22.0 Bike-Pedestrian Crossing

The purpose of this chapter is to describe the evaluation of the potential bike-pedestrian crossing opportunities near the Long Bridge Project (the Project). This chapter reviews the process for developing the bike-pedestrian crossing as potential mitigation for impacts to properties protected under Section 4(f) of the United States Department of Transportation Act of 1966,[1] and its potential impacts to the human and natural environment.

22.1. Overview

While a bike-pedestrian crossing is not part of the Purpose and Need for the Long Bridge Project, the Federal Railroad Administration (FRA) and District Department of Transportation (DDOT) began considering the potential opportunity to accommodate connections to the pedestrian and bicycle network that follow the trajectory of the Long Bridge Corridor during the pre-NEPA Phase I and II Studies. During the NEPA process, the public submitted comments during the Scoping Period requesting inclusion of a bike-pedestrian crossing. Exploration of a potential crossing continued throughout the NEPA process for the Project.

FRA and DDOT assessed the feasibility of the bike-pedestrian crossing and considered whether a path could be designed consistent with railroad operator plans and railroad safety practices. The National Park Service (NPS), which administers the George Washington Memorial Parkway (GWMP) and East Potomac Park, agreed that the bike-pedestrian crossing could potentially serve as mitigation for impacts to the parks. The crossing could provide an important connection between the parks and the regional trail system and therefore has a regional recreational benefit.

Bicycle and pedestrian connectivity is an element of regional multimodal transportation network plans. A bike-pedestrian connection in the vicinity of Long Bridge is included in the NPS *Paved Trails Study* (2016)[2] and *moveDC* (2014),[3] the multimodal long-range transportation plan for the District of Columbia (the District). The *Long Bridge Study* (Phase I Study), completed in 2015, evaluated the railroad network system as well as the overall multimodal connectivity and capacity needs in the area, including potential bicycle and pedestrian opportunities.[4] Modeling for the Phase I Study identified an increase in pedestrian and bicycle use of the trail network with the addition of bike-pedestrian connections, with most of the use originating for the District. As discussed in **Section 22.1.2, Public and Agency Comments**, members of the public and several agencies have expressed support for the crossing.

The only existing bike-pedestrian path across the Potomac River in the vicinity of Long Bridge is attached to an interstate highway on the 14th Street Bridge. The next closest crossing is over a mile north via that Arlington Memorial Bridge. According to bi-directional counter data available on the public website of

[1] 49 USC 303
[2] NPS, National Capital Region. *Paved Trails Study*. 2016. Accessed from https://parkplanning.nps.gov/document.cfm?documentID=74623. Accessed October 20, 2018.
[3] DDOT. *moveDC: the District of Columbia's Multimodal Long-Range Transportation Plan*. 2014. Accessed from http://www.wemovedc.org/. Accessed October 20, 2018.
[4] DDOT. *Long Bridge Study*. 2015. Accessed from https://ddot.dc.gov/publication/final-long-bridge-study. Accessed October 20, 2018.

BikeArlington, an Arlington County program, the 14th Street Bridge path at the Mount Vernon Trail (MVT) carried 59,391 bicyclists and 8,802 pedestrians in July 2018.[5] On average in July 2018, the path carried 1,583 bicyclists and 357 pedestrians per day on Saturdays and Sundays. A total of 2,203 bicyclists and 454 pedestrians used the path on July 4, 2018.[6] A second connection would alleviate some of the pedestrian and cyclist traffic on the 14th Street Bridge, would be a pathway dedicated solely to cyclists and pedestrians, and would provide an enhanced connection between Long Bridge Park, the MVT, GWMP, and East and West Potomac Parks.

22.1.1. Previous Plans and Studies

As noted above, the opportunity for a bike-pedestrian crossing near the existing Long Bridge has been included in plans and studies such as *moveDC*, the *NPS Paved Trails Study,* and *Long Bridge Study* (Phase I Study).

22.1.1.1. moveDC

The District's *moveDC* multimodal long-range transportation plan, completed in 2014, includes specific recommendations for investments in the transportation system within the District. The recommendations in the plan "recognize how to use the infrastructure the city already has wisely and efficiently; target investment to benefit people's mobility and quality of life; and use the transportation system to improve the environment."[7] A bike-pedestrian connection from Maine Avenue to the Virginia line in conjunction with the Long Bridge Project is included in the Bicycle Element of the plan. The bike-pedestrian crossing would help advance the plan's goal of citywide accessibility and mobility by connecting with regional bicycle facilities and ensuring the trail network is compatible with regional initiatives.[8]

22.1.1.2. Paved Trails Study – National Capital Region, NPS

The *NPS Paved Trails Study*, completed in 2016, provides a vision for the regional trail network, including both NPS and local government-owned trails. The study includes 121 capital and programmatic recommendations within the 95-mile trail network, and a framework for prioritizing regional funding of trail-related projects. The framework includes corridors of regional significance, high-volume corridors, and linkages among those corridors. Combining regionally significant and high-volume corridors led to the development of the National Capital Trail (NCT) concept. The concept designates four distinct loops that each offer between 18 and 45 miles of diverse trail experiences, linking NPS parks and area destinations.[9] The study proposes a new dedicated bike-pedestrian crossing along the trajectory of the new railroad bridge (called the CSX Bridge Trail Connector in the study) to provide an additional connection across the Potomac River between segments of the NCT.[10] The bike-pedestrian crossing would connect to the MVT, Long Bridge Park, and Boundary Channel Drive on the west side of the

[5] BikeArlington. Undated. Counter Dashboard. Accessed from http://counters.bikearlington.com/. Accessed October 21, 2018.
[6] BikeArlington. Undated. Counter Dashboard. Accessed from http://counters.bikearlington.com/. Accessed October 21, 2018.
[7] *moveDC*, p. 57.
[8] *moveDC*, p. B-38.
[9] *Paved Trails Study*, p. ES-4.
[10] *Paved Trails Study*, p. 6-17.

Potomac River and to Ohio Drive SW and Rock Creek Multi-Use Trail on the east side of the Potomac River.

22.1.1.3. Long Bridge Study (Phase I Study)

The Phase I Study considered the need for intermodal connectivity and system linkages. The study noted the extensive bike-pedestrian network on both sides of the Potomac River, and the existing usage of the 14th Street Bridge path by hundreds of pedestrians and 1,500 to 2,000 bicyclists per day.[11] Of the eight alternatives evaluated in the Phase I Study, four included a bike-pedestrian connection to the bike-pedestrian network.

22.1.2. Public and Agency Comments

Members of the public and representatives from Participating and Cooperating agencies have offered comments on bike-pedestrian crossing as summarized below.

22.1.2.1. Public Comments

During the Scoping period for the Project EIS, members of the public expressed strong support for a bicycle and pedestrian crossing near Long Bridge. The Project received 80 comment submissions from the public and public organizations during the Scoping comment period in fall 2016. Twenty of the 80 public comments supported providing bicycle and pedestrian access, including comments that cited the importance of a safety barrier separating bicyclists and pedestrians from the railroad crossing. The Friends of Long Bridge Park, Crystal City Civic Association, and Southern Environmental Law Center noted their support for alternatives connecting existing pedestrian and bicycle trail networks.

FRA and DDOT held a public meeting on December 14, 2017, to present the results of the concept screening process for the EIS, including the Action Alternatives for evaluation in the EIS. At the meeting, FRA and DDOT showed three potential bike-pedestrian crossing options that would land near the MVT in Virginia and in East Potomac Park in the District. Two of the options presented would be separate structures from the railroad bridge(s), while one of the options would be attached to the upstream side of a new railroad bridge. Following the public meeting, members of the public and stakeholders submitted 1,604 comments in support of a bike-pedestrian crossing as part of the Project. One commenter expressed opposition to the bike-pedestrian crossing. Of the 1,604 email comments in favor of a bike-pedestrian crossing, 98 percent of commenters supported extending the crossing over the GWMP to destinations in Arlington and Crystal City, and over the Washington Channel to destinations in the District.

On November 29, 2018, FRA and DDOT held a public meeting to present the Preferred Alternative for the Project. FRA and DDOT also presented two bike-pedestrian crossing options as potential Section 4(f) mitigation and noted key differentiating design, security, and cost elements. During and following the public meeting, 45 members of the public commented on the bike-pedestrian crossing. Some members of the public asked for more detailed information on the design and maintenance of the crossing, while others asked for confirmation that the bike-pedestrian crossing would move forward even if the preferred crossing option is an independent bridge that is separate from the railroad bridge.

[11] *Long Bridge Study*, p. 11.

FRA and DDOT noted in the meeting that if the bike-pedestrian crossing is included as mitigation in the Record of Decision (ROD), the Virginia Department of Rail and Public Transportation, the project sponsor for final design and construction, would be responsible for implementing the bike-pedestrian connection. Fourteen of the 45 comments suggested extending the bike-pedestrian crossing farther into the District, to areas such as L'Enfant Plaza and the Wharf. DDOT stated that the most feasible connection at the northern end of the corridor is at Ohio Drive SW in East Potomac Park, as there is not adequate space to extend the connection along the railroad corridor. Further bicycle and pedestrian connections into the District would be considered as part of separate projects. The bike-pedestrian crossing was extended on the southern end to connect with Long Bridge Park in response to public comments from the December 2017 public meeting. Two organizations, Virginians for High Speed Rail and the Southern Environmental Law Center also submitted comments via letters to the Project and voiced support for the bike-pedestrian crossing.

22.1.2.2. Agency Comments

Cooperating and Participating Agencies also addressed the potential bike-pedestrian crossing options during the Scoping Period and in several Interagency and Public meetings throughout the NEPA process. **Table 22-1** summarizes the agencies' comments and positions on a proposed bike-pedestrian crossing. Consulting Parties also discussed the crossing at the four Consulting Parties meetings.

Table 22-1 | Agency Comments and Positions on the Bike-Pedestrian Crossing Received During NEPA Process

Agency	Comment
Arlington County	• Supports construction of a bike-pedestrian crossing as part of the Project • Supports a direct bike-pedestrian connection to Long Bridge Park
United States Commission of Fine Arts (CFA)	• Supports connecting the bike-pedestrian crossing to the regional bicycle and pedestrian network • Supports a direct bike-pedestrian connection to Long Bridge Park
District of Columbia State Historic Preservation Office	• Supports the Preferred Option
National Capital Planning Commission (NCPC)	• Any bike-pedestrian connection should maximize utility and enhance experience for all users
NPS	• Supports the potential bike-pedestrian crossing option as mitigation for impacts to parkland; • Has concerns regarding impacts to the MVT; needs to see evaluation of potential impacts, including congestion on the trail, visual changes, and loss of vegetation and trees
Virginia Department of Historic Resources	• Supports the Preferred Option
Virginia Department of Rail and Public Transportation	• Notes primary focus of the Project is increasing rail capacity • Has significant concerns regarding safety and constructability of any single bridge structure sharing rail, bicycle, and pedestrian accommodation
Virginia Railway Express (VRE)	• Has concern regarding the safety and security implications of any single bridge structure sharing rail, bicycle, and pedestrian accommodation

22.1.3. Development of Bike-Pedestrian Crossing Options

The bike-pedestrian crossing study limits extend from the north end of Long Bridge Park in Arlington, Virginia, to Ohio Drive SW in the District. The crossing would connect to the planned trail network within Long Bridge Park, which will connect to the on-street bicycle network following Long Bridge Drive to Crystal City. The bike-pedestrian crossing analysis includes a conceptual evaluation of connections to the MVT and Ohio Drive SW. FRA and DDOT considered railroad crossing concepts that included a bike-pedestrian path advanced through the first level of screening (Level 1 Concept Screening).

FRA and DDOT did not screen bike-pedestrian crossing opportunities as part of the Level 2 Concept Screening. Instead, the analysis determined that opportunities for a bike-pedestrian crossing could be included with all the railroad tracks or alignment concepts being considered for the Project. FRA and DDOT developed four potential bike-pedestrian crossing options for further evaluation (see **Section 22.1.3.2, Level 2 Concept Screening and Development of Bike-Pedestrian Options**, for details). The analysis included upstream and downstream bike-pedestrian crossing options to determine if a crossing could be designed to be consistent with railroad operator plans and railroad safety practices.

FRA has since selected a Preferred Alternative for the railroad bridge. The Preferred Alternative for the railroad bridge would expand the north-south railroad corridor from two to four tracks throughout the Long Bridge Corridor. The Preferred Alternative would involve adding two tracks west of the existing corridor and a new two-track bridge over the GWMP; a new two-track crossing over the MVT, Potomac River, and Ohio Drive SW; a new two-track bridge over the Washington Metropolitan Area Transit Authority (WMATA) Metrorail Portal; two new, separate, two-track bridges over I-395; and new four-track bridges over Ohio Drive SW, the Washington Channel, and Maine Avenue SW. (See **Chapter 3, Alternatives**).

22.1.3.1. Level 1 Concept Screening for DEIS Alternatives

In spring 2017, the Level 1 Concept Screening evaluated 18 preliminary concepts to address the deficiencies of the Long Bridge Corridor, which varied based on number of railroad tracks, the type of crossing, and the inclusion of additional transportation modes, including a bike-pedestrian path. The concepts at this stage focused on the elements (such as number of railroad tracks) to be included in the Project and did not consider specific track alignments. FRA and DDOT assumed that these elements could have various configurations and that all elements could be provided within existing right-of-way constraints. The screening evaluated 18 preliminary concepts for their ability to meet the Project Purpose and Need, including consistency with adopted regional, state, or local transportation plans. The screening retained the bike-pedestrian path because it is included in *moveDC*.

22.1.3.2. Level 2 Concept Screening and Development of Bike-Pedestrian Options

During the Level 2 Concept Screening, FRA and DDOT developed potential bike-pedestrian crossing options for further evaluation. The alignments met the following metrics:

- Provides a minimum of 25 feet horizontal separation between structures over the river;[12]
- Connects to existing bike-pedestrian facilities, paths, or on-street infrastructure, including bike-friendly streets; and
- Does not require more than a 5-percent slope for ramps from the crossing to existing connections (required by Americans with Disabilities Act of 1990 [ADA] regulations).

FRA and DDOT eliminated from consideration any initial options that would place the bike-pedestrian crossing between two independent railroad bridges. These options would require the railroad bridges and track alignments on each approach to the river to be located farther apart from each other, significantly expanding the area of right-of-way impact on the Virginia and District sides of the river. This right-of-way impact would be to parkland, which is a Section 4(f) resource. Locating the bike-pedestrian crossing between two railroad bridges would also make connections to existing trail facilities and Long Bridge Park more difficult.

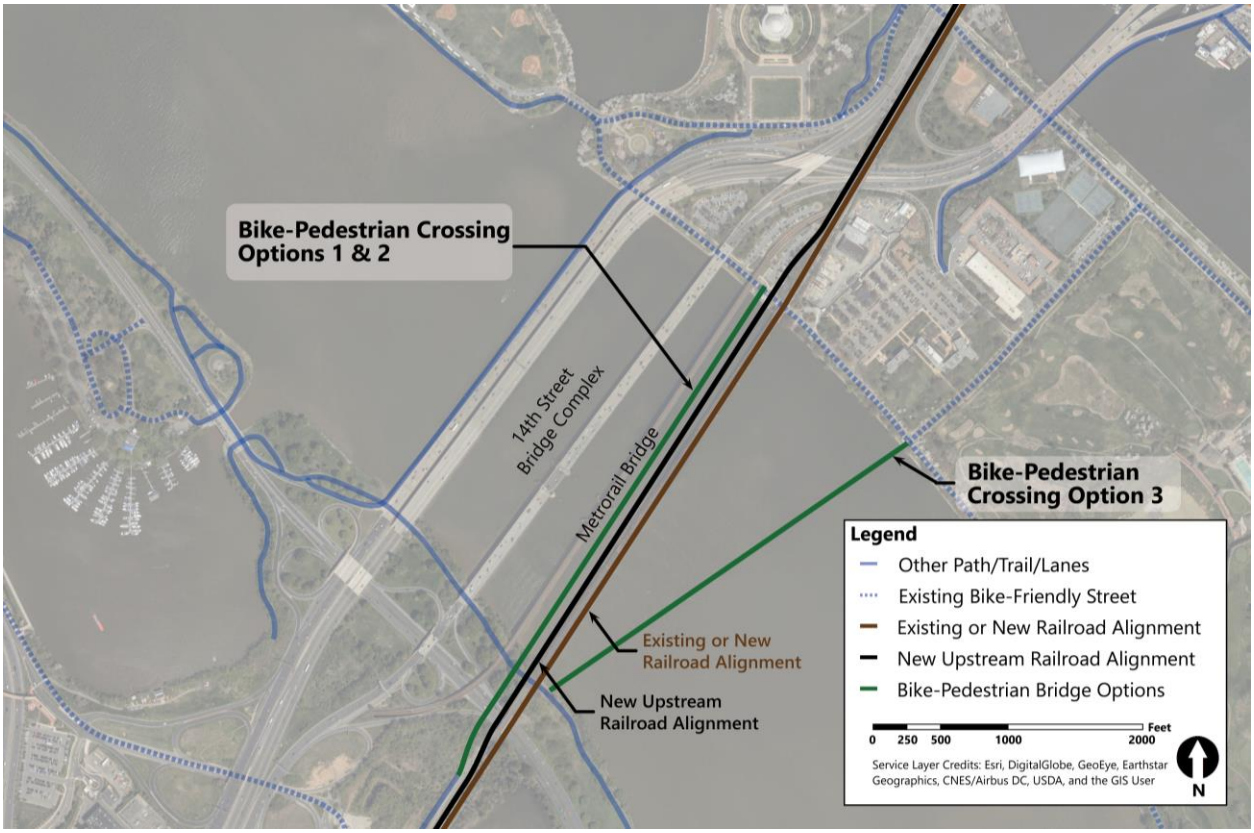
The screening retained four bike-pedestrian crossing options for further analysis alongside the two Project Action Alternatives that were advanced, Action Alternative A and Action Alternative B.[13] The four bike-pedestrian crossing options illustrated in **Figure 22-1** are:

- **Option 1**, which would provide a crossing attached to the upstream side of the new upstream railroad bridge, with two variations:
  - **Option 1A (Figure 22-2)** would use a shared superstructure and substructure with the railroad bridge.
  - **Option 1B (Figure 22-3)** would use a shared substructure, but separate superstructures.
- **Option 2 (Figure 22-4)**, which would provide a crossing on an independent bridge on the upstream side of the new upstream railroad bridge.
- **Option 3**, which would provide a crossing on an independent bridge downstream of the existing railroad bridge. To optimize connections to bicycle and pedestrian facilities, the crossing would connect in the District to Ohio Drive SW near the NPS National Capital Region Headquarters, rather than landing next to Long Bridge.

