in **Figure 6-3**. The area within the delineated RPA buffer along the Virginia side of the Potomac River consists of transportation corridors and maintained park land with scattered trees. Along Roaches Run and its contiguous wetlands, the RPA buffer consists of mostly disturbed forest and scrub-shrub vegetation, although the railroad tracks also cross portions of the RPA.

6.3.5. Coastal Zone Management

Virginia's coastal zone includes the Tidewater region, encompassing 29 counties, 15 cities, and 42 towns. Four tidal rivers are in this zone, including the Potomac River and its direct tributaries. Therefore, the entire Local Study Area in Virginia is within Virginia's designated coastal zone and subject to the consistency regulations requiring a Federal consistency determination.

6.4. Permanent or Long-Term Effects

This section discusses the permanent or long-term effects following the construction of the No Action Alternative and Action Alternatives on water quality and water resources within the Local and Regional Study Areas. For a complete description of the permanent or long-term effects, see **Appendix D3, Environmental Consequences Report**.

6.4.1. Water Quality

6.4.1.1. No Action Alternative

The No Action Alternative includes planned and funded transportation projects likely to be implemented by 2040, and maintenance projects necessary to keep the existing bridge and Corridor in service. Projects within the Local Study Area include the Fourth Track Virginia (VA) to L'Enfant (LE) Interlocking and the L'Enfant South Storage Track projects, both located in the northeastern portion of the Local Study Area, and the DC to Richmond Southeast High Speed Rail (DC2RVA) project, located at the southeastern extent of the Local Study Area. Each of these projects would likely result in a slight increase in impervious area or conversion of a small area from previously disturbed vegetated area to rail ballast.

6.4.1.2. Action Alternative A (Preferred Alternative)

Action Alternative A would result in minor permanent direct adverse impacts to water quality without mitigation. As indicated in **Table 6-3** and described below, changes to land cover anticipated within each of the three watersheds within the Local Study Area would result in an increase in SWRv for the Potomac River watershed:

- The new bridge over the George Washington Memorial Parkway would result in an increase in impervious area of less than 0.01 acres, as almost the entire area within the bridge footprint is impervious under existing conditions.

- The new closed-deck bridge over the Potomac River, parallel to the existing open-deck bridge to remain, would result in an approximately 1.9-acre increase in impervious area in the Potomac River watershed.
- As the proposed bridges in the District MS4 watershed are generally located over existing impervious areas and the alignment of the proposed railroad would require replacing existing impervious area with rail ballast, this work would result in an approximate 0.8-acre decrease in impervious area within the District MS4 watershed.

Table 6-3 | Action Alternative A SWRv Comparison to No Action Alternative

Watershed	Action Alternative A Change from No Action Alternative within Local Study Area					SWRv[6] Change from No Action Alternative (cf)	SWRv Change from No Action Alternative (%)
	Paved[1] (acres)	Open-Deck Bridge Over Water[2] (acres)	Open Water[3] (acres)	Compacted[4] (acres)	Natural[5] (acres)		
District MS4	-0.8	0.0	-0.2	1.0	0.0	-2,190	-0.6
Potomac River	1.9	0.0	-1.9	0.0	0.0	7,796	25.1
Roaches Run	<0.01	0.0	0.0	0.0	0.0	1	0.0
TOTAL	1.1	0.0	-2.1	1.0	0.0	5,607	1.1

[1] As the bridges over the Washington Channel and Tidal Basin are closed-deck, their footprints are counted as impervious area for calculating SWRv.

[2] Open-deck bridge over water counted as impervious area for calculating SWRv.

[3] Open water excluded from SWRv calculation.

[4] Compacted Area: Land disturbed and/or graded for use as managed turf or landscaping or rail ballast.

[5] Natural Area: Land that is undisturbed and exhibits hydrologic properties equal to or better than meadow in good condition.

[6] Calculated using 1.2 inches of rainfall as required for Major Land Disturbing Activities.

Groundwater

Action Alternative A would have no long-term impact to groundwater quality, as it would not introduce pollutants into the groundwater or alter existing groundwater flow patterns. Action Alternative A would result in an increase in impervious area as a result of the new closed bridge deck. However, since almost the entire increase is in an area of existing open water, Action Alternative A would have negligible long-term adverse impacts on groundwater quantity through reduction in groundwater recharge.

Surface Water

Action Alternative A impacts to surface water quality would range from negligible to minor and would include both adverse and beneficial direct impacts. There would be no changes to drainage subwatersheds as a result of Action Alternative A. Specifically:

- Negligible adverse direct impacts on surface water quality would result from the minor increase in impervious area tributary to Roaches Run.

- The existing and proposed bridges would have minor adverse direct impact on surface water quality within the Potomac River given the anticipated pollutant load from the area relative to the volume of the receiving surface water body. Under Action Alternative A, the existing open-deck Long Bridge would remain in place. Precipitation within the bridge footprint would continue to discharge directly to the Potomac River through bridge openings, carrying with it any pollutants built up on the bridge. Action Alternative A would also include a new bridge with a closed deck and a closed drainage system to collect runoff within the bridge footprint. The footprint of this new bridge would be subject to the same pollutants as the existing bridge, resulting in an increase in area for these pollutants to build up and wash-off.
- Action Alternative A would have a negligible beneficial direct impact on surface water quality within the Potomac River based on the reduction in impervious area tributary to the District MS4 and given the anticipated pollutant load from the area relative to the volume of the receiving surface water body.
- Action Alternative A could have a negligible adverse direct impact on surface water quality within the Potomac River due to a potential increase in birds nesting on the bridge, which could result in an increase in pathogen pollutants.

Permit requirements for wetlands and surface waters are discussed in **Section 6.2.1.2, Regulatory Context, Water Quality**.

Stormwater

Action Alternative A would have no long-term impacts to stormwater infrastructure. There may be a need for minor modifications to District, NPS, and Arlington County drainage infrastructure within the Local Study Area, such as new catch basins, drainage pipes, water quality inlets, and pipe connections within the District, to accommodate new bridges and other changes to the railroad configuration.

Action Alternative A would have negligible adverse direct impacts to Roaches Run and minor beneficial direct impacts to the District MS4 due to changes in impervious surface. As the increase in impervious area within the Potomac River watershed is almost entirely over existing open water, Action Alternative A would have a negligible adverse direct impact on recharge, peak runoff rates, or total runoff volume in the Potomac River watershed.

At the design phase, a Stormwater Management Plan would be developed for the project in compliance with Chapter 60 of the Arlington County Code and in accordance with DOEE review requirements. The Stormwater Management Plan would detail the location and design of all planned stormwater management facilities serving the project.

