

1 **22.0 Bike-Pedestrian Crossing**

2 The purpose of this chapter is to describe the evaluation of the potential bike-pedestrian crossing
3 opportunities near the Long Bridge Project (the Project). This chapter reviews the process for developing
4 the bike-pedestrian crossing as potential mitigation for impacts to properties protected under Section
5 4(f) of the United States Department of Transportation Act of 1966,¹ and its potential impacts to the
6 human and natural environment.

7 **22.1. Overview**

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

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

21 Bicycle and pedestrian connectivity is an element of regional multimodal transportation network plans.
22 A bike-pedestrian connection in the vicinity of Long Bridge is included in the NPS *Paved Trails Study*
23 (2016)² and *moveDC* (2014),³ the multimodal long-range transportation plan for the District of Columbia
24 (the District). The *Long Bridge Study* (Phase I Study), completed in 2015, evaluated the railroad network
25 system as well as the overall multimodal connectivity and capacity needs in the area, including potential
26 bicycle and pedestrian opportunities.⁴ Modeling for the Phase I Study identified an increase in
27 pedestrian and bicycle use of the trail network with the addition of bike-pedestrian connections, with
28 most of the use originating for the District. As discussed in **Section 22.1.2, Public and Agency**
29 **Comments**, members of the public and several agencies have expressed support for the crossing.

30 The only existing bike-pedestrian path across the Potomac River in the vicinity of Long Bridge is attached
31 to an interstate highway on the 14th Street Bridge. The next closest crossing is over a mile north via that
32 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.

33 BikeArlington, an Arlington County program, the 14th Street Bridge path at the Mount Vernon Trail
34 (MVT) carried 59,391 bicyclists and 8,802 pedestrians in July 2018.⁵ On average in July 2018, the path
35 carried 1,583 bicyclists and 357 pedestrians per day on Saturdays and Sundays. A total of 2,203 bicyclists
36 and 454 pedestrians used the path on July 4, 2018.⁶ A second connection would alleviate some of the
37 pedestrian and cyclist traffic on the 14th Street Bridge, would be a pathway dedicated solely to cyclists
38 and pedestrians, and would provide an enhanced connection between Long Bridge Park, the MVT,
39 GWMP, and East and West Potomac Parks.

40 **22.1.1. Previous Plans and Studies**

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

44 **22.1.1.1. moveDC**

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

54 **22.1.1.2. Paved Trails Study – National Capital Region, NPS**

55 The *NPS Paved Trails Study*, completed in 2016, provides a vision for the regional trail network, including
56 both NPS and local government-owned trails. The study includes 121 capital and programmatic
57 recommendations within the 95-mile trail network, and a framework for prioritizing regional funding of
58 trail-related projects. The framework includes corridors of regional significance, high-volume corridors,
59 and linkages among those corridors. Combining regionally significant and high-volume corridors led to
60 the development of the National Capital Trail (NCT) concept. The concept designates four distinct loops
61 that each offer between 18 and 45 miles of diverse trail experiences, linking NPS parks and area
62 destinations.⁹ The study proposes a new dedicated bike-pedestrian crossing along the trajectory of the
63 new railroad bridge (called the CSX Bridge Trail Connector in the study) to provide an additional
64 connection across the Potomac River between segments of the NCT.¹⁰ The bike-pedestrian crossing
65 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.

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

68 **22.1.1.3. Long Bridge Study (Phase I Study)**

69 The Phase I Study considered the need for intermodal connectivity and system linkages. The study noted
70 the extensive bike-pedestrian network on both sides of the Potomac River, and the existing usage of the
71 14th Street Bridge path by hundreds of pedestrians and 1,500 to 2,000 bicyclists per day.¹¹ Of the eight
72 alternatives evaluated in the Phase I Study, four included a bike-pedestrian connection to the bike-
73 pedestrian network.

74 **22.1.2. Public and Agency Comments**

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

77 **22.1.2.1. Public Comments**

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

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

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

¹¹ Long Bridge Study, p. 11.