[12] The 25-foot horizontal separation is required to enable construction of substructures outside the zone of influence for the adjacent bridge while establishing minimum clearances for future maintenance and inspection needs.

[13] Action Alternative A would construct a new two-track railroad bridge upstream of the existing Long Bridge; the existing two-track Long Bridge would be retained to create a four-track crossing. Action Alternative B would construct a new two-track railroad bridge upstream of the existing Long Bridge; subsequently, the existing bridge would be replaced with a new two-track bridge, creating a four-track crossing (see Chapter 3, Alternatives).

Figure 22-1 | Level 2 Bike-Pedestrian Crossing Alignment Options



Options shown at the public and agency meetings in December 2017 did not show the bike-pedestrian connection across the GWMP to Long Bridge Park. However, following feedback received from the public and agencies (CFA, NCPC, and Arlington County) that emphasized the importance of a connection to Crystal City in Arlington, the potential to cross the GWMP was evaluated as part of all options. The crossing to Long Bridge Park would provide the option for bicyclists traveling between the Crystal City, Pentagon City, and Potomac Yard areas and the District to avoid the MVT, easing congestion on that heavily used trail. Public comments suggested a bike-pedestrian connection across the Washington Channel to Maine Avenue SW or L'Enfant Plaza. However, as determined by FRA and DDOT, the connection at these locations would be infeasible since there is not adequate space to extend these improvements.

Following the Level 2 Concept Screening, FRA and DDOT eliminated Option 3 from consideration because it would introduce a new visual element into the viewsheds from GWMP, East Potomac Park, and the Potomac River, resulting in additional impacts, and because it could not provide a direct connection to Long Bridge Park and from there to Crystal City. NPS did not support Option 3 as Section 4(f) mitigation because of its visual impacts.

Figure 22-2 | Section of New Upstream Railroad Bridge and Bike-Pedestrian Crossing Option 1A

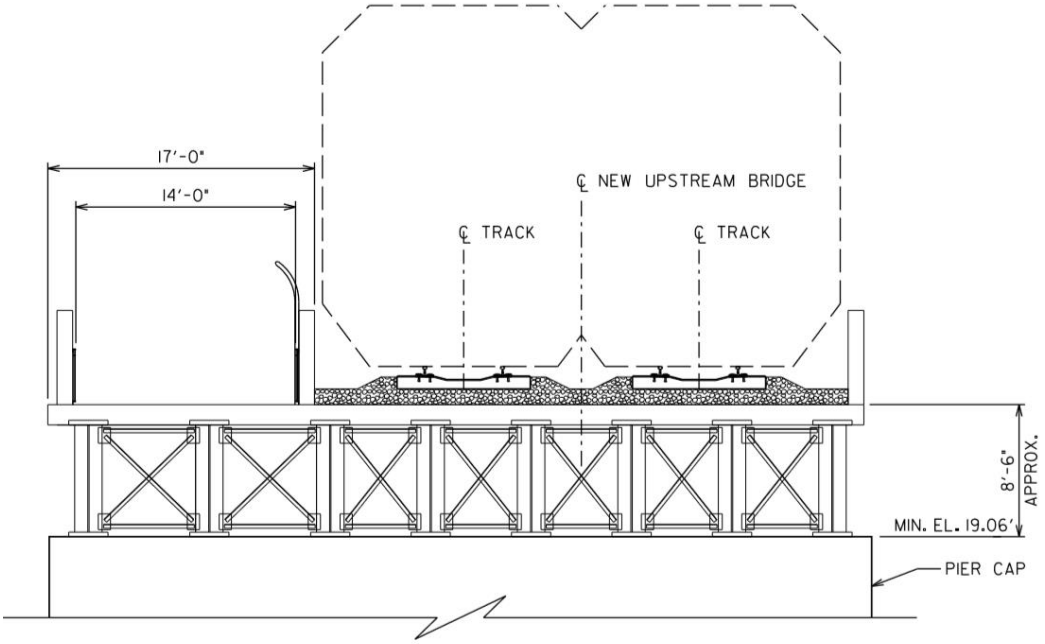


Figure 22-3 | Section of New Upstream Railroad Bridge and Bike-Pedestrian Crossing Option 1B

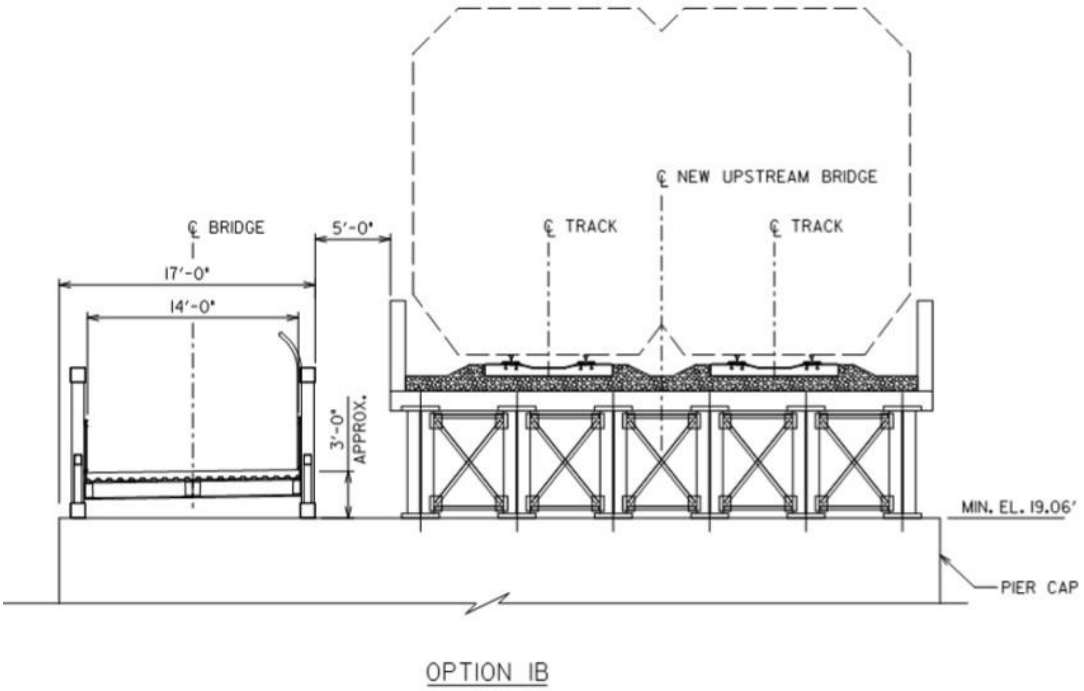
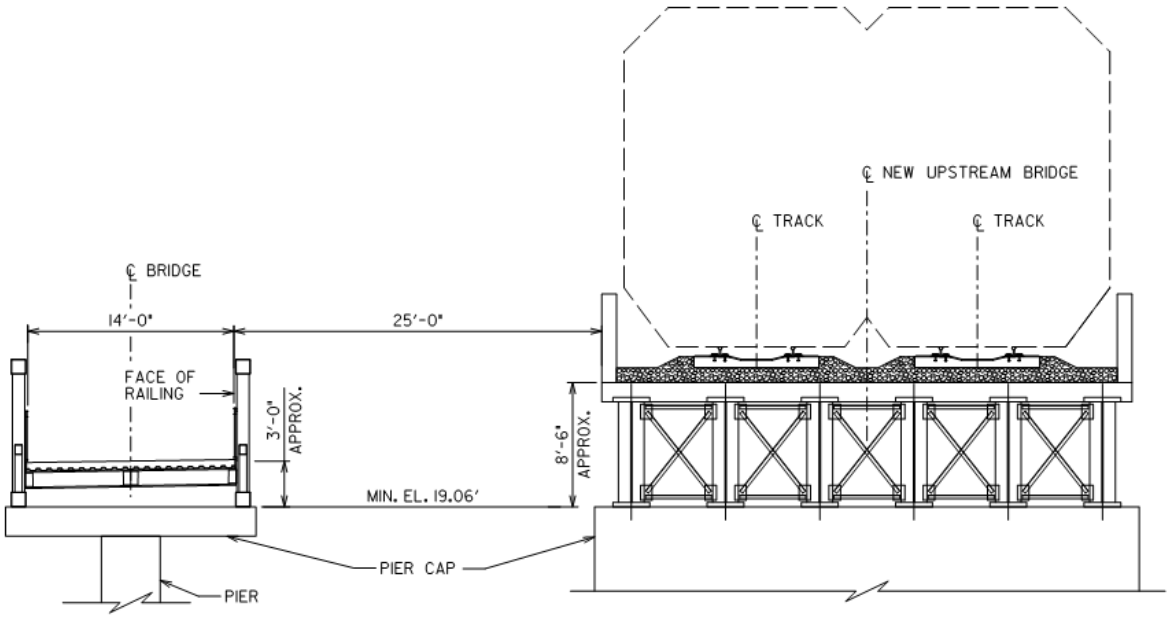


Figure 22-4 | Section of New Upstream Railroad Bridge and Bike-Pedestrian Crossing Option 2



OPTION 2

22.1.3.3. Safety and Security Analyses

FRA and DDOT conducted a Threat, Vulnerability, and Risk Assessment (TVRA, or security assessment) and Hazard Analysis (HA, or safety assessment) on the three bike-pedestrian crossing options remaining after the Level 2 Concept Screening (Options 1A, 1B, and 2). DDOT and FRA used the results of the TVRA and HA to determine if each option should be further evaluated. Safety, security, and risk analysis professionals conducted the TVRA and HA. The TVRA identified the credible threats that a person or group of people with malicious intent might consider harming travelers and damaging the railroad system infrastructure by using the bicycle-pedestrian crossing as a path of attack (for example, climbing onto the railroad bridge or throwing something onto the railroad bridge), and the potential safety issues with the options. The HA evaluated safety hazards and hazardous conditions, probability of occurrence, and the resultant consequence of that occurrence.

TVRA Conclusions

Option 1A would share its superstructure and substructure with the new upstream railroad bridge (**Figure 22-2**). The TVRA concluded that this option would have the highest risk of the options available, because it would provide the easiest access to the railroad bridge from the bike-pedestrian crossing.

Option 1B (**Figure 22-3**) would share its substructure with the new upstream railroad bridge, but would have a separate superstructure, enabling additional separation distance from the active railroad. The TVRA concluded that this option would have the second highest risk of the options available. While separating the superstructures would reduce risk compared to a completely attached structure, it would

still be possible to access the railroad bridge from the bike-pedestrian crossing because of the shared substructure and proximity.

Both Option 1A and Option 1B would require substantial security measures, which would include some combination of protective screening, cameras, thermal imaging, radar equipment, and regular law-enforcement patrols to make it more difficult for pedestrians to access the railroad bridge.

Option 2 (**Figure 22-4**) would locate the bike-pedestrian crossing on a separate structure approximately 25 feet upstream of the new railroad bridge. This option would have the lowest risk for the Long Bridge bike-pedestrian crossing from a safety and security perspective. The separate structure eliminates the possibility of an adversary directly accessing the railroad bridge from the bike-pedestrian crossing as well as potential hazards that could occur if the crossing is attached to the bridge.

Hazard Analysis Conclusions

The HA concluded that the number of potential hazards that could occur and their severity are greater when the bicycle-pedestrian crossing is attached to the railroad bridge (either superstructure or shared substructure). Such hazards could include injury due to proximity to passing trains, damage to the railroad system and equipment, access during an emergency, and exposure to hazardous leaks and spills from the railroad.

22.1.4. Bike-Pedestrian Crossing Option Screening

This section describes the options removed from further consideration and identification of the Preferred Option.

22.1.4.1. Options Removed from Further Consideration

Following completion of the TVRA analysis, FRA and DDOT eliminated Options 1A and 1B from further consideration for the following reasons:

- **Option 1A,** as shown in **Figure 22-2,** requires extending the railroad bridge piers further upstream by approximately 22 feet to support the bike-pedestrian crossing. Larger piers would result in more environmental impacts as well as a greater cost compared to single-column bridge piers supporting an independent bike-pedestrian bridge. The need to carry trains as well as bicycles and pedestrians means the bridge piers would be sized to support the heavier railroad load.

  Option 1A would also have the highest safety and security risk, requiring substantial security measures, and would have the highest cost for those measures. The deck of Option 1A, because it shares its superstructure with the new upstream railroad bridge, would be at a much higher elevation than the deck of Options 1B and 2 across the river. This would require longer ramps to connect to the MVT and East Potomac Park, resulting in additional impacts to the GWMP, MVT, and NPS Parking Lot C. In addition, the proximity to the railroad bridge would result in a less desirable experience for bicyclists and pedestrians than a fully separate bridge or a crossing using a separate superstructure. This proximity would also make maintenance and inspection more difficult and costly compared to the other options.

- **Option 1B,** as shown in **Figure 22-3**, would also require extending the railroad piers to support the bike-pedestrian crossing and would have the same costs and resource impacts as Option 1A. Option 1B would share its substructure with the new upstream railroad bridge but would use a separate superstructure. The deck of Option 1B would be lower than the deck of Option 1A, reducing impacts to the GWMP, MVT, and NPS Parking Lot C. Separating the superstructures would mitigate some of the concerns discussed above related to pedestrian and bicyclist experience and maintenance and inspection. However, the shared substructure would still make Option 1B less desirable than Option 2 for these considerations. Finally, Option 1B would have high safety and security risk, requiring substantial security measures, and would have high costs for those measures.

22.1.4.2. Identification of the Preferred Option

Conceptual engineering analysis on the Preferred Bike-Pedestrian Crossing Option (Preferred Option) further defined the crossing, ramps, and path geometry. The screening advanced **Option 2** for further consideration for the following reasons:

- As shown in **Figure 22-4**, the Preferred Option would be on a separate structure approximately 25 feet upstream of the new upstream railroad bridge. Six-foot diameter single column piers would support the structure. These smaller piers would have fewer potential impacts to resources within the Project Area compared to the larger piers required for Options 1A or 1B.
- The results of the TVRA indicated that the Preferred Option would have the lowest security risk, as the separate structure and distance between bridges would prohibit pedestrians from accessing the railroad bridge. Therefore, fewer security measures would be required.
- The Preferred Option is favored by the railroad operators and NPS (the land owner on either side of the bridge and of the river bottom) as the separate structure would reduce the need for risk mitigation measures, simplify inspection and maintenance, and allow for smaller piers and landing ramps on NPS property.
- The construction cost of the Preferred Option would be approximately 20 percent less than Option 1B.

22.1.4.3. Description of the Preferred Option

The Preferred Option would provide a bike-pedestrian connection between Long Bridge Park in Arlington, Virginia, and East Potomac Park in the District, crossing the Potomac River on an independent bridge on the upstream side of the new upstream railroad bridge (**Figure 22-5**). The southern end of the Preferred Option would connect to a path at the northern end of the Long Bridge Aquatic and Fitness Center and Park Expansion in Long Bridge Park, which is currently under construction and scheduled for completion in 2021 The bike-pedestrian path would cross over the GWMP, MVT, and the Potomac River on a 2,300-foot-long bridge consisting of prefabricated truss spans. The northern end of the Preferred Option would connect to Ohio Drive SW in East Potomac Park. The area between Ohio Drive SW and the Southwest neighborhood following the trajectory of the Long Bridge Corridor is constrained and directly extending the connection would be infeasible. Bicycle and pedestrian connections from Ohio Drive SW into the District would be considered as part of separate projects.

The bridge superstructure, including the railing, would be either steel or aluminum and would have an approximate overall height of 7 feet and width of 14 feet. The materials and dimensions of the bridge would be confirmed in a final design phase following completion of the EIS. The bridge railing would have vertical pickets and an overall height of approximately 4.5 feet. Specific designs for the bridge and railing have not yet been determined but would be ADA compliant and in accordance with the requirements of the authority having jurisdiction over final design and construction.

Figure 22-5 | Preferred Bike-Pedestrian Crossing Option – Independent Bridge Structure

After crossing over the GWMP, the bike-pedestrian crossing would connect to the MVT via a ramp near the shoreline of the Potomac River. A level landing area would extend from the bike-pedestrian bridge and connect to the ramp. The ramp would slope downward at a 5-percent grade to another level landing area before changing directions 180 degrees and continuing down to the MVT. The overall length of the ramp to the MVT would be approximately 225 feet with approximately five 6-foot diameter piers supporting the structure.

The bike-pedestrian bridge would continue over the Potomac River, 25 feet upstream from the new railroad bridge. The bike-pedestrian bridge would have approximately 22 single-column, 6-foot diameter concrete piers with concrete caps, which would be aligned with the railroad bridge piers. The navigation clearance of the bike-pedestrian bridge would match the vertical clearance of the new railroad bridge providing additional clearance beyond the 18 feet provided by existing Long Bridge. After crossing the Potomac River, the bridge would continue across Ohio Drive SW in the District and terminate in NPS Parking Lot C in East Potomac Park. The ramp down from the northern terminus of the bike-pedestrian bridge to the parking lot and Ohio Drive SW would be similar in design to the ramp down to the MVT with approximately five 6-foot diameter piers supporting the structure.