In addition, stormwater management facilities would be designed in accordance with Title 40 Code of Federal Regulations (CFR) Part 122.26 – Storm Water Discharges; the District's Water Pollution Control Act of 1984; the District's Storm Water Permit Compliance Amendment Act of 2000; and Title 21 of the District's Municipal Regulations (Chapter 11- Water Quality Standards and Chapter 19 – Water Quality Monitoring Regulations).

6.4.1.3. Action Alternative B

Action Alternative B would result in minor permanent direct adverse impacts to water quality, as shown in **Table 6-4,** similar to the impacts under Action Alternative A. Impacts would be the same within the Roaches Run and District MS4 watersheds, while the increase in impervious surface within the Potomac River watershed would be approximately 3.8 acres due to the addition of two new, closed-deck bridges and removal of the existing open-deck bridge.

Table 6-4 | Action Alternative B SWRv Comparison to No Action Alternative

Watershed	Action Alternative B Change from No Action Alternative within Local Study Area					SWRv[6] Change from No Action Alternative (cf)	SWRv Change from No Action Alternative (%)
	Paved[1] (acres)	Open-Deck Bridge Over Water[2] (acres)	Open Water (acres)[3]	Compacted[4] (acres)	Natural[5] (acres)		
District MS4	-0.8	0.0	-0.2	1.0	0.0	-2,190	-0.6
Potomac River	3.8	-1.8	-2.0	0.0	0.0	8,340	29.2
Roaches Run	<0.01	0.0	0.0	0.0	0.0	1	0.0
TOTAL	3.0	-1.8	-2.2	1.0	0.0	6,151	1.3

[1] As the bridges over the Washington Channel and Tidal Basin are closed-deck, their footprints are counted as impervious area for calculating SWRv.

[2] Open-deck bridge over water counted as impervious area for calculating SWRv.

[3] Open water excluded from SWRv calculation.

[4] Compacted Area: Land disturbed and/or graded for use as managed turf or landscaping or rail ballast.

[5] Natural Area: Land that is undisturbed and exhibits hydrologic properties equal to or better than meadow in good condition.

[6] Calculated using 1.2 inches of rainfall as required for Major Land Disturbing Activities.

6.4.2. Wetlands and Other Waters of the United States

The anticipated permanent impacts to waters of the United States from the Action Alternatives would result from placing piers in the Potomac River and Washington Channel/Tidal Impoundment. **Figures 6-5** and **6-6** illustrate and **Table 6-5** summarizes permanent impacts for wetlands and other waters of the United States by delineated feature for each Action Alternative. Based on this table, there is no difference in impacts to wetlands and other waters of the United States for each Action Alternative.

6.4.2.1. No Action Alternative

The No Action Alternative would have no adverse direct or indirect impacts to wetlands and other waters of the United States. The majority of these projects are not located adjacent to wetlands. The DC2RVA Project would include work adjacent to Roaches Run, but as documented in the Final

Environmental Impact Statement (FEIS) for that project, it would not affect that water body or its associated wetlands.[28]

6.4.2.2. Action Alternative A (Preferred Alternative)

Action Alternative A would have minor permanent direct adverse impacts to wetlands and other waters of the United States due to the placing of piers in the Potomac River and the Washington Channel. **Figure 6-5** shows these impacts.

6.4.2.3. Action Alternative B

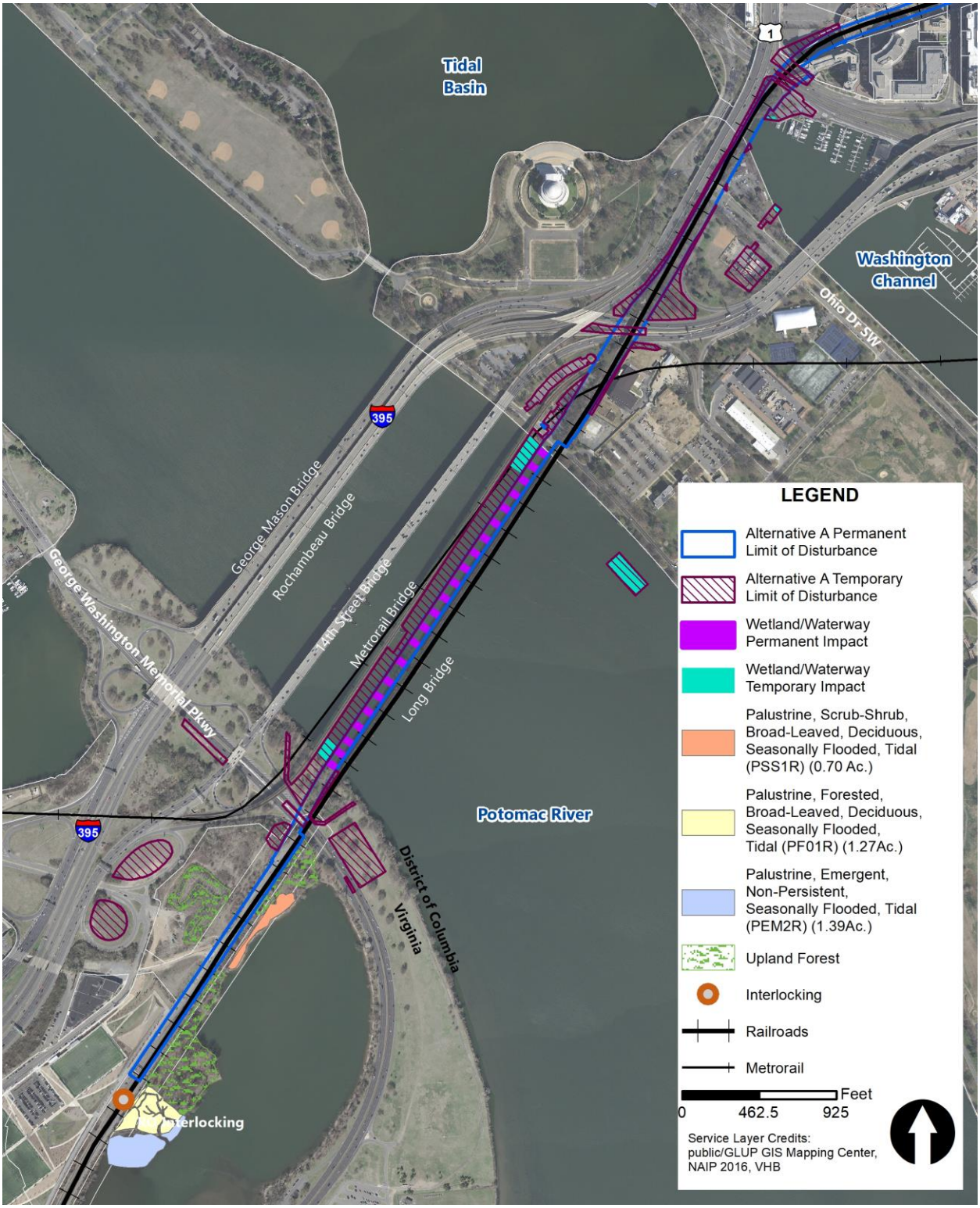
The permanent impacts to wetlands and other waters of the United States under Action Alternative B would be the same as the impacts under Action Alternative A. **Figure 6-6** shows these impacts.