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

115 **22.1.2.2. Agency Comments**

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

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

Agency	Comment
Arlington County	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Supports the Preferred Option
National Capital Planning Commission (NCPC)	<ul style="list-style-type: none"> • Any bike-pedestrian connection should maximize utility and enhance experience for all users
NPS	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Supports the Preferred Option
Virginia Department of Rail and Public Transportation	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • Has concern regarding the safety and security implications of any single bridge structure sharing rail, bicycle, and pedestrian accommodation

122 **22.1.3. Development of Bike-Pedestrian Crossing Options**

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

129 FRA and DDOT did not screen bike-pedestrian crossing opportunities as part of the Level 2 Concept
130 Screening. Instead, the analysis determined that opportunities for a bike-pedestrian crossing could be
131 included with all the railroad tracks or alignment concepts being considered for the Project. FRA and
132 DDOT developed four potential bike-pedestrian crossing options for further evaluation (see **Section**
133 **22.1.3.2, Level 2 Concept Screening and Development of Bike-Pedestrian Options**, for details). The
134 analysis included upstream and downstream bike-pedestrian crossing options to determine if a crossing
135 could be designed to be consistent with railroad operator plans and railroad safety practices.

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

144 **22.1.3.1. Level 1 Concept Screening for DEIS Alternatives**

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

154 **22.1.3.2. Level 2 Concept Screening and Development of Bike-Pedestrian**
 155 **Options**

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

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

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

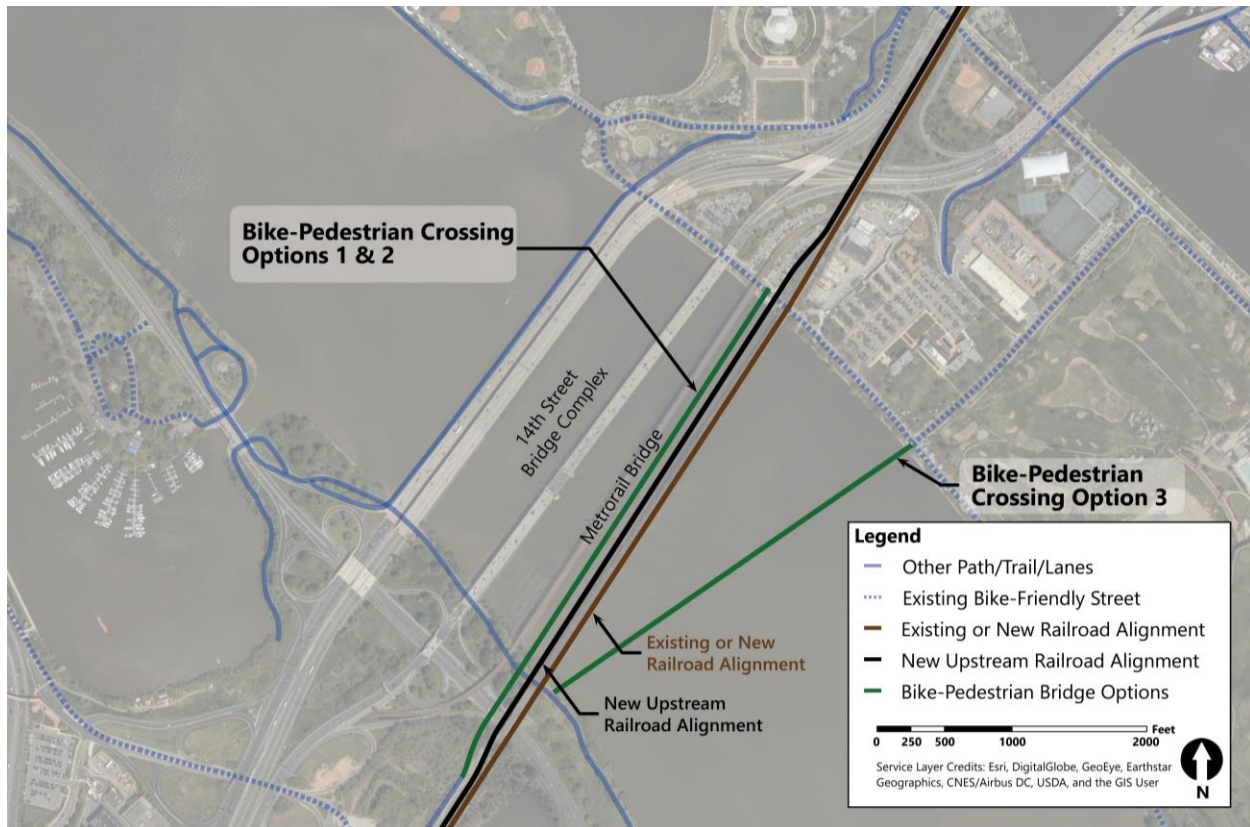
170 The screening retained four bike-pedestrian crossing options for further analysis alongside the two
 171 Project Action Alternatives that were advanced, Action Alternative A and Action Alternative B.¹³ The four
 172 bike-pedestrian crossing options illustrated in **Figure 22-1** are:

- 173 • **Option 1**, which would provide a crossing attached to the upstream side of the new upstream
 174 railroad bridge, with two variations:
 - 175 ○ **Option 1A (Figure 22-2)** would use a shared superstructure and substructure with the
 176 railroad bridge.
 - 177 ○ **Option 1B (Figure 22-3)** would use a shared substructure, but separate superstructures.
- 178 • **Option 2 (Figure 22-4)**, which would provide a crossing on an independent bridge on the
 179 upstream side of the new upstream railroad bridge.
- 180 • **Option 3**, which would provide a crossing on an independent bridge downstream of the existing
 181 railroad bridge. To optimize connections to bicycle and pedestrian facilities, the crossing would
 182 connect in the District to Ohio Drive SW near the NPS National Capital Region Headquarters,
 183 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).

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

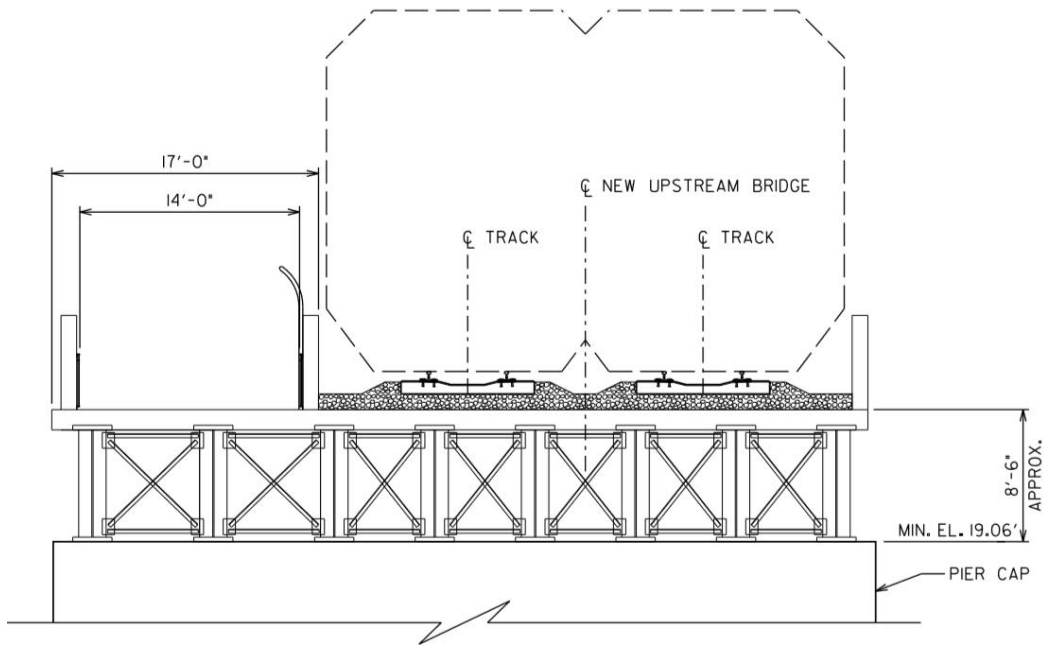


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186 Options shown at the public and agency meetings in December 2017 did not show the bike-pedestrian
 187 connection across the GWMP to Long Bridge Park. However, following feedback received from the
 188 public and agencies (CFA, NCPC, and Arlington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