As proposed in the Draft Section 4(f) Evaluation, construction of the Preferred Option would be required 4(f) mitigation committed to in the ROD. The Preferred Option could be constructed along with the railroad bridge construction contract or separately following completion of the Project. If constructed along with the Project construction contract, it is anticipated that construction would begin following completion of the project as the same space is needed to deliver equipment and materials for the railroad bridge pier construction. Therefore, the construction of the bike-pedestrian bridge piers would take place after completion of the railroad bridge piers. Construction would take approximately two additional years. Pedestrian-bike bridge construction would use access points and temporary finger piers along the shoreline for delivery of equipment and materials via barge, and construction of the drilled shaft foundations, piers, and superstructure bridge components. See **Chapter 3, Alternatives** for information on the construction of the railroad bridge. More details on construction would become available as final design of the Preferred Option is advanced.

22.2. Environmental Consequences of the Preferred Option

Based on the conceptual engineering, DDOT and FRA assessed the potential permanent and temporary impacts of the Preferred Option on the environmental resources within the Study Area. The analysis for each resource considered the same regulatory context, as summarized in **Chapters 4** through **21** and described in detail in **Appendix D1, Methodology Report.** Because the Preferred Option is within the Local and Regional Study Areas for the Action Alternatives, the analysis of impacts relied on the data collected to document the Affected Environment for the Project. In general, the analysis of the environmental impacts followed the same or similar methodologies as used to evaluate the impacts of the Action Alternatives. Where the methodologies differ, the sections below explain the approach taken to evaluate the impacts of the bike-pedestrian bridge.

22.2.1. Natural Ecological Systems and Endangered Species

This section assesses the potential short-term and long-term impacts of the Preferred Option on natural ecological systems and endangered species. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 5, Natural Ecological Systems and Endangered Species** for a description of the regulatory context and Local and Regional Study Areas.

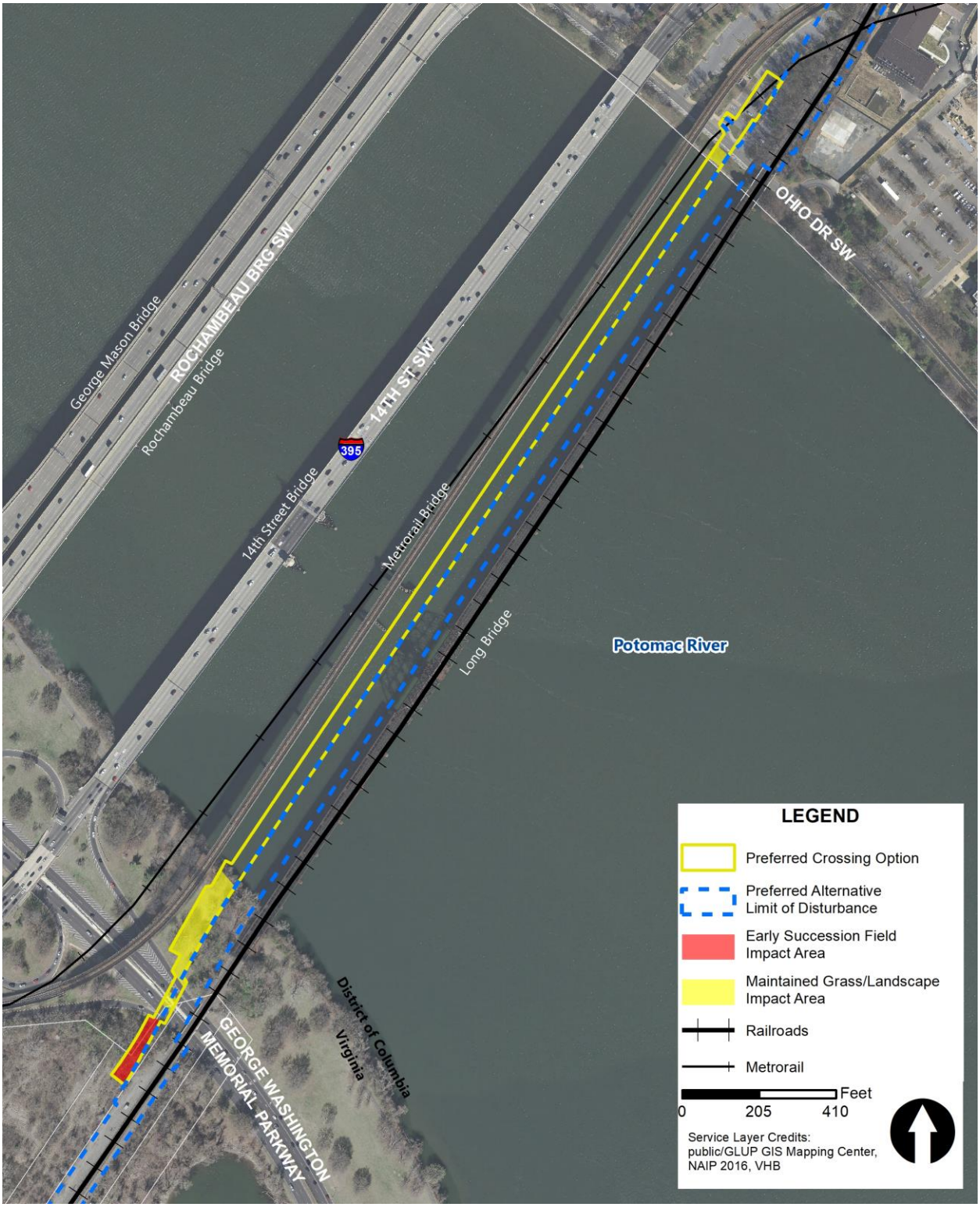
The analysis of impacts to natural ecological systems and endangered species as a result of the bike-pedestrian crossing applied the same methodologies used to evaluate impacts of the Action Alternatives (see **Chapter 5.2.2 Natural Ecological Systems and Endangered Species, Methodology**).

22.2.1.1. Permanent or Long-Term Effects

Terrestrial Vegetation

The Preferred Option would have minor permanent direct adverse impacts to terrestrial vegetation on the Virginia side of the Potomac River where the bridge would connect to the MVT and Long Bridge Park via ramps, as shown in **Figure 22-6.** The Preferred Option would permanently impact 7,225 square feet (0.2 acres) of early succession scrub-shrub habitat just south of the GWMP roadway for the ramp connecting to Long Bridge Park. The Preferred Option would not directly impact the natural forest between the existing tracks and Roaches Run.

364 **Figure 22-6** | Preferred Option Permanent Impacts to Vegetated Areas



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There would be impacts to an additional 20,055 square feet (0.5 acres) of maintained landscape areas on both sides of the Potomac River. Indirect impacts to terrestrial vegetation under the Preferred Option would be negligible. The Preferred Option when combined with either of the Action Alternatives would permanently impact 12,921 square feet (0.3 acres) of early succession scrub-shrub habitat and either 176,891 square feet (4.1 acres) of forest when combined with Action Alternative A or 197,649 square feet (4.5 acres) of forest when combined with Action Alternative B (see **Chapter 5.4.1.1, Natural Ecological Systems and Endangered Species, Terrestrial Vegetation**).

Wetland Vegetation

There would be no permanent direct or indirect adverse impacts to wetland vegetation from the Preferred Option. This is because the Preferred Option is located upstream of the new railroad bridge and is therefore not located adjacent to the wetlands associated with Roaches Run.

Submerged Aquatic Vegetation

The Preferred Option would cross over a single bed of submerged aquatic vegetation (SAV) found along the northern shoreline of the Potomac River. Permanent direct impacts would amount to 28 square feet for a single, concrete circular bridge support having a diameter of 6 feet located in the center of the SAV bed. In addition, shading of the SAV bed by the 17-foot wide trail bridge deck could impact SAV growth after construction.

When combined with the Action Alternatives, the total direct impacts to SAV would be 1,778 square feet. See **Chapter 5.4.1.3, Natural Ecological Systems and Endangered Species, Submerged Aquatic Vegetation.**

Wildlife

The Preferred Option would have a negligible permanent direct adverse impact due to the disturbance of small areas of upland habitat, including removing several trees and the small scrub-shrub habitat adjacent to the western side of the proposed new railroad right-of-way in Long Bridge Park. Permanent impacts would include the removal of deciduous shade trees within the GWMP available for use by various songbirds and gray squirrels (*Sciurus carolinensis*) as well as scrub-shrub habitat within the undeveloped northeast corner of Long Bridge Park. The new bike-pedestrian bridge would increase available habitat for wildlife that use bridge structures, resulting in a negligible beneficial indirect impact.

Aquatic Biota

The Preferred Option would have negligible permanent direct adverse impacts to aquatic biota associated with disturbance to benthic habitat. The Preferred Option would involve construction of a separate bridge structure spanning the Potomac River upstream of the railroad bridge. It would include 22 bridge piers placed on concrete footers, disturbing benthic habitat by 622 square feet (<0.1 acres). Soft-bottom benthic habitat would be lost, impacting benthic invertebrates that use such substrate. This area is relatively small in comparison to available habitat in adjacent areas in the Potomac River. Permanent effects to the benthic invertebrate community would be negligible and localized. Because

the Preferred Option includes installing additional pier structures in the Potomac River, the additional structures would provide cover and foraging opportunities for many fish species.

When combined with the Action Alternatives, total impacts to benthic habitat would be 8,014 square feet in the Potomac River. There would be no additional disturbance to benthic habitat in the Washington Channel. See **Chapter 5.4.1.5, Natural Ecological Systems and Endangered Species, Aquatic Biota.**

Rare, Threatened, and Endangered Species (RTE)

The Preferred Option would cause negligible permanent direct adverse impacts to shortnose or Atlantic sturgeon. The Preferred Option would involve construction of an independent bridge structure comprised of 22 bridge piers, 6 feet in diameter, reducing available sturgeon foraging habitat by an additional 622 square feet (<0.1 acres) as noted above. The potential permanent impact to sturgeon and Atlantic sturgeon Critical Habitat would be relatively small compared to the available habitat that would remain following the construction.

22.2.1.2. Temporary Effects

Terrestrial Vegetation

No temporary direct or indirect adverse impacts to terrestrial vegetation would be attributable to the Preferred Option if the Preferred Option is constructed along with the Project. If the Preferred Option is constructed along with the new railroad bridge construction contract, no additional area would be required for access and staging (see **Chapter 5.4.1.1, Natural Ecological Systems and Endangered Species, Terrestrial Vegetation**). However, if the Preferred Option is constructed separately following completion of the Project, it could cause additional impacts because of the potential for different staging and access areas.

Wetland Vegetation

There would be no temporary direct or indirect adverse impacts to wetland vegetation due to the Preferred Option.

Submerged Aquatic Vegetation

Temporary adverse impacts to SAV from the Preferred Option could occur due to contractor boat propellers gouging the shallow river bottom and suspended sediments moving downstream from the construction zone during installation of the bridge.

Wildlife

No additional temporary direct or indirect adverse impacts to wildlife would be attributable to the Preferred Option if constructed along with the Project. If the Preferred Option is constructed along with the new railroad bridge construction contract, no additional area would be required for access and staging (see **Chapter 5.4.1.3, Natural Ecological Systems and Endangered Species, Wildlife**). However, if the Preferred Option is constructed separately following completion of the Project, it could cause additional impacts because of the potential for different staging and access areas. This may result in

temporary displacements of wildlife during construction, but once completed, these areas would be restored.

Aquatic Biota

Minor temporary indirect adverse impacts to aquatic fauna from the construction of the Preferred Option would result from similar measures used to build the new railroad bridge, as described for the railroad piers (see **Chapter 5.4.1.4, Natural Ecological Systems and Endangered Species, Aquatic Biota**). The bike-pedestrian bridge supports would be 6-foot piles driven in the wet. The Preferred Option would result in the construction of piers, which would require the installation of piles using drilled shafts. Avoidance and minimization techniques described in **Section 22.2.1.3, Avoidance, Minimization, and Mitigation**, such as the use of turbidity curtains to contain suspended sediments, would offset any potential impacts from construction of the Preferred Option.

RTE Species

Minor temporary direct adverse impacts to RTE species from the construction of the Preferred Option would result from similar measures used to build the new railroad bridge, as described for the railroad piers (see **Chapter 5.4.2, Natural Ecological Systems and Endangered Species, RTE Species**). Construction of the piers for the Preferred Option would require the installation of piles that could result in increased turbidity and sound and pressure waves. Avoidance and minimization techniques described in **Section 22.2.1.3, Avoidance, Minimization, and Mitigation**, would offset any potential impacts from construction of the bike-pedestrian bridge.

22.2.1.3. Avoidance, Minimization, and Mitigation

Terrestrial Vegetation

Steps to mitigate the loss of vegetation would include planting native woody shrubs and trees on NPS property within the GWMP and Long Bridge Park in coordination with Arlington County. Tree species may include various oaks (*Quercus* sp.), American sycamore (*Platanus oxidentalis)*, and tulip poplar (*Liriodendron tulipfera*). Impacts to trees and vegetated areas would be minimized through tree protection measures and preventing or limiting equipment access to adjacent forested areas through protective fencing. Both forest areas and individual trees within construction staging and access areas would be protected prior to construction, under the supervision of a licensed arborist or other qualified professional. The arborist would perform any necessary pruning to maximize tree survival both during and following bridge construction. Adjusting temporary access and staging areas to avoid trees and vegetation would be determined during refinement of the disturbance limits to ensure that vehicles and materials are only stored on vegetated surfaces when necessary. When vegetated surfaces are the only option for staging near the Project, fencing, mulch, and planking would be installed to reduce injury to and compaction of vegetation.

Wetland Vegetation

There would be no effects to wetland vegetation due to the Preferred Option. Therefore, no avoidance, minimization, or mitigation is necessary.

Submerged Aquatic Vegetation

Steps to mitigate adverse impacts would include the use of a silt curtain around the immediate construction zone of the single bridge pier to be installed in the SAV bed in order to keep suspended sediments from spreading over any downstream SAV, as well as restricting contractor boat access only within the immediate area of the pier support to be placed within the SAV area.

Wildlife

Efforts to minimize impacts would be implemented throughout the future phases of design and construction of the Project. Specifically, efforts would be made during final design to avoid trees that could be used by wildlife. Best management practices (BMPs) and currently acceptable design and construction procedures would be used to reduce or eliminate anticipated undesirable effects resulting from construction. Construction activities would be planned to minimize unnecessary disturbance of wildlife habitat. For example, where appropriate and practicable, construction activities affecting avian wildlife would be performed during months when migratory birds are not nesting. Erosion control and stormwater management would be implemented during construction to reduce disturbance to wildlife habitat from erosive forces, such as stormwater runoff.

Aquatic Biota

Avoidance and minimization of construction impacts to aquatic biota would include construction methods to reduce noise, vibration, sedimentation, or turbidity, and time-of-year restrictions to protect areas of seasonal importance for migratory species. Depending upon the specific construction methods for the proposed Project, various techniques would be investigated to avoid or minimize impacts to aquatic biota as described below.

No dredging is proposed under the current construction plan. The avoidance of dredging would minimize overall impacts to existing river bed habitats and would minimize sedimentation and resuspension of sediment into the water column.

To reduce turbidity or clouding of water from potential sediment releases during construction of the new bridge piers, work would be conducted behind turbidity curtains. Installation of piles using drilled shafts can create minor sediment releases and produce noise. The expected sediment release and noise produced from this activity is low, but turbidity curtains would be used to further reduce turbidity and attenuate noise within the Potomac River. Sufficient space is present within the Potomac River to allow fish to escape the area prior to the start of drilling.

Time-of-year restrictions on in-stream construction work would be required by regulatory agencies to avoid impacting migratory fish species during specific periods when they are most likely to be present in the Project Area. The Potomac River supports regular spring spawning runs of four anadromous herring and shad species: blueback herring (*Alosa aestivalisI*), hickory shad (*Alosa mediocris*), alewife (*Alosa pseudoharengus*), and American shad (*Alosa sapidissima*). Although variable among species and across years, spawning events generally occur between late March and early June for all four species.[14] Striped bass (*Morone saxatilis*), another anadromous species that uses the Potomac River, typically spawns from

[14] Lippson, A.J. and R. L. Moran. 1974. *Manual for identification of early developmental stages of fishes of the Potomac River estuary*. Prepared for Maryland Department of Natural Resources, Power Plant Siting Program.

mid-April to June. During this time, and several weeks prior, adults of these species are most likely to be found in the Project Area. Sufficient space is present within the Potomac River to allow migratory fish to circumvent disturbance areas, assuming construction activities are staggered, and work is not occurring across the entire river at one time.

RTE Species

Avoidance and minimization of construction impacts include construction methods to reduce noise, vibration, sedimentation, or turbidity, and time-of-year restrictions to protect areas of seasonal importance. Depending upon specific construction methods for the Project, various techniques would be investigated during later phases of design to avoid or minimize impacts to sturgeon or Atlantic sturgeon critical habitat. To reduce turbidity from potential sediment releases and noise during construction and pier installation through drilled shafts, drilling would occur behind turbidity curtains.

Time-of-year restrictions on in-stream construction work would also be required to avoid impacting sturgeon during specific periods when they are most likely to be present. Based upon recent capture information, the most likely time for adult shortnose sturgeon presence within the Project Area would be during the spring spawning run (mid-March to mid-May). The likelihood of sturgeon being within the Project Area is so low that use of other avoidance and minimization measures may preclude the need for time-of-year restrictions. Additional informal consultation with the National Marine Fisheries Service (NMFS) further in the design process would be necessary to confirm whether the Preferred Option is not likely to adversely affect sturgeon. Additional coordination with NMFS would also be necessary in later phases of design to confirm potential construction restrictions.

22.2.2. Water Resources and Water Quality

This section assesses the potential short-term and long-term impacts of the Preferred Option on water resources and water quality. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 6, Water Resources and Water Quality** for a description of the regulatory context, analysis methodology, and Local and Regional Study Areas.

The analysis of impacts to water resources and water quality as a result of the bike-pedestrian crossing applied the same methodologies used to evaluate impacts of the Action Alternatives (see **Chapter 6.2.2, Water Resources and Water Quality**, **Methodology**).