Table 6-5 | Permanent Impacts to Waters of the United States (Including Wetlands) by Feature

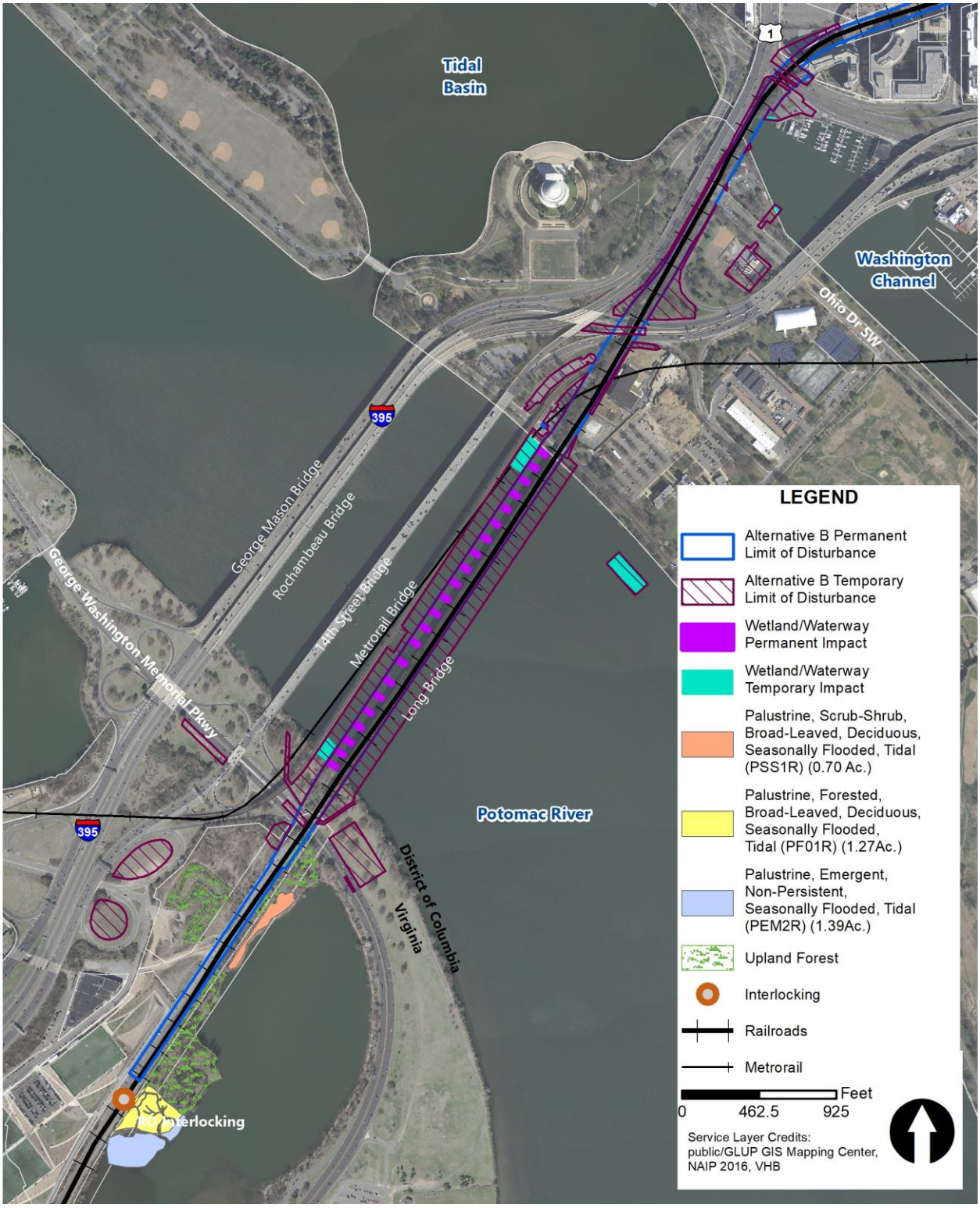
Resource	State	Action Alternative A	Action Alternative B
Wetland 1 (PSS1R)	Commonwealth of Virginia	0 sf (0 acres)	0 sf (0 acres)
Wetland 2 (PFO1R)	Commonwealth of Virginia	0 sf (0 acres)	0 sf (0 acres)
Wetland 3 (PEM1R)	Commonwealth of Virginia	0 sf (0 acres)	0 sf (0 acres)
Roaches Run (R1UBV)	Commonwealth of Virginia	0 sf (0 acres)	0 sf (0 acres)
Potomac River (R1UBV)	District of Columbia	22,000 sf (approx. 0.5 ac)	22,000 sf (approx. 0.5 acre)
Washington Channel/Tidal Impoundment (R1UBV)	District of Columbia	1,037 sf (<0.1 acre)	1,037 sf (<0.1 acre)
Total Wetlands		0 sf (0 acres)	0 sf (0 acres)
Total Waters		23,037 sf (approx. 0.5 acre)	23,037 sf (approx. 0.5 acre)

[28] Virginia Department of Rail and Public Transportation. DC to Richmond Southeast High Speed Rail Final Environmental Impact Statement and Final Section 4(f) Evaluation, Updated Environmental Resource Mapbooks. May 2019. Accessed from http://dc2rvarail.com/files/4115/5380/5868/Part48b_Appendix_M1_Wetlands_Streams_Area1_-_Area2_Part1_DC2RVA_FEIS.pdf. Accessed July 16, 2019.