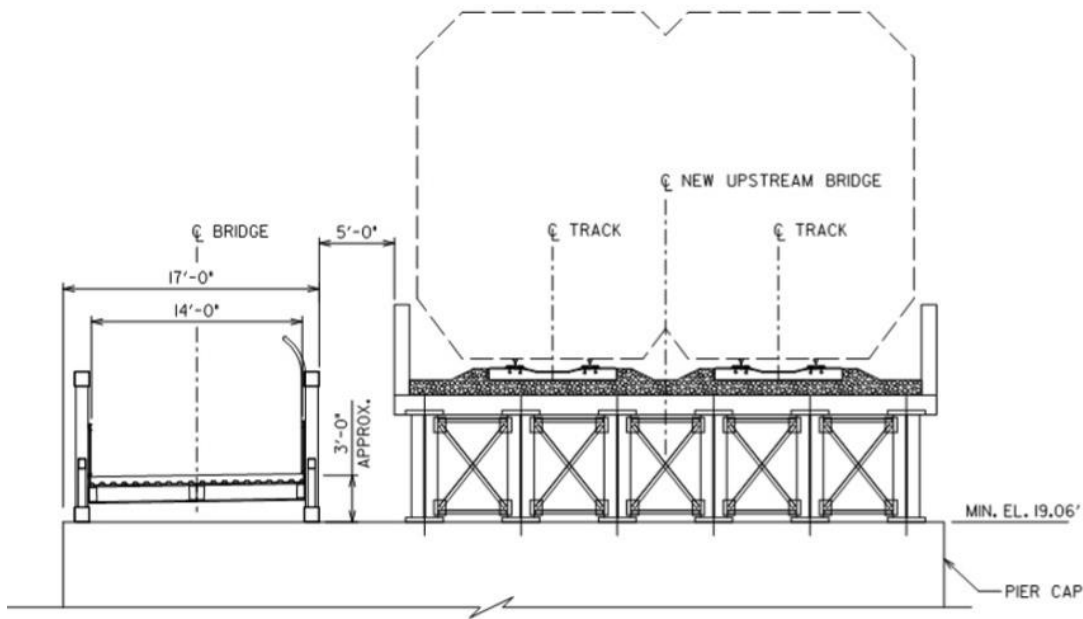
196 Following the Level 2 Concept Screening, FRA and DDOT eliminated Option 3 from consideration
 197 because it would introduce a new visual element into the viewsheds from GWMP, East Potomac Park,
 198 and the Potomac River, resulting in additional impacts, and because it could not provide a direct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