22.2.2.1. Permanent or Long-Term Effects

Water Quality

The Preferred Option would have a negligible permanent direct adverse impact on groundwater recharge, peak runoff rates, or total runoff volume reaching the Potomac River due to an increase in impervious surface. The Preferred Option would also cause minor permanent direct adverse impacts on water quality due to an increase in impervious surface allowing for buildup and wash-off of pollutants. The construction of a ramp connecting to the MVT, a crossing deck over the Potomac River, and a landing in the existing NPS Parking Lot C in East Potomac Park would result in this increase in impervious surface.

Groundwater

The Preferred Option would have negligible permanent direct adverse impacts on groundwater quantity through reduction in groundwater recharge. The Local Study Area generally consists of only shallow discharges to groundwater in the unconfined surficial aquifer that flows toward the Potomac River. The Preferred Option would result in an increase in impervious area of less than 0.1 acres within the Roaches Run watershed. The Preferred Option would increase impervious area within the Potomac River watershed because of the new closed bridge deck. Almost the entire increase is in area of existing open water.

There would be no permanent direct adverse impacts to groundwater quality because of the Preferred Option. The Preferred Option would not introduce pollutants into the groundwater.

Surface Water

There would be negligible permanent direct adverse impacts on surface water quality because of the Preferred Option. The Preferred Option would not change drainage to sub-watersheds. The crossing would result in an increase in impervious area of less than 0.1 acres tributary to Roaches Run.

The Preferred Option would have negligible permanent direct adverse impacts 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. Currently, rain falls directly into the river in this location. Under the Preferred Option, stormwater would wash from the deck into the river. Because the Preferred Option would not be used by vehicles, pollutant load would be negligible and primarily from aerial deposition.

Stormwater

The Preferred Option would not have permanent direct or indirect adverse impacts to stormwater infrastructure. The Preferred Option would have negligible permanent indirect adverse impacts 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.

Stormwater within the Local Study Area would continue to be conveyed either directly to the Potomac River or via overland flow to Roaches Run. As the Preferred Option would result in an increase in impervious area of less than 0.1 acres tributary to Roaches Run, slight increases to the stormwater retention volume and negligible permanent adverse impacts on stormwater quality would be anticipated.

The Preferred Option would also result in an approximately 1.3-acre increase in impervious area within the Potomac River watershed. Since this increase in impervious area is almost entirely over existing open water, the crossing would have a negligible permanent indirect adverse impact on recharge, peak runoff rates, or total runoff volume in the Potomac River watershed. When combined with the Action Alternatives, the total increase in impervious area within the Potomac River watershed would be 3.2 acres (see **Chapter 6.4.1, Water Quality and Water Resources, Water Quality**).

Wetlands and Other Waters of the United States

The Preferred Option would have minor permanent direct adverse impacts to other waters of the United States. Permanent impacts to tidal waters of the United States within the District would increase by a total of 693 square feet (<0.02 acres) due to the pilings, as shown in **Figure 22-7**. There would be minor permanent indirect adverse impacts to other waters of the United States under the Preferred Option because of the removal of approximately 1,650 cubic yards of soil and sediment from installing the crossing piers through drilled shafts. Removal of soil and sediment for the crossing piers would have minor permanent direct adverse impacts to the overall function of the Potomac River.

When combined with the Action Alternatives, total impacts to waters of the United States would be 23,730 square feet (0.5 acres). See **Chapter 6.4.2, Water Quality and Water Resources, Wetlands and Waters of the United States**.

Flood Hazards and Floodplain Management

The Preferred Option would cause a negligible permanent direct adverse impact resulting in an increase in floodplain base elevation. The Preferred Option would require new bridge piers to be placed in the Potomac River and adjacent floodplain. The increase in floodplain base elevation would not be at a level to trigger the Federal Emergency Management Agency (FEMA) 1-foot threshold. Prior to final design and permitting of the crossing, a determination of the effects would be modeled in accordance with FEMA protocols to more accurately estimate the new floodplain elevation.

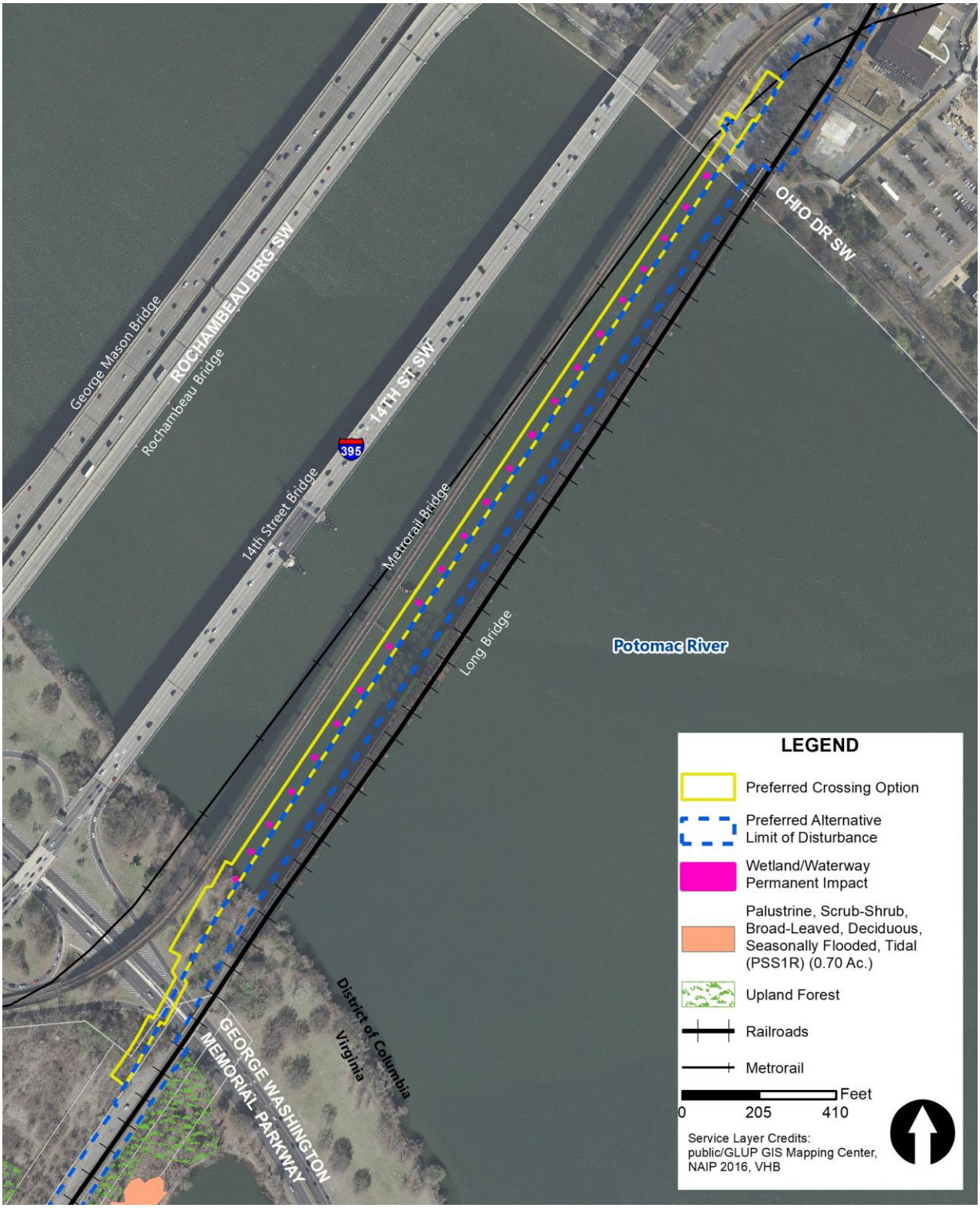
Additionally, adverse effects to the floodplain would be minimized through retaining walls. The vertical retaining walls would reduce the footprint and preserve existing floodplain features to the greatest extent practicable. Impacts to the floodplain and river bed are anticipated to be negligible and not affect the function or integrity of the resource.

Chesapeake Bay Preservation Areas

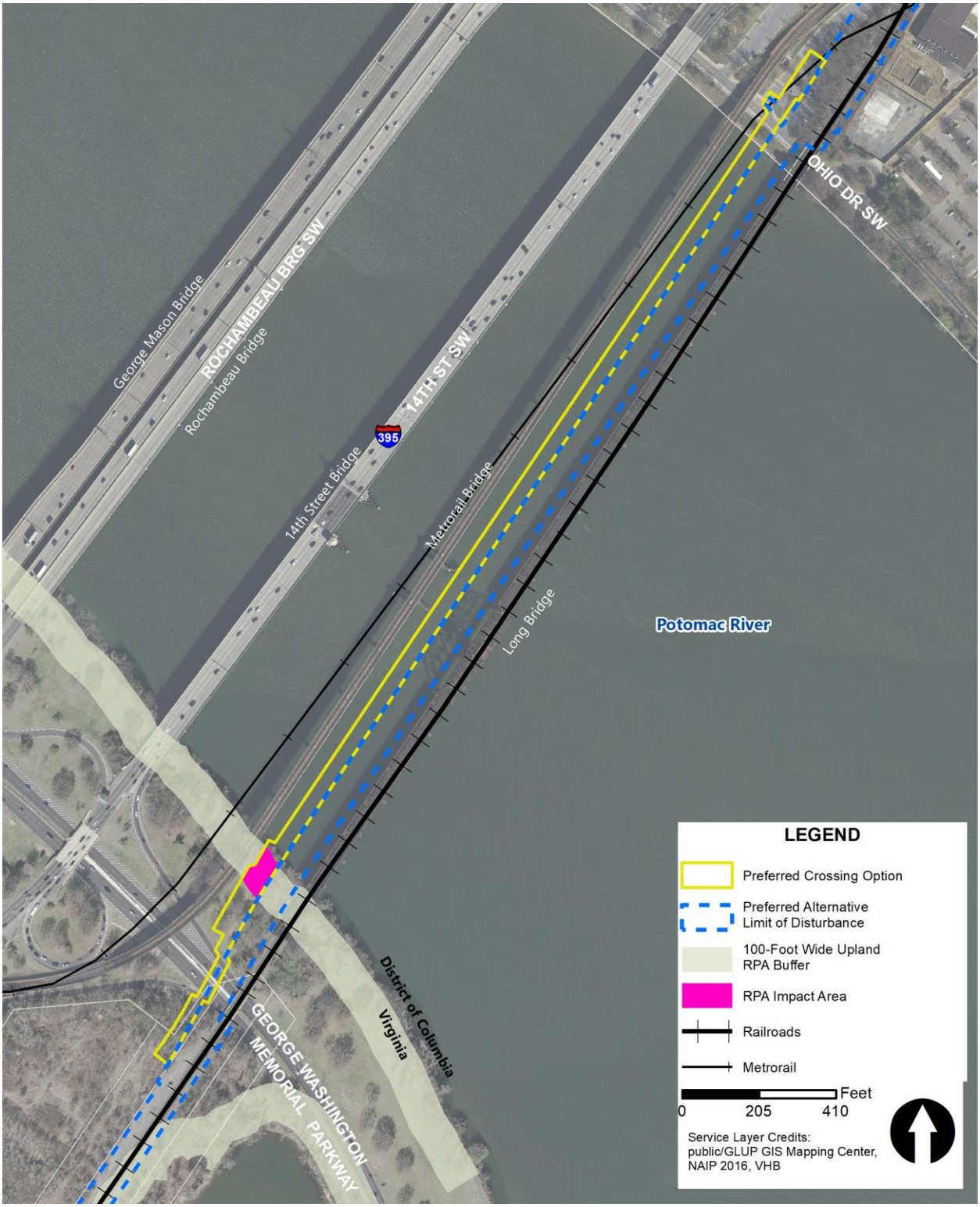
The Preferred Option would cause minor permanent direct adverse impacts to the 100-foot RPA buffer along the shoreline of the Potomac River of approximately 6,570 square feet (0.15 acres), as shown in **Figure 22-8**. The Preferred Option would add a structure over the RPA buffer, as well as a ramp within the RPA. Permanent impacts to the RPA would include those areas converted to infrastructure and impervious surface that could increase pollutant loads to the Potomac River.

When combined with Action Alternative A, the Preferred Option would impact approximately 14,000 square feet (0.3 acres) of the RPA buffer. When combined with Action Alternative B, the Preferred Option would impact approximately 18,000 square feet (0.4 acres) of the RPA buffer (see **Chapter 6.4.4, Water Resources and Water Quality, Chesapeake Bay Preservation Areas**).

Figure 22-7 | Preferred Option Impacts to Wetlands and Waterways



621 **Figure 22-8** | Preferred Option Impacts to Vegetation within the RPA



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Coastal Zone Consistency

FRA and DDOT expect the bike-pedestrian crossing 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 and addressed both the Project and the bike-pedestrian crossing. 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.

22.2.2.2. Temporary Effects

Water Quality

Soil erosion and sedimentation caused by construction activities may result in negligible temporary direct adverse impacts on water quality within the Local Study Area. These activities can include construction of the bridge, staging and laydown areas, and access locations. In addition, construction activities could result in increased likelihood of spills of fuels, lubricants, or other pollutants.

The Preferred Option would be designed and constructed in accordance with the United States Environmental Protection Agency (EPA) 2017 National Pollutant Discharge Elimination System (NPDES) Construction General Permit, the Virginia Erosion and Sediment Control Regulations, the District Department of Energy and Environment (DOEE) *Stormwater Management Guidebook*, the Anacostia Waterfront Development Zone, and the Arlington County *Stormwater Manual*.

Despite protective measures, the Preferred Option could result in negligible temporary direct adverse effects to water quality, including sedimentation, turbidity, and pollutants entering surface waters. As a separate facility, the Preferred Option would be constructed either along with the Project or constructed separately following the completion of the Project. If constructed along with the Project, the Preferred Option would make use of the same construction access and staging areas. However, if constructed separately as a different construction contract, access and staging would be required from Long Bridge Park, the GWMP, and East Potomac Park.

Groundwater

The Preferred Option would not impact groundwater quality or quantity because the bike-pedestrian bridge piles would be driven in the wet and would not require dewatering.

Surface Water

The Preferred Option would not impact surface water quality. The Preferred Option construction would be performed using drilled shafts, removing approximately 1,650 cubic yards of soil and sediment during pier installation. Construction staging, laydown areas, and access locations could also result in erosion and sedimentation, resulting in negligible temporary direct adverse impacts to surface water quality in the Potomac River and Roaches Run. However, adverse impacts to surface water quality would be avoided through implementation of temporary treatment measures such as turbidity curtains and erosion and sedimentation control.

Stormwater

The Preferred Option would result in no temporary direct or indirect adverse impacts to stormwater. Construction of the Preferred Option would comply with construction-phase stormwater management requirements. Construction activities would include erosion and sediment controls and management of construction wastes to prevent stormwater impacts in compliance with EPA's 2017 NPDES Construction General Permit,[15] DOEE's *Erosion and Sediment Control Manual*,[16] and the *Virginia Erosion and Sediment Control Handbook*.[17]

Wetlands and Other Waters of the United States

There would be no temporary direct or indirect adverse impacts to wetlands under the Preferred Option. Negligible temporary direct adverse short-term impacts to tidal waters of the U.S. are expected for installing circular drilled shafts for the piers, as opposed to cofferdams, which are associated with dredging.

Flood Hazards and Floodplain Management

The Preferred Option would have negligible temporary direct adverse impacts to the floodplain area due to staging of equipment along the shoreline within the floodplain.

Chesapeake Bay Preservation Areas

The construction of the Preferred Option along with the Preferred Alternative would result in no additional access or staging areas and no additional adverse impacts to RPAs. However, if the Preferred Option is constructed separately following the completion of the Project, it would have additional temporary adverse impacts if construction staging or access areas are placed within the RPAs (**Figure 22-8**).

22.2.2.3. Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 6.6, Water Resources and Water Quality, Avoidance, Minimization, and Mitigation**).

Water Quality

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

[15] 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.
[16] DOEE. 2017. *Erosion and Sediment Control Manual*. Accessed from https://doee.dc.gov/esc. Accessed August 24, 2018.
[17] 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.

Construction-Phase Mitigation

Erosion and sedimentation controls associated with the Preferred Option would be in accordance with EPA's 2017 NPDES Construction General Permit, DOEE's *Stormwater Management Guidebook*, the DDOT *Green Infrastructure Standards*, the DC Water *Green Infrastructure Utility Protection Guidelines*, the DC Water *Project Design Manual Volume 3 Infrastructure Design,* and the Arlington County *Stormwater Manual.*

Post-Construction Stormwater BMPs

If necessary, permanent adverse impacts to water quality in the Roaches Run and Potomac River watersheds, would be mitigated through stormwater BMPs. Design of stormwater BMPs would be completed during final design. If designed in accordance with the DOEE *Stormwater Management Guidebook*[18] or the Arlington County *Stormwater Manual*,[19] 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.

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. Treatment BMPs such as oil/grit separators could be implemented to treat runoff prior to discharge; however, these BMPs would not mitigate increases in runoff volume or peak flow rate, which would be negligible.

Wetlands and Other Waters of the United States

Potential impacts to waters of the U.S. would be minimized by aligning the new piers with existing piers, which minimizes the potential to alter the existing current of the river. Erosion control and stormwater management would be implemented during construction to reduce disturbance to waters of the U.S. from erosive forces, such as stormwater runoff. Because the Preferred Option includes 6-foot-diameter drilled shafts, these piers would not require the use of cofferdams, which can create minor sediment releases. Although the drilling of new piers would cause some sediment release, the expected amount from this activity is low. Turbidity curtains would be used around each drilled shaft to further reduce turbidity within the Potomac River.

Flood Hazards and Floodplain Management

Although impacts to the floodplain would be unavoidable, efforts would be taken to minimize floodplain impacts during the design and construction phases. Minimization efforts would include a 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. Additionally, adverse effects to the floodplain would be minimized through retaining walls. The vertical retaining walls would reduce the footprint and preserve existing floodplain features to the greatest extent practicable.

[18] DOEE. 2017.