Figure 6-5 | Action Alternative A Permanent and Temporary Impacts to Wetlands and Waterways



468 **Figure 6-6 |** Action Alternative B Permanent and Temporary Impacts to Wetlands and Waterways



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6.4.3. Flood Hazards and Floodplain Management

FEMA has identified the current 100-year floodplain elevation to be 11.5 feet at the point of the Long Bridge crossing of the Potomac River. This elevation takes into consideration the effects of the existing bridge pile structures. The range and extent of the floodplain within the Local Study Area are described in **Appendix D2, Affected Environment Report.**

6.4.3.1. No Action Alternative

The No Action Alternative would have no adverse direct or indirect impacts to the base flood (100-year floodplain) elevation or boundary. Under the No Action Alternative, the existing railroad bridge and infrastructure throughout the Long Bridge Corridor would continue to function and operate under existing conditions. None of the projects included in the No Action Alternative are expected to affect the base flood elevation or boundary within the Local Study Area.

6.4.3.2. Action Alternative A (Preferred Alternative)

Action Alternative A would have negligible permanent direct adverse impacts to the base flood (100-year floodplain) elevation or boundary. Constructing a new two-track bridge upstream of the existing Long Bridge and the redevelopment of the existing Corridor to expand the north-south rail system from two tracks to four tracks would require 22 new piers within the Potomac River as well as earthwork, abutments, and piers within the upland in and adjacent to the floodplain. The design of the new bridges, piers, and abutments would take their impacts to the Potomac River floodplain into consideration.

Given the expanse of the current flood zone, the design of the new piers as elliptical in shape, and the minimization of appurtenant structures within the upland in and adjacent to the floodplain, any resulting increase in the elevation or extent of the floodplain would be negligible. Furthermore, the bottom of the bridge superstructure is 18 feet above Mean High Water, or more than 9 feet above the 100-year floodplain, and therefore would have a negligible impact on the floodplain. Construction of the bridge embankments and piers would result in an impact of approximately 12,000 cubic yards within the 100-year floodplain. The level of impact is not expected to trigger FEMA's 1-foot threshold requirement described above. Prior to final design, an analysis of the potential flooding increase would be performed using a FEMA-approved model to demonstrate no major rise in, and thus no adverse effect of, the water surface of the base flood (100-year floodplain).

6.4.3.3. Action Alternative B

The permanent impacts under Action Alternative B would be the same as the impacts under Action Alternative A given that Action Alternative B includes the same proposed construction of a new two-track bridge upstream of the existing Long Bridge and the replacement of the existing Long Bridge to a configuration consistent with its current design; thus, adverse direct impacts would be negligible.

6.4.4. Chesapeake Bay Preservation Areas

The analysis identified RPAs, as defined by the Chesapeake Bay Preservation Ordinance in Arlington County, in conjunction with the wetland delineation. Chesapeake Bay Preservation Areas within the Local Study Area include all protected wetland and waters, as well as the 100-foot upland buffer from the delineated edge for the purpose of protecting water quality of the Chesapeake Bay. Because

wetland and water impacts are discussed in **Section 6.3.2, Wetlands and Other Waters of the United States**, the following sections specifically discuss the 100-foot upland buffer. As these resources are only delineated under Commonwealth of Virginia law, they end at the Virginia edge of the Potomac River and are not delineated in the District. The 100-foot RPA buffer occurs in a number of locations within the Virginia portion of the Long Bridge Corridor. Areas include the southern end of the Local Study Area and along the Potomac River shoreline in Virginia. Permanent impacts to RPA upland buffers would include those areas converted to infrastructure and impervious surface that could increase pollutant loads to the Potomac River. The impact analysis did not consider the portions of the RPA that are currently impervious.

6.4.4.1. No Action Alternative

Most of the projects in the No Action Alternative would not be located near RPAs and would therefore have no adverse direct or indirect impacts to RPAs. However, the DC2RVA Project would have adverse impacts to the RPA associated with Roaches Run, as documented in the FEIS for the project. [29]

6.4.4.2. Action Alternative A (Preferred Alternative)

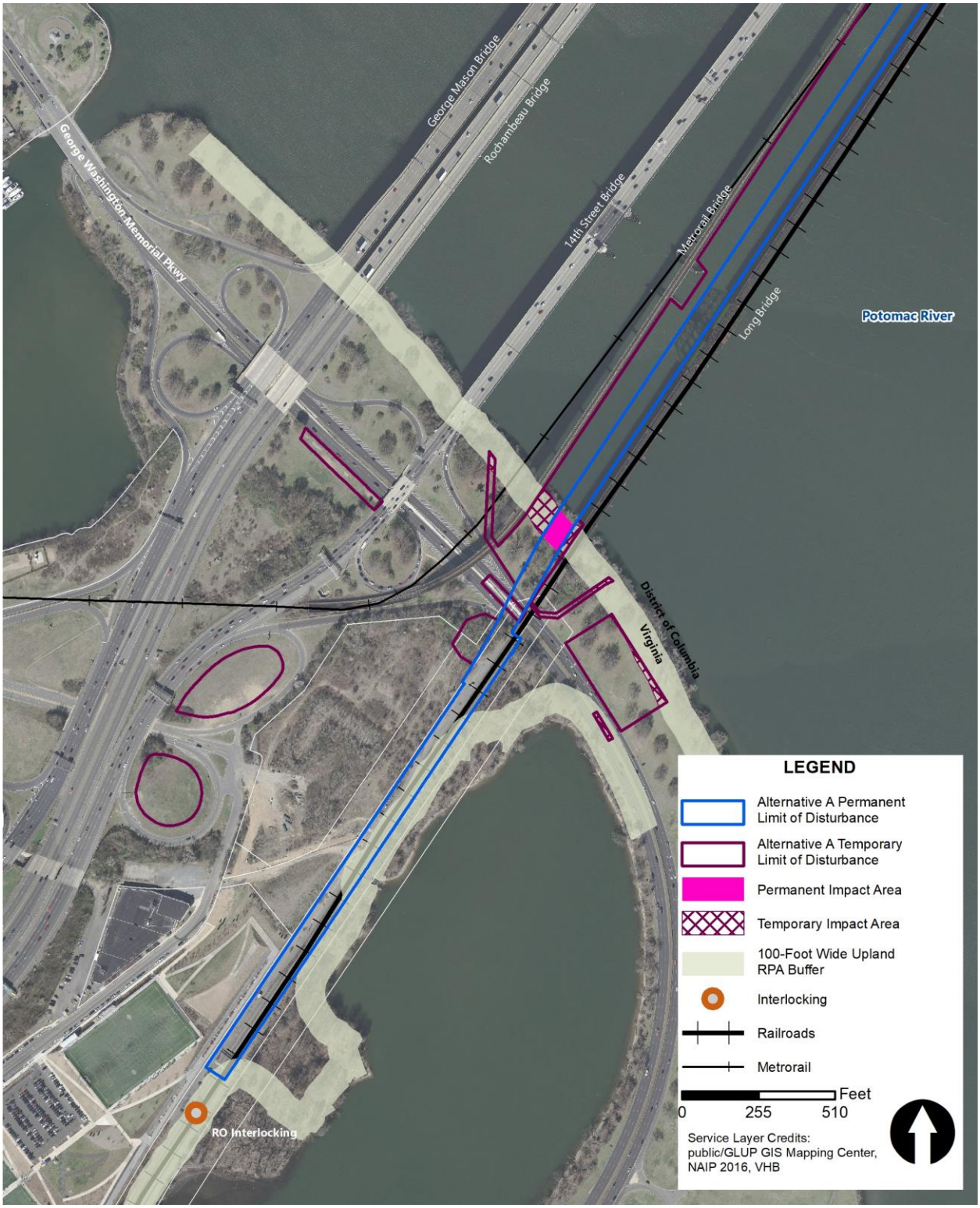
Under Action Alternative A, there would be minor permanent direct adverse impacts to the RPA. The new bridge structure would cross over the RPA along the Potomac River at the southern end of the Local Study Area. The decking of the new bridge would create additional impervious surface causing a permanent impact to the RPA through increased pollutant loading to waterbodies and loss of vegetation underneath bridge areas. This impact would be approximately 7,359 square feet (0.2 acre) for Action Alternative A. There would be no indirect impacts to the RPA under Action Alternative A. **Figure 6-7** shows impacts to the RPA for this alternative.