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



OPTION 1A

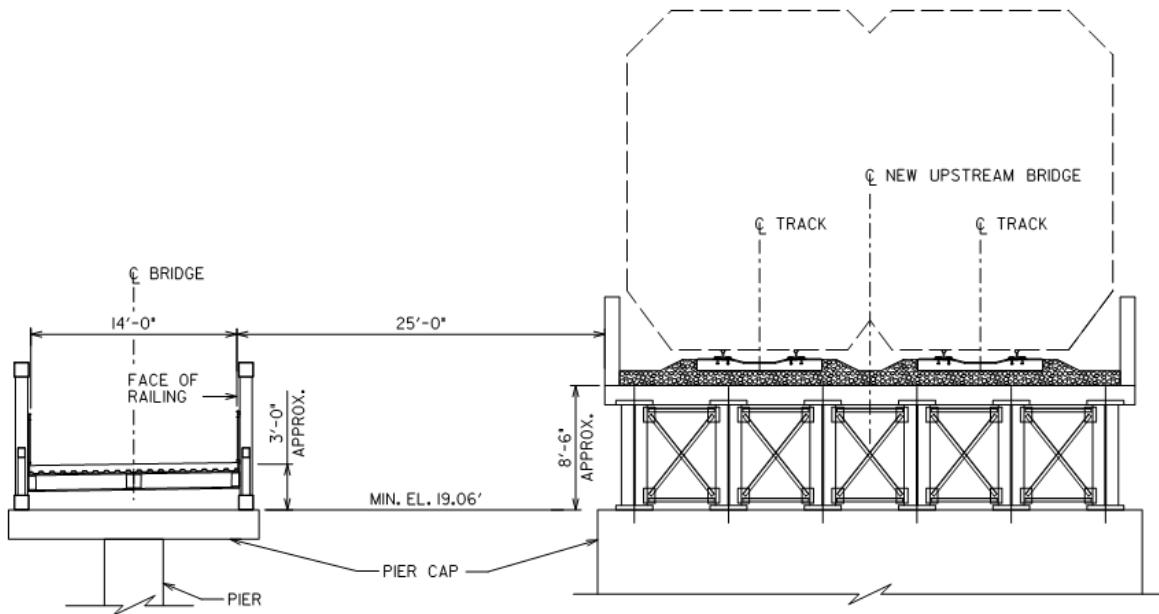
202 **Figure 22-3** | Section of New Upstream Railroad Bridge and Bike-Pedestrian Crossing Option 1B



OPTION 1B

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



206 OPTION 2

207 **22.1.3.3. Safety and Security Analyses**

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

218 **TVRA Conclusions**

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

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

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

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

231 Option 2 (**Figure 22-4**) would locate the bike-pedestrian crossing on a separate structure approximately
232 25 feet upstream of the new railroad bridge. This option would have the lowest risk for the Long Bridge
233 bike-pedestrian crossing from a safety and security perspective. The separate structure eliminates the
234 possibility of an adversary directly accessing the railroad bridge from the bike-pedestrian crossing as
235 well as potential hazards that could occur if the crossing is attached to the bridge.

236 **Hazard Analysis Conclusions**

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

242 **22.1.4. Bike-Pedestrian Crossing Option Screening**

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

245 **22.1.4.1. Options Removed from Further Consideration**

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

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

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

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- **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.

273 **22.1.4.2. Identification of the Preferred Option**

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

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- 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.

290 **22.1.4.3. Description of the Preferred Option**

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

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

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



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

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

325 As proposed in the Draft Section 4(f) Evaluation, construction of the Preferred Option would be required
326 4(f) mitigation committed to in the ROD. The Preferred Option could be constructed along with the
327 railroad bridge construction contract or separately following completion of the Project. If constructed
328 along with the Project construction contract, it is anticipated that construction would begin following
329 completion of the project as the same space is needed to deliver equipment and materials for the
330 railroad bridge pier construction. Therefore, the construction of the bike-pedestrian bridge piers would
331 take place after completion of the railroad bridge piers. Construction would take approximately two
332 additional years. Pedestrian-bike bridge construction would use access points and temporary finger
333 piers along the shoreline for delivery of equipment and materials via barge, and construction of the
334 drilled shaft foundations, piers, and superstructure bridge components. See **Chapter 3, Alternatives** for
335 information on the construction of the railroad bridge. More details on construction would become
336 available as final design of the Preferred Option is advanced.

337 **22.2. Environmental Consequences of the Preferred Option**

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

347 **22.2.1. Natural Ecological Systems and Endangered Species**

348 This section assesses the potential short-term and long-term impacts of the Preferred Option on natural
349 ecological systems and endangered species. This section also discusses proposed avoidance,
350 minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter**
351 **5, Natural Ecological Systems and Endangered Species** for a description of the regulatory context and
352 Local and Regional Study Areas.