[19] Arlington County. *Stormwater Manual: A Guide to Stormwater Requirements for Land Disturbing Activities in Arlington County.* 2018. Accessed from https://building.arlingtonva.us/wp-content/uploads/sites/38/2016/09/DES-Stormwater-Management-Ordinance-Guidance-Manual.pdf. Accessed September 19, 2018.

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, proper erosion and sediment control techniques would help reduce runoff that could 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.

22.2.3. Geologic Resources

This section assesses the potential short-term and long-term impacts of the Preferred Option on geologic resources. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 7, Geologic Resources** for a description of the regulatory context and Local and Regional Study Areas.

The analysis of impacts to geologic resources as a result of the bike-pedestrian crossing used a qualitative assessment based on geologic mapping from the Project's documentation of the affected environment (**Chapter 7.3, Geologic Resources, Affected Environment**). The qualitative assessment involved identification of geologic, soils, and geomorphic features within the bike-pedestrian crossing's footprint and determining potential impacts of installing the structure.

22.2.3.1. Permanent or Long-Term Effects

Geologic Resources

The Preferred Option would cause minor permanent direct adverse effects to geologic resources. Minor permanent direct adverse effects would be localized and would not affect the integrity of the resource. The Preferred Option would have free-standing support structures occupying approximately 622 square feet of shallow river bed of the Potomac River. Minor alterations to other geomorphic features would include grading and filling in the floodplain to link the Preferred Option with existing infrastructure on the north and south sides of the Potomac River. These modifications would not affect the function or integrity of geologic resources. See **Section 22.2.2, Water Resources and Water Quality**, for further discussion on the effects to floodplain functions. The new Preferred Option connection would be constructed in accordance with current seismic structural criteria.

Soils

The Preferred Option would have minor permanent direct adverse effects to soil resources since the footprint of the bike-pedestrian connection is relatively small and localized and would not affect the function or integrity of soils. The free-standing supports within the river would be constructed using drilled shafts that would remove approximately 1,650 cubic yards of soil. These soils would be removed and disposed of offsite in accordance with applicable laws and regulations. See **Section 22.2.4, Solid Waste Disposal and Hazardous Materials**, for offsite disposal of potential soil materials.

Soils would be disturbed at the north and south ends of the bike-pedestrian connection for the construction of access ramps down to existing infrastructure. The primary concern for these areas would be related to the potential for soil loss from erosion following construction. Removing existing vegetative cover like trees and grasses can destabilize soils, making them susceptible to erosion during

rainfall events. The erodibility of existing soils is variable due to previous disturbance and potentially imported materials. However, further investigations during the design phase would identify appropriate permanent soil stabilization measures for specific locations that could include items such as silt fences, rock check dams, soil stabilization blankets, and temporary and permanent seeding. A Stormwater Pollution Prevention Plan (SWPPP) would be developed to provide guidance and strict adherence to erosion and sediment control measures developed for the Project.

22.2.3.2. Temporary Effects

Geologic Resources

The Preferred Option would have minor temporary direct adverse effects to geologic resources, but would be considered relatively small and localized, and would not affect the function or integrity of the resource. During construction phases of the Preferred Option, construction access, storage, and staging would temporarily disturb geomorphic features like the floodplain, but once construction is completed the areas would be returned to pre-construction conditions. Temporary impacts to riverine features such as disturbance of the shallow river bed adjacent to the channel would occur through the installation of free-standing support structures that would occupy approximately 622 square feet of shallow river bed of the Potomac River. After removal of construction structures, the river bed would be exposed to existing tidal currents and frequent flood events that constantly move river sediments, potentially returning these temporary impact areas to more natural conditions in a relatively quick timeframe.

Soils

The Preferred Option would have minor temporary direct adverse effects to soil resources since the footprint of the bike-pedestrian connection is relatively small and localized and would not affect the function or integrity of soil resources. Disturbed areas would be returned to preconstruction conditions and would not affect the function or integrity of the resource. Temporary effects to soil resources would result from construction access, staging and stockpiling, and demolition/construction work of the permanent improvements. The free-standing supports within the river would be constructed using drilled shafts that would result in the removal of approximately 1,650 cubic yards of soil. These soils would be removed and disposed of offsite in accordance with applicable laws and regulations. See **Section 22.2.4, Solid Waste Disposal and Hazardous Materials**, for further discussion on the offsite disposal of potential soil materials.

Temporary soil disturbance would occur at the north and south ends of the bike-pedestrian connection for the construction of access ramps down to existing infrastructure. The primary concern for these areas would be related to the potential for soil loss from erosion during and following construction. Removal of existing vegetative cover like trees and grasses can destabilize soils, making them susceptible to erosion during rainfall events. The erodibility of existing soils is variable due to previous disturbance and potentially imported materials. However, further investigations during the design phase would identify appropriate temporary and permanent soil stabilization measures for specific locations that could include items such as silt fences, rock check dams, soil stabilization blankets, and temporary and permanent seeding. A SWPPP would be developed to provide guidance and strict adherence to erosion and sediment control measures developed for the project.

22.2.3.3. Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 7.6, Geologic Resources, Avoidance, Minimization, and Mitigation**).

Geologic Resources

The Preferred Option may result in minor adverse effects to geomorphic features like the floodplain and river bed due to construction of the bike-pedestrian connection. These geomorphic features cannot be avoided while achieving the goals and objectives of the Preferred Option. Adverse effects to the floodplain would be minimized through retaining walls. The vertical retaining walls would reduce the footprint and preserve existing floodplain features to the greatest extent practicable. As the impacts to the floodplain and river bed are anticipated to be minor, localized, and not affecting the function or integrity of the resource, no mitigation is proposed.

Soils

The Preferred Option would have minor adverse effects on soil resources within the Local Study Area due to the bike-pedestrian ramp features at the north and south ends. Erosion of soil resources would be mitigated through soil stabilization blankets, turbidity curtains, silt fences, rock check dams, and other BMPs designed to minimize and control soil loss during and following construction. Retaining walls would also minimize the Project footprint and disturbance to soil resources. Final construction documents would include an approved erosion and sediment control plan and SWPPP from the Virginia Department of Environmental Quality (VDEQ) and DOEE, further minimizing permanent erosion hazards.

22.2.4. Solid Waste and Hazardous Materials

This section assesses the potential short-term and long-term impacts of the Preferred Option on solid waste and hazardous materials. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 8, Solid Waste and Hazardous Materials** for a description of the regulatory context and Local and Regional Study Areas.

The analysis of impacts from solid waste and hazardous materials as a result of the bike-pedestrian crossing used a qualitative assessment based on information collected from assessing impacts of the Action Alternatives (see **Chapter 8, Solid Waste Disposal and Hazardous Materials**). The bike-pedestrian crossing would not be an intensive waste generator and use of the bridge would only result in trash generated by bicyclists and pedestrians.

22.2.4.1. Permanent or Long-Term Impacts

Solid Waste

The Preferred Option would have negligible permanent direct adverse impacts on the environment due to an increase in solid waste generation and disposal. Long-term direct impacts such as trash generation by users of the crossing would be negligible and would be handled by maintenance of the Preferred Option; negligible permanent indirect adverse impacts would occur related to the ultimate off-site disposal location for soil generated during construction of the Preferred Option. No new on-site sources of solid waste are expected to be introduced for the Preferred Option.

Hazardous Materials

The Preferred Option would have no permanent direct or indirect adverse impacts on the environment and human health relative to hazardous materials. There would be no long-term generation of hazardous materials because of the Preferred Option.

22.2.4.2. Temporary Effects

During construction, the Preferred Option is expected to generate hazardous materials and solid waste. The types of solid waste and hazardous materials generated during construction would likely be related to environmental media (such as soil) and construction materials (such as machinery and supplies).

Solid Waste

The Preferred Option would have minor temporary direct adverse impacts because of solid waste generation and disposal. No demolition is anticipated for construction of the crossing. Excess soil (approximately 1,650 cubic yards) would be excavated from the river bed because of drilled shafts and pier installations and transported off-site. Direct impacts would be minor and associated with the excavation and removal of solid waste, and indirect impacts would be minor and primarily consist of the off-site transportation of these materials.

Hazardous Materials

The Preferred Option would have minor temporary indirect adverse impacts because of hazardous materials. Urban runoff from the region is likely to have impacted sediments at the bottom of the Potomac River with contaminants such as heavy metals and petroleum hydrocarbons such as polyaromatic hydrocarbons, and polychlorinated biphenyls. The construction of the Preferred Option would result in 1,650 cubic yards of sediments generated by excavation within the drilled shafts for the crossing piers. Sediments found to be contaminated could have a potentially minor temporary adverse effect during the transportation, disposal, and management of contaminated media.

Construction-related equipment contains mechanical fluids that have the potential to result in spills or leaks when not maintained in good working order. Contractors may also use supplies containing hazardous materials. Although the spill or release of oil or hazardous materials in the process of construction is an unlikely event, spill prevention plans would be required to prevent and control any such spills. Therefore, construction-related equipment is not anticipated to result in an adverse temporary effect.

The temporary concrete plant installed for construction of the Project would remain in place for construction of the Preferred Option. The process of creating concrete involves the use of aggregate, sand, and water, which would need to be transported to and stored within the Local Study Area. The raw materials associated with concrete generation may originate from a variety of sources and have the potential to contain oil and/or hazardous materials (OHM). Therefore, materials containing OHM would need to be stored properly either on impermeable surfaces covered as needed to prevent erosion, or within containers to prevent the materials from impacting the surrounding environment. The generation of concrete also involves the use of chemical additives, lubricants, and fuel, the use of which has the potential to impact environmental media within the Local Study Area. These materials would be stored in vessels such as tanks and drums with secondary containment in order to prevent an accidental spill.

The contractor operating the plant would also need to implement a Spill Prevention Plan to respond to a release of fuel or chemicals, if an incident were to occur. Finally, the process of creating concrete may generate dust, which would need to be monitored and suppressed to prevent off-site migration of particulate matter. Based on the processes noted above, the operation of the concrete plant would likely have a minor temporary adverse impact on the Local Study Area and indirect impacts based on the potential for dust generation, spills of OHM (that would be cleaned up if they occur), and transportation impacts (truck emissions and fuel usage).

22.2.4.3. Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 8.6, Solid Waste Disposal and Hazardous Materials, Avoidance, Minimization, and Mitigation**).

Solid Waste

The construction of the Preferred Option would result in the generation of soil and minor construction debris during the construction phases of the Project. A Soil Management Plan (SMP) would be developed based on results of subsurface investigations dictating appropriate soil handling procedures and identifying appropriate receiving facilities. Construction debris would be handled appropriately in accordance with applicable regulations, and contractors would maintain good housekeeping practices to prevent construction debris from impacting the environment. All applicable licenses, permits, and approvals would be obtained prior to initiating the work. The work would be conducted in accordance with Federal, state, and local regulatory guidelines and procedures. Proper personal protective equipment (PPE) would be used based on the contaminants of concern and known or suspected hazards.

Hazardous Materials

The construction of the Preferred Option would likely result in the generation of hazardous materials (such as contaminated soil or sediment from drilled shafts) during the construction phases of the Project. Prior to initiating construction, all applicable licenses, permits, and approvals would be obtained. The work would be conducted in accordance with Federal, state, and local regulatory guidelines and procedures. An SMP would be developed based on the results of subsurface investigations. These investigations would be conducted to pre-characterize soils designated for excavation during construction phases. The SMP typically outlines standards and procedures for identifying and disposing of contaminated materials that may be encountered during construction. Soil tracking protocols would be detailed from the point of excavation to designated testing areas and to the ultimate disposal sites. Records pertaining to hazardous material generation, transport, and disposal would be maintained for a prescribed period of time and in a manner consistent with Federal, state, and local regulations.

Fugitive dust would be controlled through wetting, sweeping, and other suppression techniques. Furthermore, a Health and Safety Plan would be developed that would provide the minimum health and safety specifications contractors must meet during construction, including requirements for environmental monitoring, PPE, site control and security, and training. PPE would be selected based on the contaminants of concern and known or suspected hazards.

Spills and leaks associated with vehicles and heavy machinery can be appropriately mitigated by implementing spill response programs that specify procedures for emergency response in the event a spill or leak occurs. Depending on the nature of the spill or discharge to the environment, it may also be necessary to contact regulatory agencies such as the National Response Center, the EPA Region 3 Office, the United States Coast Guard Marine Safety Office, Virginia Department of Emergency Services, and the DOEE. The agency to be contacted would depend on the nature and amount of the spilled material and the location of the spill.

22.2.5. Transportation and Navigation

This section assesses the potential short-term and long-term impacts of the Preferred Option on transportation and navigation. The **transportation system** includes all transportation modes, including passenger and freight railroad (Amtrak, VRE, CSX Transportation, and Norfolk Southern), the transit system (Metrorail and local bus operations), the pedestrian and bicycle network, and the surrounding roadway network. This section also evaluated navigation and the marine transportation system. **Navigable waterways** are waters subject to the ebb and flow of tides and are presently used, have been used in the past, or may be used for transportation. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 9, Transportation and Navigation** for a description of the regulatory context and Local and Regional Study Areas.

The analysis of impacts to transportation and navigation as a result of the bike-pedestrian crossing used a qualitative assessment. Bicycle and pedestrian routes that would include the bike-pedestrian crossing were analyzed to determine any adverse or beneficial impacts to users and the overall bicycle network in this area, as well as any resulting mode shifts. Impacts to navigation due to the bike-pedestrian crossing were assessed similarly to the assessment used for the Action Alternatives (see **Chapter 9.2.2.2, Transportation and Navigation, Methodology**).

22.2.5.1. Permanent or Long-Term Effects

Railroad Infrastructure and Operations

The Preferred Option would not have permanent or long-term impacts on the railroad infrastructure and operations. The Preferred Option would be constructed on a separate structure upstream from the new railroad bridge.

Transit

The Preferred Option would have no permanent direct or indirect adverse impacts to transit. The Preferred Option would construct a bike-pedestrian crossing downstream of the WMATA Metrorail bridge. It would not require permanent modification of transit operations or infrastructure and therefore is not expected to have permanent or long-term effects on transit.

Pedestrian and Bicycle Network

The Preferred Option would have major permanent direct beneficial impacts to the pedestrian and bicycle network. By providing additional pedestrian and bicycle access to and between Crystal City, the MVT, and East Potomac Park, the Preferred Option would increase the connectivity of, and have a

beneficial impact on, the existing pedestrian and bicycle network. The new bike-pedestrian connection between the District and Arlington would be a pathway dedicated solely to cyclists and pedestrians and would provide an enhanced connection between (via Long Bridge Park), the MVT, and destinations in the District. It is expected that some bicycle and pedestrian traffic would be diverted from the existing 14th Street Bridge particularly for people traveling to and from Long Bridge Park, Crystal City, Pentagon City, and surrounding neighborhoods. The Preferred Option would serve as a more direct connection from these areas. Also, since the Preferred Option would be separated from automobile traffic, travel on the Preferred Option would likely be preferable for pedestrians and bicyclists.

NPS has expressed concern that the bike-pedestrian bridge would increase congestion on the MVT. The new connection would make it easier for users from Pentagon City, Crystal City, Potomac Yard, and surrounding areas to cross the GWMP and the Potomac River in this location, and some users would likely use the ramp to access the MVT. However, other pedestrians and bicyclists who currently use the MVT to access the 14th Street Bridge when traveling between these areas and the District would now use the direct connection provided by the new bridge and never access the MVT at all. Therefore, the new connection would decrease volumes and current congestion on the MVT. Finally, the ramp landing at the MVT would be designed to minimize conflict between users already on the trail and those coming from the bike-pedestrian bridge.

Roadway Network

The Preferred Option would have negligible permanent direct beneficial impacts to the roadway network through potential mode shifts from automobiles to bicycles. The Preferred Option would construct a bike-pedestrian crossing over the Potomac River. This new connection would provide access between Crystal City, the MVT, and East Potomac Park, and increased connectivity between Arlington and the District. Increased connectivity through the Preferred Option may encourage some drivers to change modes from automobiles to bicycles. However, given the current volume of automobile traffic on roadways within the Local Study Area (in 2015, the 14th Street Bridge Complex carried over 230,000 vehicles per day),[20] any shift from driving to bicycling would have a negligible impact on roadway congestion. The Preferred Option would not require permanent modification of streets, roads, or highways, and therefore would not impact roadway infrastructure.

Parking

The Preferred Option would have a minor permanent direct adverse impact to parking. The Preferred Option would include a new bike-pedestrian ramp in the NPS Parking Lot C in East Potomac Park. Approximately fifty parking spaces would be eliminated due to the construction of the Project. The exact number of parking spots to be removed would be determined as design of the bike-pedestrian crossing and ramp is advanced, as the surface parking areas would be reconfigured to minimize permanent loss of parking spaces. The addition of the bike-pedestrian ramp would result in less space for reconfiguration of the parking spaces. The removal of parking and additional constraint of the remaining surface parking would amount to a minor direct adverse impact as the current spaces are generally under-utilized except during peak times such as during the National Cherry Blossom Festival each spring.

[20] DDOT. Traffic Volume M Section 3.3.2.2 (p. 29): made revisions for consistency with DEIS
ap 2015. July 2017. Accessed from https://ddot.dc.gov/publication/traffic-volume-maps-2015. Accessed January 17, 2019.

Navigation

There would be minor permanent direct adverse impacts to navigation due to the Preferred Option. Installation of the Preferred Option may pose hazards such as marine vessel strikes to the bike-pedestrian crossing piers. However, the Preferred Option would be consistent with the clearances provided by the rail bridge constructed with the Project which would exceed the 18 feet provided by existing Long Bridge. The piers of the new bike-pedestrian bridge would align with the railroad bridge piers, maintaining the navigation channel and existing horizontal clearances.

Aviation

There would be no permanent or long-term effects on aviation because of the Preferred Option. The top of structure of the Preferred Option would be within the limit set by the Federal Aviation Administration.