6.4.4.3. Action Alternative B

Under Action Alternative B, there would be minor permanent direct adverse impacts to the RPA. The new bridge structure would cross over the RPA along the Potomac River at the southern end of the Local Study Area, and result in similar pollutant concerns and vegetation loss as with Action Alternative A. In addition, there would be a slight increase in the deck width of the replacement bridge compared to the existing bridge. This impact would be approximately 11,462 square feet (0.3 acre) for Action Alternative B. There would be no indirect impacts to the RPA under Action Alternative B. **Figure 6-8** shows impacts to the RPA for Alternative B.

[29] Virginia Department of Rail and Public Transportation. DC to Richmond Southeast High Speed Rail Final Environmental Impact Statement and Final Section 4(f) Evaluation, Updated Environmental Resource Mapbooks. May 2019. Accessed from http://dc2rvarail.com/files/4115/5380/5868/Part48b_Appendix_M1_Wetlands_Streams_Area1_-_Area2_Part1_DC2RVA_FEIS.pdf. Accessed July 16, 2019.

537 **Figure 6-7 |** Action Alternative A Impacts to Vegetation within the RPA



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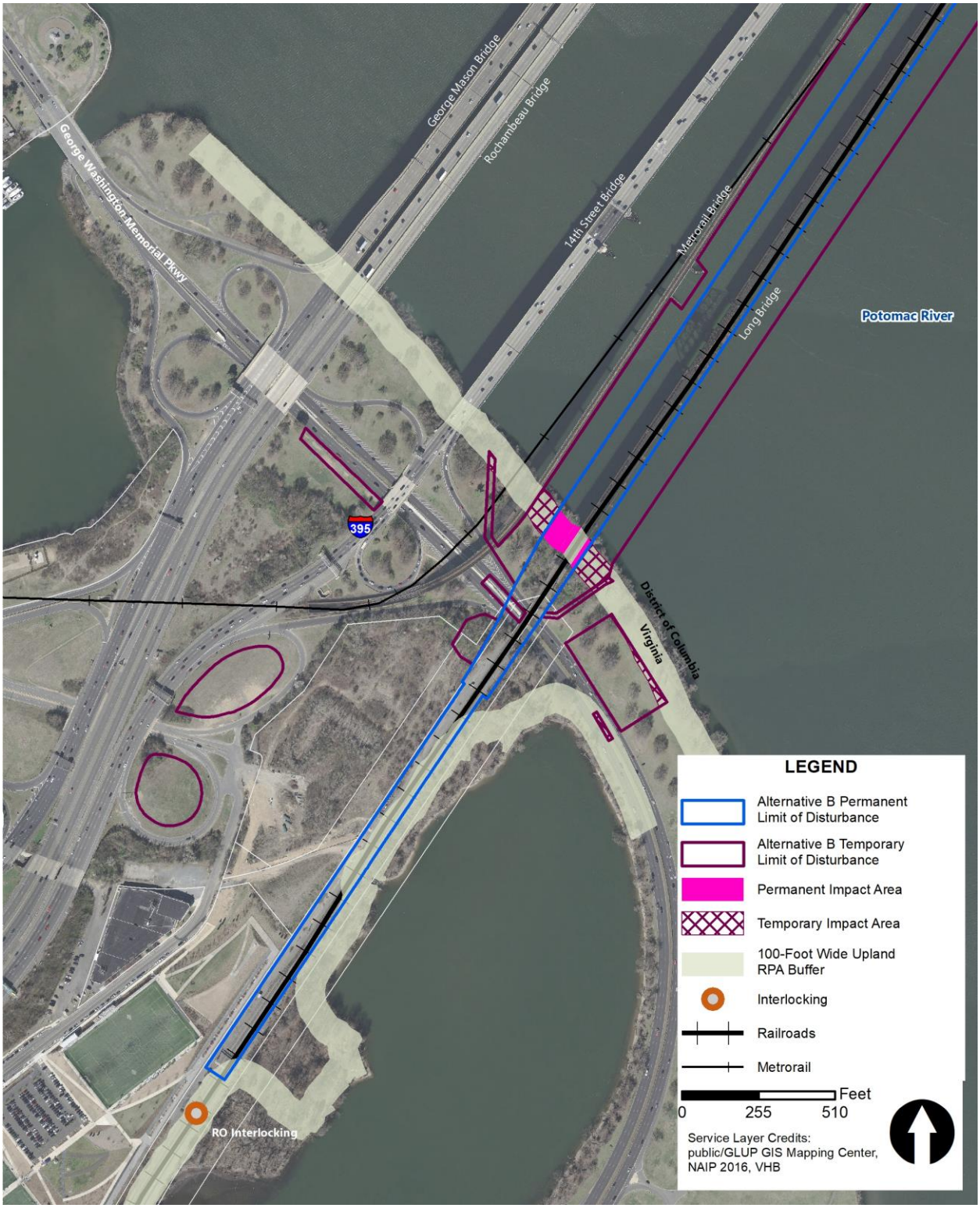
539 **Figure 6-8** | Action Alternative B Impacts to Vegetation within the RPA



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6.4.5. Coastal Zone Consistency

FRA and DDOT expect the Project to be consistent with the enforceable policies of Virginia's CZMP, as described in the draft Consistency Determination, pending review by VDEQ. FRA's draft Consistency Determination was submitted to VDEQ on August 9, 2019. The Federal Consistency Determination commits the Project to a variety of actions related to consistency with Virginia's CZMP, including obtaining permits and approvals related to stormwater management, RPAs, coastal lands, water resources, and other environmental resources.

6.5. Temporary Effects

This section discusses the direct or indirect temporary effects of the No Action Alternative and Action Alternatives during construction, based on conceptual engineering design. For a complete description of the temporary effects to water quality and water resources, see **Appendix D3, Environmental Consequences Report**.

6.5.1. Water Quality

Soil erosion and sedimentation caused by construction may result in temporary adverse direct impacts to water quality within Local Study Area. These activities can include construction of the railroad bed, tracks, bridges, staging and laydown areas, access locations, and dewatering operations. Construction activities could result in increased likelihood of spills of fuels, lubricants, or other pollutants.

6.5.1.1. No Action Alternative

Groundwater

Construction activities associated with projects in the No Action Alternative are not anticipated to extend into the water table.

Surface Water

The proposed DC2RVA project area would result in land-disturbing activities immediately upgradient of Roaches Run, and the Fourth Track VA to LE Interlocking and the L'Enfant South Storage Track projects would result in land-disturbing activities tributary to the District MS4. The No Action Alternative construction activities will include erosion and sediment controls and management of construction wastes to prevent stormwater impacts, in compliance with EPA's 2017 NPDES Construction General Permit,[30] 2018 VPDES Storm Water General Permit,[31] DOEE's *Erosion and Sediment Control Manual*,[32]

[30] US Environmental Protection Agency (EPA). 2017. *National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Activities*. Accessed from https://www.epa.gov/sites/production/files/2017-06/documents/2017_cgp_final_permit_508.pdf. Accessed June 15, 2018.

[31] Commonwealth of Virginia. 2018. *General VPDES Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems*. Accessed from https://www.deq.virginia.gov/Portals/0/DEQ/Water/PollutionDischargeElimination/MS4/20181106_2018_Virginia_MS4_General%20Permit_ADACompliant%20(1).pdf?ver=2019-03-08-160940-160. Accessed July 2, 2019.

[32] District Office of Energy and Environment. 2017. *Erosion and Sediment Control Manual*. Accessed from https://doee.dc.gov/esc. Accessed June 15, 2018.

Chapter 57 of the Arlington County Code, and the *Virginia Erosion and Sediment Control Handbook*.[33] A Stormwater Pollution Prevention Plan (SWPPP) would be required to document compliance with the above requirements.

Stormwater

Projects associated with the No Action Alternative that are tributary to the District MS4 have the potential to adversely impact District MS4 infrastructure by transporting sediment into drainage infrastructure during construction. Sediment in a drainage system can result in lost conveyance capacity and shallow flooding. It is anticipated that any temporary adverse impact would be mitigated through these projects' compliance with EPA's 2017 NPDES Construction General Permit,[34] 2018 VPDES Storm Water General Permit, DOEE's *Erosion and Sediment Control Manual*, Chapter 57 of the Arlington County Code, and the *Virginia Erosion and Sediment Control Handbook*.

6.5.1.2. Action Alternative A (Preferred Alternative)

The anticipated construction duration for Action Alternative A is approximately 5 years. Temporary land-disturbing activities include the temporary relocation of the Mount Vernon Trail (MVT), laydown areas, and access points to the Potomac River and Washington Channel.

Groundwater

Excavation for bridge footings and for work within the tunnel under Maryland Avenue SW associated with Action Alternative A would likely occur below the water table and would therefore need dewatering. The contractor would need to comply with EPA's dewatering requirements,[35] as well as DOEE, DC Water, and VDEQ requirements for treatment and metering of pumped groundwater. Compliance with these requirements would mitigate any impacts.

Pumped groundwater from excavations would be discharged to either the District MS4 or via overland flow to surface waters. See the **Surface Water** and **Stormwater** sections below for summaries of water quality impacts.

Surface Water

Action Alternative A construction would not impact surface water quality. Construction activities must include erosion and sediment controls and management of construction wastes to prevent stormwater impacts in compliance with EPA's 2017 NPDES Construction General Permit, 2018 VPDES Storm Water General Permit, DOEE, and Virginia requirements. Since the area of ground disturbing impacts will exceed 5,000 square feet, an Erosion and Sedimentation Plan and a Stormwater Management Plan with

[33] VDEQ. Undated. Virginia Erosion and Sediment Control Handbook. Accessed from http://www.deq.virginia.gov/Programs/Water/StormwaterManagement/Publications/ESCHandbook.aspx. Accessed January 12, 2018.
[34] US Environmental Protection Agency (EPA). 2017. *National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Activities*. Accessed from https://www.epa.gov/sites/production/files/2017-06/documents/2017_cgp_final_permit_508.pdf. Accessed June 15, 2018.
[35] EPA. 2017. *NPDES General Permit for Construction Activities. Section 2.4 Construction Dewatering Requirements*. Accessed from https://www.epa.gov/sites/production/files/2017-06/documents/2017_cgp_final_permit_508.pdf. Accessed June 15, 2018.

BMPs will need to be submitted to DOEE. Compliance with construction-phase stormwater management requirements would mitigate any impacts.

Piers for the proposed new bridge spanning the Potomac River upstream of the existing Long Bridge would be constructed using barges, temporary finger piers, and coffer dams. This type of in-water work has the potential to result in suspension of dredged sediment and temporary, minor adverse impacts on water quality in the Potomac River. DOEE and VDEQ would issue permits under Section 401 of the Clean Water Act, which includes requirements for dewatering and dredging within Waters of the United States. **Section 6.2.1.2, Wetlands and Other Waters of the United States** provides additional information on Section 401.

Construction staging, laydown areas, access locations, dewatering operations, and other required disturbance to groundcovers can also result in erosion and sedimentation, which could result in temporary, minor adverse impacts to surface water quality in the Potomac River, Roaches Run, and the Washington Channel. However, adverse impacts to surface water quality would be avoided through implementation of temporary treatment measures designed to satisfy the requirements of the erosion and sedimentation control requirements referenced above.

Stormwater

Action Alternative A construction would result in negligible temporary direct adverse impacts to stormwater infrastructure and stormwater quality. Construction activities within the District, Arlington, and NPS MS4 areas include removal of impervious and previously developed pervious surfaces to accommodate the proposed railroad ballast areas and excavation for the construction of bridge abutments. This work could result in construction dewatering and exposure of erodible soils, which have the potential to contribute sediment to the District, Arlington, and NPS MS4s, potentially resulting in a loss of capacity of the existing closed drainage systems. All activities would comply with EPA's 2017 NPDES Construction General Permit, 2018 VPDES Storm Water General Permit, DOEE, and Virginia construction-phase stormwater management requirements to minimize impact to the District, Arlington, and NPS MS4s.