22.2.5.2. Temporary Effects

The Preferred Option would have minor temporary direct adverse effects to transportation and navigation. As a separate facility, the Preferred Option may be constructed along with the construction of the Project or as a separate construction project at a later time. If constructed along with the Project, the Preferred Option would make use of the same construction access and staging areas, rerouting of the MVT, diverting sidewalks, and extend the duration of construction. However, if constructed separately, construction access and staging would be required in similar areas as the Preferred Alternative along the GWMP and Ohio Drive SW. Separate construction of the Selected Crossing over the GWMP would require traffic control measures, temporary lane closures, and temporary lane shifts on the GWMP for delivery of materials and equipment, and for construction activities for the abutments, piers, and superstructure while maintaining a safe work zone. Construction material for the Preferred Option could be barged in on the river and staging areas would have to be established. To encourage traffic to make use of other routes, additional access points would be identified.

22.2.5.3. Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 9.6, Transportation and Navigation, Avoidance, Minimization, and Mitigation**). As there are no anticipated permanent adverse effects to transportation or navigation except for loss of parking, mitigation measures are proposed to mainly address temporary impacts and are the same as the mitigation measures of the Project's Preferred Alternative.

The construction of the Preferred Option would require typical maintenance of traffic measures such as lane and shoulder closures, lane shifts, potential detours and a host of temporary traffic mitigation strategies to minimize the impacts to the traveling public. The implementation of these measures and strategies would be necessary in order construct the project safely while allowing for reasonable production of construction operations. The contractor would be required to develop, in coordination with DDOT, a project-wide Traffic Management Plan (TMP) that includes temporary traffic control plans, the analysis of traffic operations, and a public outreach campaign. During development of the TMP, additional coordination with the Project stakeholders and public at large would inform the specific measures laid out in the plan.

For impacts to parking during construction, temporary parking or parking shuttles would be considered as potential mitigation for the loss of parking spaces at NPS Parking Lot C, especially during periods of heavy usage, such as during the National Cherry Blossom Festival. Permanent loss of parking would not be mitigated since parking is generally underused.

For impacts to the MVT, the mitigation would be the same as the Preferred Alternative. Wayfinding signage would be installed, as appropriate, to redirect pedestrian and bicycle traffic during temporary closures due to construction. In addition, temporary crossings of trails for materials delivery would be scheduled during evening hours to the extent practicable, to minimize impacts to trail users.

The construction of the Preferred Option would require the installation of navigation lights, the quantity to be determined through agency coordination, the development of an inspection and maintenance program for the crossing and navigation lights, and to inform recreational boaters of the new bike-pedestrian crossing and proper clearances for watercraft.

22.2.6. Air Quality and Greenhouse Gas Emissions

This section assesses the potential short-term and long-term impacts of the Preferred Option on air quality and greenhouse gas emissions. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 10, Air Quality and Greenhouse Gas Emissions** for a description of the regulatory context and Local and Regional Study Areas.

The analysis of impacts to air quality and greenhouse gas emissions due to the bike-pedestrian crossing applied a similar methodology to that used for evaluating impacts of the Action Alternatives (See **Chapter 10.2.2, Air Quality and Greenhouse Gases, Methodology**). The bike-pedestrian crossing is within the footprint of the Action Alternatives' Study Areas for air quality and greenhouse gas emissions. Due to its use for non-motorized transportation and its smaller size and scope, it was assumed that the bike-pedestrian crossing emissions from permanent and temporary activities would be below those of the Action Alternatives and would not exceed *de minimis* thresholds for criteria pollutants and would therefore not require a General Conformity determination.

22.2.6.1. Permanent or Long-Term Effects

The Preferred Option would not have permanent direct adverse air quality impacts and would have minor permanent indirect benefits to air quality. The current pedestrian-bike crossing on the 14th Street Bridge carries approximately 2,000 trips per weekday during the warmer months. The proposed crossing and connection to Crystal City via Long Bridge Park would likely encourage additional pedestrian and bicycle trips, thereby slightly reducing vehicle trips and the corresponding vehicular pollutant emissions including carbon monoxide (CO), volatile organic carbon (VOC), nitrogen oxide (NOx), particulate matter (PM), and CO2.

22.2.6.2. Temporary Effects

The Preferred Option would have minor temporary adverse effects to air quality and GHG. The emissions associated with construction activities for the Preferred Option are assumed not to exceed *de minimis* thresholds for criteria pollutants. This is based on the conclusion that construction of the Preferred Alternative (with its much larger construction scope) would be below *de minimis* thresholds.

The Preferred Option would be constructed either along with the Project or constructed separately following the completion of the Project. Similar to construction of the Preferred Alternative, pollutant emissions during construction would occur because of emissions from on-site diesel equipment, increased truck traffic to and from the construction site on local roadways, and fugitive dust.

22.2.6.3. Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 10.6, Air Quality and Greenhouse Gases, Avoidance, Minimization, and Mitigation**).

No permanent air quality mitigation is proposed, as the bike-pedestrian bridge would have no permanent adverse impacts to air quality. Although no major temporary adverse impacts are anticipated during construction of the Preferred Option, measures would be taken to reduce pollutant emissions during construction in accordance with all applicable laws and regulations.

The District's and Virginia's anti-idling laws would be enforced during all construction phases for the Preferred Option. Construction in the District would comply with the District's 20 DCMR 900 limiting non-road engine idling to 3 minutes. Construction components in Virginia would comply with 9 VAC 5-40-5670 limiting motor vehicle idling to 3 minutes unless providing auxiliary power for purposes other than heating or air conditioning. Idling restriction signs would be placed on the premises to remind drivers and construction personnel of the idling regulations.

Construction contractors would be required to use ultra-low-sulfur diesel fuel for all off-road construction vehicles as an additional measure to reduce air emissions from construction activities. Any non-road diesel equipment rated 50 horsepower or greater would meet EPA's Tier 4 emission limits or be retrofitted with appropriate emission reduction equipment. Emission reduction equipment could include EPA-verified or California Air Resources Board verified diesel oxidation catalysts or diesel particulate filters.

Protective measures around the construction and demolition work would be required to protect pedestrians and prevent dust and debris from leaving the site or entering the surrounding community in accordance with 20 DCMR 605. Appropriate methods of dust control would be determined by the surfaces affected (such as roadways or disturbed areas) and would include, as necessary, the application of water, the use of stone in construction roads, and vegetative cover. Dust generated from earthwork and other construction activities, such as stockpiled soils, would be controlled by spraying with water to mitigate wind erosion on open soil areas. Other dust suppression methods, such as wheel washing, may be implemented to minimize the off-site transport of dust. Regular sweeping of the pavement of adjacent roadway surfaces may be required during the construction period to minimize the potential for vehicular traffic to create airborne dust and particulate matter. Another way to reduce air quality impacts would be to recycle construction waste.

22.2.7. Energy

This section assesses the potential short-term and long-term impacts of the Preferred Option on energy resources. **Energy resources** refer to energy end-use, or consumption. Energy use is divided into operational and construction energy consumption. Energy sources considered include electricity and

other fuels as applicable, such as natural gas, gasoline, diesel fuel, and propane. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 11, Energy** for a description of the regulatory context and Local and Regional Study Areas.

The analysis calculated energy use for the bike-pedestrian crossing for lighting, maintenance, and construction. These calculations used reasonable assumptions as precise data was not available for quantifying energy consumption for these features.

22.2.7.1. Permanent or Long-Term Effects

The Preferred Option would have minor permanent direct adverse impacts to energy due to use of lighting and other equipment, as well as a minor permanent direct beneficial impact to energy due to shifting trips from motorized to non-motorized modes. The Preferred Option would be on a separate structure upstream from the new railroad bridge. Energy consumed by lighting and other equipment on the new crossing would be minor and estimated to be 52.31 million British Thermal Units (BTU) annually, a negligible amount when compared to the overall annual energy use of the Washington Metropolitan Region of 174 trillion BTU.

Vehicles and equipment would consume energy used for ongoing maintenance of the Preferred Option. Energy consumption is assumed at a negligible 14.95 million BTU annually. In addition, the Preferred Option would provide a new route for non-motorized travel, reducing energy use by shifting some users from motorized transportation to bicycling or walking.

22.2.7.2. Temporary Effects

There would be minor temporary direct adverse impacts to energy as a result of the Preferred Option. Temporary effects for the Preferred Option include the energy consumed by vehicles and equipment during construction. The Preferred Option would require trucks and other equipment that consume fuel throughout the course of their operation, most likely in the form of diesel fuel. At this level of design, the precise number of vehicle trips, distance traveled, or hours of operation have not yet been determined for the Preferred Option alone, and therefore, fuel usage cannot be precisely quantified. However, construction of the bike-pedestrian crossing was estimated at 0.001 trillion BTU.

22.2.7.3. Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 11.6, Energy, Avoidance, Minimization, and Mitigation**).

The most energy efficient technologies would be used wherever feasible in the operations the Preferred Option. These technologies and anticipated continued improvements in energy efficiency would reduce energy use, normalized per piece of equipment. These reductions would be associated with on-bridge equipment (for example, lighting), maintenance equipment, construction equipment and trains, due to adoption of technologies such as LED lights and higher efficiency engines.

Temporary impacts during construction would primarily result from fuel consumed in vehicles and equipment. Construction staging and access areas would be strategically planned to minimize the distance traveled by construction vehicles or trucks hauling materials to or from the site. In addition,

construction plans would emphasize minimizing, to the greatest extent possible, vehicle idling times. While some vehicles and equipment may require ongoing engine use, other applicable vehicles should adhere to this policy. The policy would encourage contractors to use fuel efficient or alternative fuel vehicles to the greatest extent feasible. Solar-powered generators would be considered as an alternative to diesel generators wherever feasible.

22.2.8. Land Use and Property

This section assesses the potential short-term and long-term impacts of the Preferred Option on land use and property. **Land use** is characterized by the arrangements, activities, and inputs people undertake in a certain land cover type to produce, change, or maintain it.[21] Examples of typical land uses include residential and commercial development, transportation, resource management, and agricultural lands. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 12, Land Use and Property** for a description of the regulatory context and Local and Regional Study Areas.

The analysis of impacts to land use and property due to the bike-pedestrian crossing applied the same data, mapping, and methods used for assessing the impacts of the Action Alternatives (see **Chapter 12.2.2, Land Use and Property, Methodology**). The analysis determined impacts to land use and property by overlaying the bike-pedestrian crossing's footprint on mapping of land use and property ownership.

22.2.8.1. Permanent or Long-Term Effects

Land Use

Construction of the Preferred Option would result in a minor permanent direct adverse impact to parkland due to loss of Long Bridge Park and GWMP land where the crossing connects to the parks. However, the Preferred Option would be consistent with existing park and recreational land uses. At Long Bridge Park, the Preferred Option would connect with a loop trail planned as part of new park facilities currently under construction. The alignment of the crossing would impact a portion of Arlington County property that is currently undeveloped and forested; this land is envisioned to serve as an edge and buffering adjacent to park facilities. As such, the bike-pedestrian crossing would complement, but not adversely impact, park facilities by providing a connection across the GWMP that would link Long Bridge Park to parkland on both sides of the Potomac River.

The Preferred Option would be on a separate structure adjacent to the new railroad bridge across the river. In East Potomac Park, the ramp would land near Ohio Drive SW in NPS Parking Lot C. Overall, moderate permanent direct adverse impacts would result from the loss of portions of the surface parking area. In the long term, moderate beneficial impacts would result from the construction of the ramp, due to the improved pedestrian access the new connection would provide to and between areas of Federal parkland, enhancing the intended use of these areas and the overall visitor experience.

[21] Natural Resources Management and Environment Department. Undated. Land Cover Classification System. Accessed from http://www.fao.org/docrep/003/X0596E/x0596e01e.htm. Accessed May 3, 2018.

Property

The Preferred Option would have minor permanent direct adverse impacts on one Federally owned parcel in Virginia, and one Federally owned parcel in the District. This would yield a total property impact area of 1.07 acres, as shown in **Table 22-2**. None of the property impacts would result in displacement of residences or businesses.

Table 22-2 | Preferred Option Property Impacts

Property	State	Acres	Acres with Action Alternative A	Acres with Action Alternative B
Long Bridge Park[1]	VA	0.14 or 0.27	0.18 or 0.41	0.18 or 0.41
GWMP[1]	VA	0.49–0.62	0.89 or 1.12	0.89 or 1.12
East Potomac Park	DC	0.31	2.71	2.81
Total		1.07	4.01	4.11

Source: Virginia and District Property Data, VHB, GIS analysis.

[1]***Range provided due to difference in and overlap of data sources from NPS and Arlington County***

Consistency with Local and Federal Plans

The Preferred Option would have minor permanent direct beneficial impacts to local and Federal Plans. The Preferred Option is largely consistent with Federal and local plans, including local plans that do not directly address the construction of a new bike-pedestrian connection over the Potomac River. By providing additional pedestrian and bicycle access to and among Crystal City, the MVT, and East Potomac Park, the Preferred Option would also further the goal of improving access to the Potomac River and Federal parkland espoused by numerous local and Federal plans. The Preferred Option is consistent with plans that specifically call out a new bike-pedestrian connection across the river in the Long Bridge Corridor, specifically the *NPS Paved Trails Study,*[22] *moveDC,*[23] and the plans for Long Bridge Park.[24]

22.2.8.2. Temporary Effects

The Preferred Option would have negligible temporary direct adverse impacts to land use. As a separate facility, the Preferred Option would be constructed either along with the Project or constructed separately following the completion of the Project. If constructed along with the railroad bridges, the crossing would make use of the same construction access and staging areas and rerouting of the MVT (see **Chapter 12.5, Land Use and Property, Temporary Effects**). However, if constructed following completion of the Project, access and staging would be required from Long Bridge Park, the GWMP, and East Potomac Park. These would result in negligible impacts requiring pedestrian sidewalks, bicycle trails, and the MVT to be temporarily diverted.

[22] NPS. *Paved Trails Study*. August 2016.
[23] *moveDC*. October 2014.
[24] *Concepts and Plans for Long Bridge Park*. Undated.

22.2.8.3. Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 12.6, Land Use and Property, Avoidance, Minimization, and Mitigation**).

Land Use

The Preferred Option, including the crossing and ramps would be designed and implemented to minimize the footprint and land use impacts to the extent practicable. During construction, visitor use of parkland and trails near the Preferred Option would be maintained to the extent practicable. Following construction of the Preferred Option, land or property adversely impacted by construction activities (including trees, other vegetation, and landscaping) would be restored to the extent practicable.

Property

Ownership of the Preferred Option is still to be determined. If the structure is owned by an entity other than NPS, a land exchange may be required for any NPS-administered property acquisition.

22.2.9. Noise and Vibration

This section assesses the potential short-term and long-term impacts of the Preferred Option on noise and vibration. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 13, Noise and Vibration** for a description of the regulatory context and Local and Regional Study Areas.

The analysis of noise and vibration impacts as a result of the bike-pedestrian crossing used a qualitative assessment of noise and vibration generation based on operations and construction.

22.2.9.1. Permanent or Long-Term Effects

There would be no noise or vibration impacts from the Preferred Option. The Preferred Option would be a bike and pedestrian facility that would not generate operational noise or vibration. Noise impacts from the operation of the Action Alternatives would range from 67 to 71 dBA in the areas affected by the bike-pedestrian crossing. These impacts would not change due to operation of the bike-pedestrian crossing. In addition, operation of the bike-pedestrian crossing would not exceed FTA criteria for vibration.

22.2.9.2. Temporary Effects

The Preferred Option would have minor temporary direct adverse impacts from noise as it would exceed the Arlington nighttime noise limit at one receptor (Mount Vernon Trail) due to construction activities related to pile driving construction of the new bridge over the GWMP. The Preferred Option would involve construction of a bike-pedestrian path from Long Bridge Park to a bridge over the GWMP, a bridge over the Potomac River, and ramps and landings at the MVT and NPS Parking Lot C in East Potomac Park. The piers within the Potomac River would be constructed using circular concrete drilled shafts. The construction activities for the Preferred Option would generate much less noise than construction of the railroad bridge as installation of the drilled shaft piers would not require pile driving equipment.

22.2.9.3. Avoidance, Minimization, and Mitigation

As no permanent or temporary noise or vibration impacts are anticipated from the Preferred Option, no avoidance, minimization, or mitigation is required. Avoidance, minimization, and mitigation approaches for temporary noise impacts of the Preferred Option would be similar to those for the Project (see **Chapter 13.6, Noise and Vibration, Minimization, and Mitigation**).

22.2.10. Aesthetics and Visual Resources

This section assesses the potential short-term and long-term impacts of the Preferred Option on aesthetics and visual resources. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 14, Aesthetics and Visual Resources** for a description of the regulatory context and Local and Regional Study Areas.

The analysis of impacts to aesthetic and visual resources due to the bike-pedestrian crossing applied a similar methodology to that used for the analysis of impacts due to the Action Alternatives (See **Chapter 14.2.2, Aesthetics and Visual Resources, Methodology**). The assessment of the aesthetic and visual impacts of the bike-pedestrian crossing was based on field observations, consideration of photographs, and the findings of other photo simulations prepared for the Action Alternatives.

22.2.10.1. Permanent or Long-Term Effects

This section considers the permanent direct and indirect impacts of the Preferred Option on aesthetics and visual resources organized by geographical sub-areas with a common visual character.

George Washington Memorial Parkway

The Preferred Option would cause moderate permanent direct adverse impacts to visual quality along the GWMP. Construction of the railroad bridge(s) would remove 5 trees within the Preferred Option's Limits of Disturbance (LOD). Locating the bike-pedestrian bridge within the construction LOD of the new railroad bridge would impact the number of trees that the Project would be able to replant to mitigate the visual impacts of both the bike-pedestrian bridge and the railroad bridge. The reduction of additional property upon which to replant trees would therefore diminish the GWMP's visual integrity through loss of trees visible from the roadway and contribute to the tunnel-like effect that results from the sequence of bridges along this segment of the GWMP.