6.5.1.3. Action Alternative B

Construction activities associated with Action Alternative B work would be similar to those for Action Alternative A, including the temporary relocation of the MVT, laydown areas, and access points to the Potomac River and Washington Channel. However, the demolition of the original Long Bridge, and the anticipated construction duration for Action Alternative B is twice that of Action Alternative A, at approximately 8 years and 3 months. As a result, Action Alternative B has an increased potential to adversely impact water quality.

6.5.2. Wetlands and Other Waters of the United States

6.5.2.1. No Action Alternative

The No Action Alternative would have no adverse temporary impacts to wetlands and other waters of the United States as construction of the projects included in the No Action Alternative is not expected to affect the wetlands within the Local Study Area.

6.5.2.2. Action Alternative A (Preferred Alternative)

Action Alternative A would cause minor temporary direct adverse impacts to waters of the United States as a result of temporary finger pier placement and construction of a spud barge in the Potomac River and barge access to the Washington Channel/Tidal Impoundment. Action Alternative A would also cause minor temporary direct adverse impacts to waters of the United States due to cofferdam placement and associated riverbed dredging for construction of the piers in the Potomac River and construction of the bridge abutments in the Washington Channel/Tidal Impoundment. **Table 6-6** summarizes temporary impacts for wetlands and other waters of the United States by delineated feature for each Action Alternative.

Table 6-6 | Temporary Impacts to Waters of the United States (Including Wetlands) by Feature

Resource	State	No Action Alternative	Action Alternative A	Action Alternative B
Wetland 1 (PSS1R[1])	Commonwealth of Virginia	0 sf (0 acres)	0 sf (0 acres)	0 sf (0 acres)
Wetland 2 (PFO1R[2])	Commonwealth of Virginia	0 sf (0 acres)	0 sf (0 acres)	0 sf (0 acres)
Wetland 3 (PEM1R[3])	Commonwealth of Virginia	0 sf (0 acres)	0 sf (0 acres)	0 sf (0 acres)
Roaches Run (R1UBV[4])	Commonwealth of Virginia	0 sf (0 acres)	0 sf (0 acres)	0 sf (0 acres)
Potomac River (R1UBV)	District of Columbia	0 sf (0 acres)	42,781 sf (approx. 0.9 acres)	59,280 sf (approx. 1.4 acres)
Washington Channel/Tidal Impoundment (R1UBV)	District of Columbia	0 sf (0 acres)	7,319 sf (approx. 0.2 acres)	7,319 sf (approx. 0.2 acres)
Total Wetlands		0 sf (0 acres)	0 sf (0 acres)	0 sf (0 acres)
Total Waters		0 sf (0 acres)	50,100 sf (approx. 1.1 acres)	66,599 sf (approx. 1.5 acres)

1. PSS1R = palustrine scrub-shrub broad-leaved deciduous, seasonally flooded tidal
2. PFO1R = palustrine forested broad-leaved deciduous, seasonally flooded tidal
3. PEM1R = palustrine emergent persistent, seasonally flooded tidal
4. R1UBV = riverine tidal unconsolidated bottom permanent-tidal

Action Alternative A would have minor temporary direct adverse impacts to wetlands and other waters of the United States over a period of approximately 5 years. Action Alternative A would have no temporary impacts on any jurisdictional vegetated wetlands. However, Action Alternative A would directly impact a total of 50,099 square feet (approximately 1.2 acres) of tidal waters in the District classified as R1UBV. Of this amount, 42,781 square feet (approximately 0.9 acres) would be for impacts to the Potomac River due to temporary finger pier placement, construction of a spud barge, and use of

cofferdams around each bridge pier. An additional 7,319 square feet (approximately 0.2 acres) would be for impacts to the Washington Channel/Tidal Impoundment due to barge access and use of a cofferdam around the bridge abutment. Alternative A would have no temporary impacts on waters of the United States in Virginia. There would be no indirect temporary impacts to wetlands and other waters of the United States under Action Alternative A. **Figure 6-5** shows the anticipated impacts.

6.5.2.3. Action Alternative B

Action Alternative B would also have minor temporary direct adverse impacts to wetlands and other waters of the United States over a period of approximately 8 years and 3 months. The impacts under Action Alternative B would be similar to the impacts under Action Alternative A, with the exception of impacts to the Potomac River. Temporary impacts to the Potomac River would increase to 66,599 square feet (approximately 1.5 acres) due to the additional cofferdams needed to remove and reconstruct the piers on the existing bridge. **Table 6-6** shows the anticipated impacts.

6.5.3. Flood Hazards and Floodplain Management

6.5.3.1. No Action Alternative

The projects included in the No Action Alternative are not expected to require construction activities within the floodplain in the Local Study Area. Therefore, there would be no construction and therefore no changes within the floodplain or to the base flood (100-year floodplain) elevation or boundary at or adjacent to the Local Study Area. Therefore, no temporary impacts would occur.

6.5.3.2. Action Alternative A (Preferred Alternative)

Action Alternative A would have a negligible temporary direct adverse impact to the base flood (100-year floodplain) elevation or boundary. During the construction phases of Action Alternative A lasting for a period of approximately 5 years, temporary measures would be required within the floodplain footprint for construction access. The initial phase of construction, prior to construction of the bridge structure, would require constructing temporary staging areas including, stockpile areas, laydown areas, and barge access areas within the floodplain, both in the upland and waterside areas. Construction of the bridge structure would involve the installation of temporary cofferdams at the bridge piers and their removal on a phased schedule. No more than six cofferdams would be placed in the river at any one time. Temporary impacts to flooding as a result of the staging areas and cofferdams prior to and during construction would include a small loss in flood storage.

6.5.3.3. Action Alternative B

The temporary impacts of Action Alternative B would be similar to those of Action Alternative A, except that their duration would be approximately 3 years and 3 months longer, given the additional time necessary to demolish and replace the existing bridge.

6.5.4. Chesapeake Bay Preservation Areas

6.5.4.1. No Action Alternative

The No Action Alternative would have no adverse temporary impacts to RPAs as construction of the projects included in the No Action Alternative is not expected to affect RPAs within the Local Study Area.

6.5.4.2. Action Alternative A (Preferred Alternative)

Action Alternative A would have minor temporary direct adverse impacts on the RPA, totaling 19,554 square feet (approximately 0.4 acres). Impacts would result from vegetation disturbance to install construction access and staging areas for the railroad improvements. Temporary impacts for Action Alternative A would occur within the Potomac River RPA buffer. They would be substantial due to the parallel, linear nature of the MVT rerouting that would occur along the Potomac River. **Figure 6-3** shows the RPA buffers. Construction activities for Action Alternative A would last approximately 5 years.

6.5.4.3. Action Alternative B

Action Alternative B would have minor temporary direct adverse impacts on the RPA for, totaling 27,757 square feet (approximately 0.6 acres). The types of impacts would be similar to those of Action Alternative A, with the exception of an additional temporary laydown area in the RPA along the Potomac River. **Figure 6-3** shows the RPA buffers. Construction Activities for Action Alternative B would last approximately 8 years and 3 months.

6.6. Avoidance, Minimization, and Mitigation

This section describes proposed mitigation for the impacts to water quality and water resources.

6.6.1. Water Quality

The following mitigation measures are proposed to minimize or mitigate for adverse impacts to groundwater, surface water, and stormwater:

- If necessary, DRPT would implement stormwater BMPs to mitigate long-term adverse impacts to water quality in the Roaches Run and Potomac River watersheds. If designed in accordance with the DOEE, Arlington County, or NPS requirements, these BMPs would decrease runoff volume and peak flow rate and would provide the prescribed treatment volume to mitigate adverse impacts to surface water and stormwater. These BMPs would also provide the prescribed recharge volume to mitigate adverse impacts to groundwater quantity and quality.
- Due to the limited space within the right-of-way in the project area, installation of open-air infiltration-type stormwater BMPs, such as bioretention areas and infiltration basins, is likely infeasible. DRPT could implement treatment BMPs such as oil/grit separators to treat runoff prior to discharge; however, these BMPs would not mitigate increases in runoff volume or peak flow rate. Design of stormwater BMPs would be completed during final design. Due to the length and configuration of the existing bridge and proposed bridges, use of BMPs would likely not mitigate minor long-term adverse impacts resulting from wash-off of pollutant build-up.

- DRPT would require the contractor to implement erosion and sedimentation controls in accordance with EPA's 2017 NPDES Construction General Permit, 2018 VPDES Storm Water General Permit, DOEE, NPS, and Arlington County requirements. These include requirements to provide an effective means of eliminating discharges of spilled or leaked chemicals, including fuels and oils, from construction activities. DRPT would also require the contractor to store, handle, and dispose of materials in a manner that prevents exposure of the products to precipitation and/or stormwater.
- On-site treatment of pumped groundwater would be in accordance with DOEE, DC Water, and VDEQ requirements for treatment and metering of pumped groundwater. The discharge of treated pumped groundwater directly to surface waters would minimize temporary MS4 infrastructure capacity and sedimentation impacts during construction.

Construction-phase and post-construction mitigation under Action Alternative B would be similar to Action Alternative A. As Action Alternative B would remove the existing bridge, it would mitigate long-term impacts associated with the existing bridge. However, since Action Alternative B replaces this existing bridge with a new bridge, Action Alternative B would likely continue to result in minor long-term adverse impacts resulting from wash-off of pollutant build-up on the bridges.

6.6.2. Wetlands and Other Waters of the United States

FRA and DDOT have made efforts to avoid and minimize impacts throughout the planning process and will continue to do so as the project moves forward to more detailed stages of design. Some of the avoidance and minimization measures to date include aligning the new piers to the existing piers to reduce hydrologic impacts; selecting alternatives with a new upstream bridge (rather than a downstream bridge) in order to expand the tracks westward rather than encroaching on Roaches Run; and using construction methods to reduce sedimentation and turbidity.

- Aligning the new piers with existing piers would minimize potential impacts to waters of the United States by decreasing the number and footprint of new piers. The Action Alternatives also include a new upstream bridge, rather than a downstream bridge, in order to expand the tracks westward rather than encroaching on Roaches Run. Additional coordination with the DC2RVA project at RO Interlocking has allowed for the elimination of a culvert extension into Roaches Run that would have had an adverse impact on jurisdictional wetlands and other waters of the United States.
- DRPT would require the contractor to implement erosion control and stormwater management measures during construction to reduce disturbance to waters of the United States from erosive forces such as stormwater runoff. To reduce turbidity from potential sediment releases during construction of the new bridge piers, work would be conducted behind cofferdams. This would allow pile driving of the pier supports in the dry, avoiding the releases of sediment that can occur if pile driving occurs in-water. Installation of the sheet piles for the cofferdam can create minor sediment releases, but sheet piles are typically installed using a vibratory hammer, which minimizes the disturbance to the bottom sediments. The expected sediment release from this activity is low, but, if needed, turbidity curtains would further reduce turbidity within the Potomac River. Minimization measures would also be investigated during demolition of the existing bridge for Action Alternative B.

6.6.3. Flood Hazards and Floodplain Management

Construction of a new two-track bridge upstream of the existing Long Bridge and the redevelopment of the existing Corridor would result in work within the existing floodplain. The development of measures to avoid or minimize work in the floodplain would take place in the design phase. Application of these measures by DRPT during the construction phase would reduce the potential for any net rise in the base flood or impacts to the floodplain from construction activities. Adherence to avoidance and minimization measures must occur concurrently with other objectives, including but not limited to meeting bridge structural requirements, waterway navigability, and prevention of bridge scour and debris and ice jam potential.

- Minimization efforts would include pier support design having an elliptical shape that would allow smoother flood flow conveyance underneath the bridge with minimal turbulence and hydraulic force against the pier walls.
- Avoidance and minimization measures during construction would include establishing staging yards landward of the 100-year floodplain as much as possible. While several construction staging sites must be placed in the floodplain, the contractor would have to adhere to a plan of action in the event of an oncoming flood event.
- Mitigation of temporary effects would, at a minimum, involve restoration of temporarily disturbed areas and construction zones and measures within the floodplain to return them to the pre-existing condition.

6.6.4. Chesapeake Bay Preservation Areas

The nature of the project as bridge construction over an RPA, the Potomac River, and its buffer means complete avoidance of the RPA is not feasible.

- In areas of bare ground, DRPT would require the contractor to employ proper erosion and sediment control techniques to help reduce runoff that would negatively affect RPAs.

Efforts made to avoid forest and vegetation impacts as part of the terrestrial vegetation avoidance and minimization would also provide avoidance and minimization in the RPA buffer. Additional coordination by FRA and DDOT with DC2RVA at RO Interlocking has allowed for the elimination of a culvert extension into Roaches Run, which would have impacted forests and vegetation within the RPA buffer of Roaches Run.