Visitors and commuters traveling southbound along the GWMP by motor vehicle would serve as the primary viewers of the Preferred Option. The overall sensitivity of these viewers to changes in visual character would be moderate overall, as the high number of daily viewers and the proximity of views, as well as the routine nature of trips along the GWMP, would be counterbalanced by the short duration of these views and viewers' secondary focus on them.

While noticeable, the Preferred Option over the GWMP would be moderately compatible with this segment of the roadway, where multiple bridges already exist in close proximity to each other and an additional bridge would exist as part of the Preferred Alternative. However, ramp structures like the proposed connection to the MVT are currently not present along the trail and would provide an additional contrast with the natural harmony of the area between the GWMP and the Potomac River.

In addition to introducing a sixth bridge structure as a new visual element with a contrasting form and design to other bridges along the GWMP, the Preferred Option would limit the ability to replant vegetation removed for construction of the new railroad bridge, including some mature trees associated with the 1932 Planting Plan, along both sides of the roadway. This vegetation buffers and frames views while contributing to the essential visual experience and natural harmony of the GWMP. Cumulatively with the five other bridges along this segment of the GWMP, the addition of the Preferred Option would adversely impact continuous views along the GWMP by expanding and further accentuating the tunnel-like environment created by transportation infrastructure along this segment of the Parkway.

The proposed ramp structure for the Preferred Option would be set back from the GWMP yet visible to passing motorists on the roadway and I-395 ramp. It would reduce the natural harmony of its context by removing trees, including some mature trees, in the open area between the Metrorail Bridge and Long Bridge. Combined with the loss of trees resulting from the Preferred Alternative, a previously natural area would be increasingly defined by transportation infrastructure, altering the planned visual character of the GWMP.

Additional adverse impacts would result from extending the GWMP crossing into Long Bridge Park, which would require removing an area of trees and scrub vegetation along southbound side of the GWMP. The loss of trees and the tallest vegetation immediately adjacent to the GWMP would open views into Long Bridge Park in a location where the vegetation currently screens the railroad and contributes to the GWMP's natural character and sense of enclosure. The Preferred Option would connect to a loop trail planned as part of the Long Bridge Park improvements but would not impact the visual character of the remainder of the park.

Mount Vernon Trail

The Preferred Option would have a moderate permanent direct adverse impact on visual quality along the MVT, particularly from the ramp structure on the areas of parkland and vegetation adjacent to the crossing. Adding a ramp would change the nature and visual setting by replacing portions of an open area of parkland with transportation infrastructure clearly visible from both directions along the trail. Similar to the GWMP, locating the bike-pedestrian bridge and ramp within the construction LOD of the new railroad bridge would impact the number of trees that the Project would be able to replant to mitigate the visual impacts of both the bike-pedestrian bridge and the railroad bridge.

Along the segment of the MVT near the Preferred Option, viewers would consist primarily of trail users traveling on bicycle and on foot. Overall viewer sensitivity would range from moderate to high, depending on the individual viewer, reflecting the scenic aspects of the view, the proximity of the view, and the routine nature of travel along the trail. Construction of a bike-pedestrian ramp near the Preferred Alternative bridges would be moderately incompatible with the visual environment. While there are existing bridges near the Preferred Option, ramp structures are currently not present along the trail and would pose an additional contrast with the natural harmony of this segment of the trail.

Potomac River

Overall, the Preferred Option would have minor permanent direct adverse impacts to visual quality on the Potomac River because of its contribution to the tunnel-like effect created by the concentration of

five other bridges along this segment of the river. Impacts would be limited, however, by the structure's location at a midway point of the five other bridges along this segment of the Potomac River

Viewers of the Preferred Option would be primarily Metrorail Yellow Line passengers and operators. The crossing would also be visible to travelers by boat and visitors to the MVT and East Potomac Park. Viewer sensitivity would be highest facing the Metrorail bridge, where a high number of travelers would have close-up views of the Preferred Option, often on a routine basis.

The Preferred Option crossing would run parallel to the upstream side of the Preferred Alternative bridge across the Potomac River. The Preferred Option's height relative to the adjacent railroad bridge would limit its visibility from downstream locations, but the structure would be clearly visible from Yellow Line Metrorail trains. In combination with other bridges spanning this portion of the Potomac River, the Preferred Option would accentuate the tunnel-like nature of the nearby bridges. As the structure would have additional piers supporting it, it would further reduce the transparency beneath the Preferred Alternative bridges to a minor extent.

East Potomac Park

Overall, the Preferred Option would have negligible permanent direct adverse impacts to the visual quality of East Potomac Park. While there would be noticeable changes in visual character, adverse impacts would be diminished in part by the existing dominance of transportation infrastructure in the surrounding visual environment and by the location of the ramp structure on the site of the existing surface parking area.

Viewers of the Preferred Option from East Potomac Park would consist primarily of East Potomac Park users and some commuters traveling on foot, in motor vehicles, and on bicycles as well as commuters traveling by Metrorail. Viewer exposure would be moderate overall, depending on the speed at which viewers are traveling through the area, due to the proximity of the bridges, the amount of time available to notice the view on bicycle or on foot, and the high number of potential viewers. Overall viewer sensitivity would be moderate, depending on the individual viewer.

The construction of the Preferred Option would be moderately compatible with the existing visual environment due to the two existing bridges along an approximately 230-foot stretch of Ohio Drive SW and a third added as part of the Preferred Alternative. However, compatibility would be limited by the contrast between the new built element and the park's natural harmony, as well as by the proximity of the new bridge to the viewer. Potential impacts would be reduced since the visual setting is already predominantly of transportation infrastructure, paved areas, with trees and landscaping lacking in this portion of the park.

The ramp structure of the Preferred Option would have the greatest visual impact as it would be clearly visible and would constitute a noticeably new visual element within East Potomac Park. Its impact would be minimized, however, by its location in a previously paved area (the existing NPS Parking Lot C surface parking area) and outside the linear vista along Ohio Drive SW. The Preferred Option would add another overhead visual element, further accentuating the visual dominance of bridges in this portion of the park. Similar to the GWMP, locating the bike-pedestrian bridge and ramp within the construction LOD of the new railroad bridge would impact the number of trees that the Project would be able to replant to mitigate the visual impacts of both the bike-pedestrian bridge and the railroad bridge.

Nighttime Conditions

The Preferred Option's impacts on nighttime conditions would be determined by the final design of the bike-pedestrian bridge, including the extent, location, and type of lighting. Pedestrian- and bicycle-scale lighting would result in potential light spillage and make the bridge visible from a distance. Lighting would be minimal and understated overall and limited to that which is necessary for bicycle and pedestrian safety. Any light spillage would not be incompatible with the Potomac River's visual environment, given the amount of light that currently emanates from the 14th Street Bridge Complex, but would be more visible and noticeable in East Potomac Park and the along the MVT, where existing lighting is minimal or nonexistent. Any light spillage along the GWMP would be absorbed by existing roadway lighting along the GWMP and the I-395 ramp.

22.2.10.2. Temporary Effects

The Preferred Option would have moderate temporary direct adverse impact to visual quality as a result of construction. Construction of the Preferred Option would occur either along with the Project or separately following the completion of the Project. If constructed along with the Preferred Alternative, temporary impacts due to construction of the Preferred Option would be the same as those described for the Preferred Alternative. Construction activities would cause generally moderate temporary adverse impacts to visual quality due to construction and staging areas, construction equipment access, construction activities, removal of vegetation, reduction of screening vegetation, and rerouting of the MVT. See **Chapter 14, Visual and Aesthetic Resources** for more details on temporary effects of the Preferred Alternative to aesthetics and visual resources.

22.2.10.3. Avoidance, Minimization, and Mitigation

Mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 14.6, Aesthetic and Visual Resources, Avoidance, Minimization, and Mitigation**).

Potential measures that would be employed to mitigate permanent adverse impacts of the Preferred Option on aesthetics and visual resources are the same as those for the Project's Preferred Alternative and include the following:

- Any vegetation within areas of temporary impact, including landscape plantings, ground cover, and trees, would be restored following construction. Monitoring to ensure vegetation survival may also be required.
- Final landscaping, including planting, plant selection, and berms, would be implemented in a manner that mitigates visual impacts on the GWMP, MVT, and East Potomac Park, and includes NPS as a participant in the design process.
- Bridge structure design and materials may be refined in later design phases to mitigate impacts on visual resources and ensure aesthetic compatibility with built, natural, and cultural resources in the surrounding visual environment.

Potential measures that would be employed to mitigate temporary adverse impacts of the Preferred Option on aesthetics and visual resources include the following:

- Construction fencing and barriers would be as aesthetically pleasing as feasible and would block potentially unattractive views into construction areas.
- Visitor use of parkland and trails near the Preferred Option would be maintained to the maximum extent feasible during construction.
- Signage for construction, traffic control, and MVT relocation would be clear, legible, attractive, and designed in consultation with NPS.

22.2.11. Cultural Resources

This section assesses the potential short-term and long-term impacts of the Preferred Option on cultural resources. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 15, Cultural Resources** for a description of the regulatory context and Local and Regional Study Areas.

The analysis of impacts to cultural resources due to the bike-pedestrian crossing applied a similar methodology to that used to assess impacts of the Action Alternatives (See **Chapter 15.2.2, Cultural Resources, Methodology**). The analysis took into consideration physical impacts to cultural resources including removal of contributing vegetation as well as visual impacts based on the analysis described in **Section 22.2.10, Aesthetics and Visual Resources**.

In addition to the impacts to historic districts discussed below, FRA and DDOT conducted a Phase IA Archaeological Assessment for the Project (see **Appendix E4, Phase IA Archaeological Assessment Technical Report**), including the LOD for the Preferred Option. The analysis identified three terrestrial areas of high potential for archaeological resources within the LOD one submerged area of moderate potential. FRA has not evaluated these sites for NRHP eligibility or their value for preservation in place.[25] Additional investigations will be identified in consultation with the appropriate SHPO and will be conducted during Final Design.

22.2.11.1. Permanent or Long-Term Effects

This section describes impacts to cultural resources resulting from the Preferred Option, organized by Historic District. This section only addresses cultural resources with identified impacts. For a complete description of the permanent or long-term effects, see **Appendix E3, Section 106 Assessment of Effects Report**. FRA and DDOT produced the Assessment of Effects Report in compliance with the Section 106 process. FRA and DDOT considered adverse impacts with an intensity of moderate or above to be adverse effects for the Section 106 evaluation.

George Washington Memorial Parkway Historic District

The Preferred Option would have a moderate permanent direct adverse impact on the GWMP. The Preferred Option's LOD includes approximately 29,000 square feet of the GWMP. In addition to the infringement on undeveloped parkland, construction of the Preferred Option and access ramps would remove contributing vegetation. Vegetation removal would include mature trees that date to the 1932

[25] When FRA, in consultation with the District of Columbia State Historic Preservation Office (DC SHPO) and Virginia Department of Historic Resources (VDHR), determines that the archeological resource is important chiefly because of what can be learned by data recovery and has minimal value to preservation in place.

planting plan of the GWMP, which were intended to visually screen the railroad bridge from the motorway, resulting in a moderate permanent direct adverse impact.

The existing, non-contributing bridges along this portion of the GWMP have already compromised the GWMP's integrity of feeling, association, and setting. Although the addition of the Preferred Option would be visible, it would not diminish the integrity of the historic district and resulting indirect permanent adverse impacts would be negligible.

Mount Vernon Memorial Highway Historic District

The Preferred Option would have a moderate permanent direct adverse impact on the Mount Vernon Memorial Highway (MVMH). Effects to the MVMH would be similar and additive to those described above affecting the GWMP. The Preferred Option's LOD includes approximately 25,000 square feet of the historic district.

East and West Potomac Parks Historic District

The Preferred Option would have a moderate permanent direct adverse impact on the East and West Potomac Parks. The Preferred Option's LOD includes approximately 14,000 square feet of the historic district. In addition to the infringement on undeveloped parkland, construction of a bike-pedestrian crossing and access ramp would affect the ability to replant Japanese cherry blossom plantings removed for construction of the new railroad bridge, resulting in a moderate permanent direct adverse impact.

National Mall Historic District

The Preferred Option would have no permanent direct or indirect adverse impacts on the National Mall Historic District. The Preferred Option's LOD include approximately 14,000 square feet within the National Mall Historic District. As there are no identified contributing features within the Preferred Option's alignment, there would be no adverse impacts on the historic district.

22.2.11.2. Temporary Effects

As a separate facility, the Preferred Option could be constructed on a different schedule from the Preferred Alternative. If constructed along with the Project, the crossing would make use of the same construction access and staging areas and would not have additional temporary effects (see **Chapter 15.5, Cultural Resources, Temporary Effects**). However, if constructed separately, access and staging areas would be required within the GWMP, MVMH, East and West Potomac Parks, and areas of East Potomac Park that would result in moderate temporary adverse direct impacts to the National Mall Historic District.

Potential impacts on archaeological resources would be minimized or avoided by locating construction access and staging activities away from areas of high archaeological potential or within sites that are paved or have been previously disturbed.

22.2.11.3. Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 15.6, Cultural Resources, Avoidance, Minimization, and Mitigation**).

The permanent and temporary impacts resulting from the bike-pedestrian crossing requires mitigation measures, including the replacement of mature, contributing vegetation within the GWMP, MVMH, and East and West Potomac Parks Historic Districts. The Section 106 consultation process is ongoing. FRA and DDOT will continue to consult with DC State Historic Preservation Office, Virginia Department of Historic Resources, and the Consulting Parties to identify ways to avoid, minimize, and mitigate adverse impacts. The Section 106 agreement document, a Programmatic Agreement (PA), describes these measures and stipulates that consultation will continue through the final design and construction processes. The Draft PA is available for review in **Appendix E5, Section 106 Draft Programmatic Agreement.**

22.2.12. Recreation and Parks

This section assesses the potential short-term and long-term impacts of the Preferred Option on parks and recreation resources. Park and recreation resources were defined as areas providing leisure, entertainment, and recreational pursuits. Such resources include public spaces, facilities, parks, open space areas, trails, and built structures for recreation. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 16, Recreation and Parks** for a description of the regulatory context and Local and Regional Study Areas.

The analysis of impacts to parks and recreation resources due to the bike-pedestrian crossing applied the same methodology used for assessing impacts of the Action Alternatives (see **Chapter 16.2.2, Recreation and Parks, Methodology**).

22.2.12.1. Permanent or Long-Term Impacts

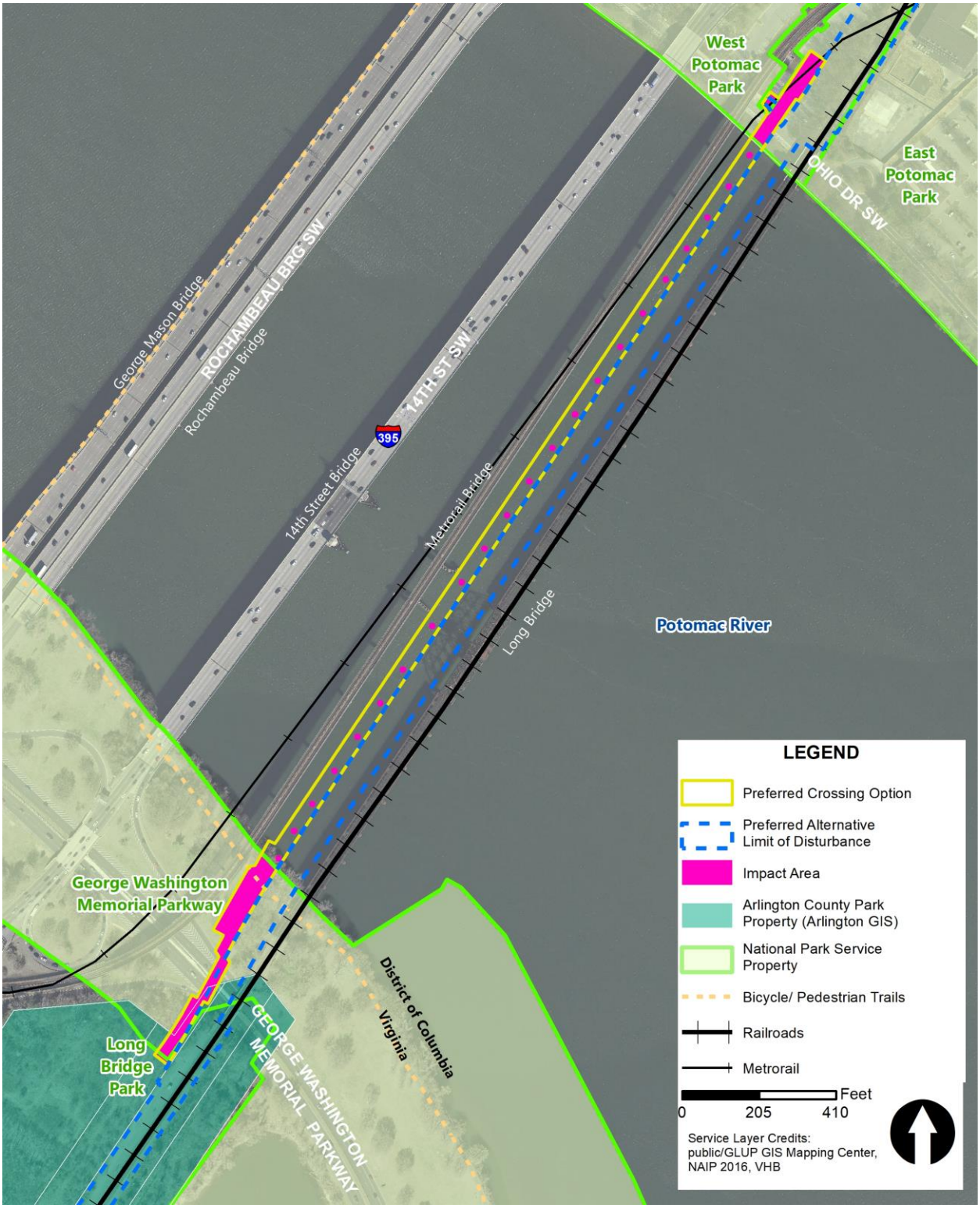
Impacts to Park Property

The Preferred Option would have minor direct adverse impacts to park property. **Table 22-2** lists the parks that construction of the Preferred Option would directly affect, and the total acres of parkland impacted (**Figure 22-9)**. It also shows the total acres of parkland impacted when the Preferred Option is combined with the Action Alternatives.

The Preferred Option would impact between approximately 0.14 and 0.27 acres of Long Bridge Park.[26] This land is currently undeveloped, forested, and serves as an edge and buffer adjacent to existing and planned facilities at Long Bridge Park. The Preferred Option would impact between approximately 0.49 and 0.62 acres of GWMP land as it crosses over the GWMP roadway to access the MVT.

[26] Parcel data from NPS and Arlington County conflict on the boundaries of the GWMP and Long Bridge Park. Therefore, direct impacts are represented as a range.

1497 **Figure 22-9 |** Permanent Direct Impacts of the Preferred Option to Parks and Recreation Areas



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The Preferred Option would terminate on East Potomac Park land, where it would impact 0.31 acres. The bike-pedestrian bridge would end in a ramp near the sidewalk for Ohio Drive SW and NPS Parking Lot C. Approximately 50 of 67 parking spaces would be eliminated due to the construction of the Project. The exact number of parking spots to be removed would be determined as design of the bike-pedestrian crossing and ramp is advanced, as the parking lots would be reconfigured to minimize permanent loss of parking spaces. The addition of the bike-pedestrian ramp would result in less space for reconfiguration of the parking spaces.

Impacts to Visitor Experience

The Preferred Option would have moderate permanent direct beneficial impacts on recreation users by connecting public park spaces for visitors and providing an alternative bike and pedestrian connection. The Preferred Option would consist of a ramp west of the existing railroad corridor, beginning in Long Bridge Park, the crossing spanning the Potomac River, and a ramp ending in East Potomac Park. The Preferred Option would have a moderate permanent direct beneficial impact to Long Bridge Park users. The new crossing would terminate in Long Bridge Park on a ramp that would connect with a loop trail planned as part of new park facilities currently under construction. Users of Long Bridge Park would be able to access the East and West Potomac Parks facilities using the crossing, which would provide a connection between parklands on both sides of the Potomac River.

The Preferred Option would have a major permanent direct beneficial impact on GWMP users by providing a connection between parklands on both sides of the Potomac River. Users of the MVT would be able to access East and West Potomac Park facilities using the crossing. Improved bike access to a Potomac River crossing would also be a beneficial impact on MVT users, including bike commuters, who currently use the I-395 bridge to cross the river. By providing a direct connection between the District and Long Bridge Park, the Preferred Option would eliminate the need for bicyclists traveling between the District and Crystal City to use the MVT, thereby reducing congestion on the trail.

The Preferred Option would have negligible permanent direct adverse impacts for recreational users of the Potomac River. Because of its location between the new railroad bridge and the Metrorail bridge, it would not impact views from the river. However, it would add additional shade for users passing under the complex of bridges.

The Preferred Option would have minor permanent direct adverse impacts on East Potomac Park users by removing parking spaces. This surface parking area is heavily used by visitors at certain times of the year, such as in the spring for the blooming of the Japanese cherry blossom plantings. The Preferred Option would also provide moderate permanent direct beneficial impacts for users of East and West Potomac Parks by providing bicycle and pedestrian access across the river to the MVT and Long Bridge Park.

22.2.12.2. Temporary Impacts

If the Preferred Option is constructed along with the Project, the crossing would make use of the same construction access and staging areas and would not have additional temporary direct or indirect impacts (see **Chapter 16.5, Recreation and Parks, Temporary Impacts**). However, if constructed following completion of the Project, access and staging would be required at Long Bridge Park, the GWMP, and East Potomac Park. Constructing the Preferred Option would have temporary direct adverse

impacts to parklands and the GWMP roadway. Impacts to the GWMP roadway would include traffic control measures, temporary lane closures, temporary lane shifts, and limited use of the roadway for construction vehicles. Impacts to the parklands would include loss of vegetation and trees due to construction staging.

22.2.12.3. Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 16.6, Recreation and Parks, Avoidance, Minimization, and Mitigation**). During construction visitor use of parkland and trails near the Preferred Option would be maintained to the extent practicable. Following construction of the Preferred Option, parkland and recreation areas adversely impacted by construction activities (including trees, other vegetation, and landscaping) would be restored to the extent practicable. Permanent loss of parking would not be mitigated since parking is generally underused.

22.2.13. Social and Economic Resources

This section assesses the potential short-term and long-term impacts of the Preferred Option on social and economic resources. Social and economic resources are related to demographics, jobs, current economic conditions, taxes, revenue, community facilities, local government services, and commercial activity. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 17, Social and Economic Resources** for a description of the regulatory context and Local and Regional Study Areas.

The analysis of impacts to social and economic resources due to the bike-pedestrian crossing applied similar methodologies as those used for the impact analysis of the Action Alternatives (See **Chapter 17.2.2, Social and Economic Resources, Methodology**). However, the analysis of the temporary economic impacts of the bike-pedestrian crossing used a qualitative analysis.

22.2.13.1. Permanent or Long-Term Effects

The Preferred Option would have a minor permanent direct beneficial impact on community cohesion by increasing connectivity of the existing pedestrian and bicycle network and providing a new connection between Arlington and the District. Community facilities would be affected in that the Preferred Option would result in both adverse and beneficial impacts to East Potomac Park and Long Bridge Park (see **Section 22.2.12, Recreation and Parks**, for impacts to parks and recreation areas).

The Preferred Option would have minor permanent direct adverse impacts to NPS Parking Lot C in East Potomac Park by removing parking spaces, which would reduce metered parking revenue to NPS. However, no additional parking spaces would be removed beyond the 50 spaces proposed in the Preferred Alternative. No other impacts to economic conditions are anticipated under the Preferred Option.

22.2.13.2. Temporary Effects

Construction of the Preferred Option would result in minor temporary effects to social conditions typical of construction projects such as minor traffic impacts on the GWMP due to construction access vehicles. As a separate facility, the Preferred Option could be constructed along with the Project or as a separate

construction contract at another time. If constructed along with the Project, the Preferred Option would make use of the same construction access and staging areas and would not have no additional temporary direct or indirect impacts. However, if constructed separately, access and staging would be required at Long Bridge Park, the GWMP, and East Potomac Park. In that case, the Preferred Option would result in minor temporary direct impacts such as traffic.

The Preferred Option would result in a minor temporary direct beneficial impact to construction employment for the duration of the construction period commensurate with the construction costs. No other temporary impacts to economic conditions are expected.

22.2.13.3. Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 17.6, Social and Economic Resources, Avoidance, Minimization, and Mitigation**).

22.2.14. Safety and Security

This section assesses the potential short-term and long-term impacts of the Preferred Option on safety and security. **Safety** is defined as being protected from or unlikely to cause danger, risk, or injury, while **security** is the state of being free from danger or threat. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 18, Safety and Security** for a description of the regulatory context and Local and Regional Study Areas.

The analysis of impacts to safety and security due to the bike-pedestrian crossing applied the same methodologies as those used for the impact analysis of the Action Alternatives (See **Chapter 18.2.2, Safety and Security, Methodology**).

22.2.14.1. Permanent or Long-Term Effects

Railroad Safety

The Preferred Option would have negligible permanent direct adverse impacts to railroad safety. The Preferred Option would be on a separate superstructure than the railroad bridge. Because of the distance between structures (25 feet), railroad safety impacts would have a negligible effect. The potential for trespassing, incursions, or refuse being thrown onto the tracks from the Preferred Option is unlikely.

Public Safety

The Preferred Option would have minor permanent direct adverse impacts on public safety. The Preferred Option would be served by public and private emergency response services, depending on the jurisdiction (the District or Arlington). The distance of the bridge over the Potomac River of 2,300 feet could result in increased time for emergency response to an incident on the bridge. In addition, the potential isolation of users during times when the bridge is not well used could provide the opportunity for criminal activity.

Constructing the Preferred Option would result in long-term safety benefits to the public by separating the bike-pedestrian crossing over the Potomac River from the roadway crossings on the 14th Street Bridge.

Security

The Preferred Option would have no permanent impacts to security. The Preferred Option would limit incursions onto the railroad right-of-way due to the distance between the structures. The Preferred Option would also be covered by police with jurisdiction of the area. Therefore, there are no anticipated security issues.

22.2.14.2. Temporary Effects

Railroad Safety

The Preferred Option would have no temporary impacts to railroad safety.

Public Safety

The Preferred Option would have negligible temporary direct adverse impacts to public safety. Construction staging and laydown areas for the Preferred Option would be secured to prevent public entry and injury using construction BMPs. Impacts to public safety would be negligible. There would be potential traffic control and lane closures on the GWMP and Ohio Drive under the Preferred Option during the evening hours, which may impact accessibility of emergency services.

Security

The Preferred Option would have negligible temporary direct adverse impacts to security. The Preferred Option would temporarily add security risk due to the addition of several construction staging areas and access points, and the proximity of these areas to public right-of-way. However, all construction staging areas and access points would be secured and security impacts would be negligible.

22.2.14.3. Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 18.6, Safety and Security, Minimization, and Mitigation**).

Railroad Safety

The Preferred Option would be on a separate structure from the railroad bridge. Therefore, no mitigation, minimization, or avoidance is required. However, fencing on the crossing could further provide safety and minimize objects being thrown from the crossing.

Public Safety

To ensure adequate access for emergency responders and deter crime, mitigation measures would include providing access for emergency responders, coordinating the design with emergency responders, and use of BMPs in design of the crossing, such as emergency call boxes, fencing, lighting, or

closed-circuit television (CCTV) cameras. Additional police and emergency response resources to ensure the safety of the public would also be identified.

Construction staging areas can be targets for theft or vandalism, with materials and construction equipment stored there for extended periods of time. Throughout the construction period, the proper measures would be in place to prohibit trespassing, such as barriers, fences, or barricades. Entrances and exits to construction sites would be locked. Areas would be well lit and equipped with automatic protective lighting systems.

Security

The crossing area would be secured through passive security means (such as lighting), and potentially active security measures (such as CCTV cameras). Security would also be managed by jurisdictional police authorities that incorporate the Preferred Option. Additional police and emergency response resources to ensure the security of the public would also be identified.

All construction sites would be secured through fencing or other passive security measures (such as lighting), as well as active security measures (such as cameras or intrusion detection), security personnel, monitoring of various activities, and adherence to strict protocols for entrance of construction workers to construction sites. The inspection of materials would also be employed at the construction sites.

22.2.15. Public Health, Elderly, and Persons with Disabilities

This section assesses the potential short-term and long-term impacts of the Preferred Option on public health, the elderly, and persons with disabilities. This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 19, Public Health, Elderly, and Persons with Disabilities** for a description of the regulatory context and Local and Regional Study Areas.

The analysis of impacts to public health, elderly, and persons with disabilities due to the bike-pedestrian crossing applied the same methodologies as those used in the impact analysis of the Action Alternatives (See **Chapter 19.2.2, Public Health, Elderly, and Persons with Disabilities, Methodology**). Assessments of impacts to **public health, elderly, and people with disabilities** for the purposes of this analysis include the resources and crucial issues or concerns relating to human health and welfare.

22.2.15.1. Permanent or Long-Term Effects

Public Health

The Preferred Option would provide a minor permanent direct beneficial effect to public health. Constructing the Preferred Option adjacent to the new railroad bridge would not result in adverse impacts to public health related to water quality, air quality, noise and vibration, or safety and security. There are no healthcare facilities identified in the Local Study Area. Therefore, no permanent adverse direct or indirect impacts to healthcare facilities are expected.

The long-term public safety benefits of constructing the Preferred Option would result in beneficial permanent health and safety improvements to the public. A major benefit would be providing a crossing

over the Potomac River separate from roadways over the Potomac River such as the 14th Street Bridge. The Preferred Option would not pose risks of motor-vehicle accidents, would connect multiple regional trails, and would provide a public health benefit by encouraging active recreation (bicycling, running, and walking).

Elderly Persons

The Preferred Option would provide minor permanent beneficial direct impacts to elderly persons by encouraging active recreation. The Preferred Option would connect multiple regional trails and would provide a public health benefit that includes the elderly by encouraging active recreation (bicycling, running, and walking) between Arlington and the District.

Persons with Disabilities

There would be no permanent direct or indirect adverse impacts to persons with disabilities due to the Preferred Option. The Preferred Option would be fully ADA compliant and would provide access to the crossing for persons with disabilities. This would provide long-term beneficial impacts to persons with disabilities by increasing the number of bike and pedestrian facilities that are ADA compliant and provide access to the network of trails on either side of the Potomac River.

22.2.15.2. Temporary Effects

Public Health

The Preferred Option would have minor temporary direct adverse impacts on public health. Overall public health impacts from construction activities would be the result of minor water quality, solid waste disposal and hazardous materials, air quality, noise and vibration, or safety and security effects. As described in their respective sections, unmitigated temporary impacts on public health related to construction are expected to be negligible.

Elderly Persons

The Preferred Option would have negligible temporary indirect adverse impacts on elderly persons because of construction. There are no nursing homes or assisted living facilities within 0.5 miles of the Preferred Option. The negligible impacts would result from diversion of pedestrian sidewalks and bicycle trails that may be used by elderly persons; however, these impacts are not specific to elderly persons.

Persons with Disabilities

The Preferred Option would have negligible temporary direct adverse impacts on persons with disabilities. The Preferred Option may result in negative impacts to persons with disabilities from changes in pedestrian walkways and sidewalks, if temporary replacement facilities are not fully accessible. If applicable, curb cuts or curb ramps would be used to enable ADA accessibility when construction activities inhibit sidewalk usage. All temporary walkways would be required to be ADA compliant when possible.

22.2.15.3. Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 19.6, Public Health, Elderly, and Persons with Disabilities, Avoidance, Minimization, and Mitigation**).

Public Health

For the Preferred Option, resource-specific mitigation measures are the same as those discussed in their applicable sections (**Section 22.2.2, Water Resources and Water Quality**; **Section 22.2.4, Solid Waste Disposal and Hazardous Materials**; **Section 22.2.6, Air Quality and Greenhouse Gas Emissions**; **Section 22.2.9, Noise and Vibration**; and **Section 22.2.14, Safety and Security**). Unmitigated temporary impacts would be negligible; therefore, no mitigation measures are proposed.

Elderly Persons

Both permanent and temporary effects to elderly persons because of the Preferred Option would be negligible. The proper signage and mitigation measures to ensure pedestrian and bicyclist safety would be used during the temporary relocation of walking trails. No additional temporary mitigation measures are proposed.

Persons with Disabilities

Temporary negative impacts to persons with disabilities because of the Preferred Option would be negligible. Temporary walkways would be required to be ADA compliant when possible. No additional temporary mitigation measures are proposed.

22.2.16. Environmental Justice

This section assesses the potential short-term and long-term impacts of the Preferred Option on environmental justice (EJ). This section also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 20, Environmental Justice** for a description of the regulatory context and Local and Regional Study Areas.

The analysis of impacts to environmental justice populations due to the bike-pedestrian crossing applied the same methodology used in the impact analysis for the Action Alternatives (See **Chapter 20.2.2, Environmental Justice, Methodology**).

22.2.16.1. Permanent or Long-Term Effects

The Preferred Option would not result in disproportionately high adverse permanent impacts to EJ populations. EJ populations would not be denied benefits from the new connection. None of the environmental impacts from establishing the new connection would be disproportionately borne by minority or low-income persons, or disproportionately affect facilities or service of importance to such persons. Completion of the new connection would not displace any persons.

None of the adverse effects of the Preferred Option would overlap with EJ populations. However, as noted in **Chapter 20.3, Environmental Justice, Affected Environment**, local District residents including EJ populations who live nearby use East Potomac Park for activities such as cycling along Ohio Drive,

walking on trails, and picnicking along the waterfront. However, the adverse impacts to the park due to the loss of approximately 50 parking spaces would not cause disproportionately high adverse effects on EJ populations. This is because the affected parking lot is currently lightly used and there is plentiful parking elsewhere in the park, closer to the activities described above.

The Preferred Option would provide a net benefit for EJ populations. The new connection would generally result in beneficial effects on transportation, and recreation and parks by creating a new crossing over the Potomac River for bicyclists and pedestrians, and indirect beneficial effects on social cohesion. This crossing would enhance access between communities on either side of the river; access between East Potomac Park, the GWMP, and Long Bridge Park; and access to the regional trail network. Minority or low-income persons would enjoy these benefits as much as the general population.

22.2.16.2. Temporary Effects

Constructing the Preferred Option would not cause any disproportionately high temporary adverse effects on EJ populations. None of the environmental impacts caused by construction would be disproportionately borne by minority or low-income persons, or disproportionately affect facilities or service of importance to such persons. Construction would not displace any persons.

All temporary adverse effects would occur immediately adjacent to the railroad corridor. These areas immediately adjacent to the railroad corridor do not meet the thresholds used to identify areas of EJ concern. As noted above, local residents including EJ populations who live nearby make use of East Potomac Park and therefore may be affected by temporary impacts to the park, including use of surface parking for construction staging. However, the bulk of activities in East Potomac Park take place south of Buckeye Drive SW in areas that would not be adversely affected by construction. All users regardless of race, ethnicity, or socioeconomic status would experience the temporary impacts north of Buckeye Drive SW. Therefore, the Preferred Option would not cause disproportionately high adverse effects on EJ populations, and no further analysis was conducted.

22.2.16.3. Avoidance, Minimization, and Mitigation

Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter 20.6, Environmental Justice, Avoidance, Minimization, and Mitigation**). The Preferred Option would not cause disproportionately high adverse effects on EJ populations. Therefore, no avoidance, minimization, nor mitigation measures are warranted beyond those already described for other resources where direct and indirect effects on those resources are described (including **Section 22.2.5, Transportation and Navigation**; **Section 22.2.6, Air Quality and Greenhouse Gas Emissions**; and **Section 22.2.8, Land Use and Property**).