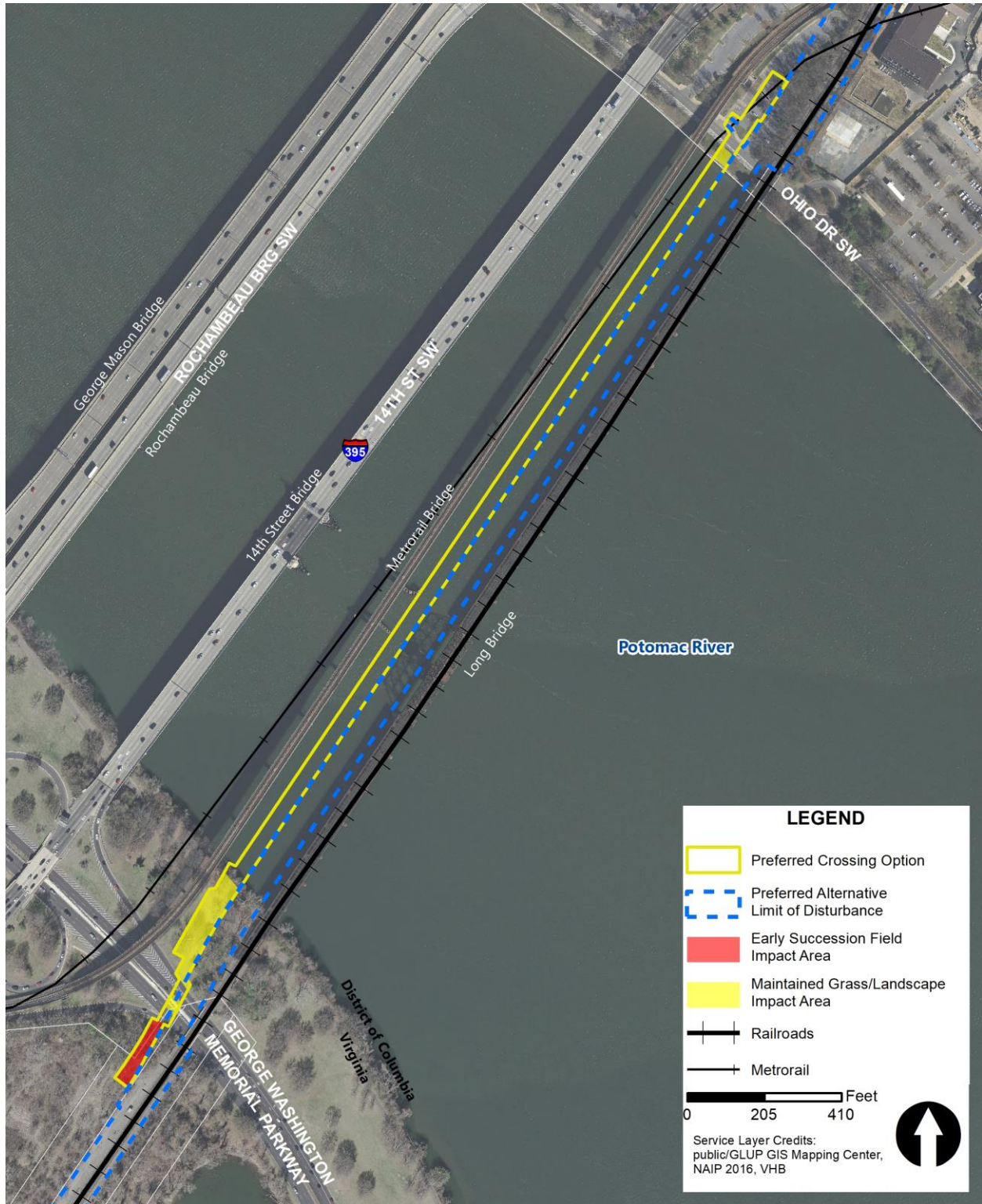
353 The analysis of impacts to natural ecological systems and endangered species as a result of the bike-
354 pedestrian crossing applied the same methodologies used to evaluate impacts of the Action Alternatives
355 (see **Chapter 5.2.2 Natural Ecological Systems and Endangered Species, Methodology**).

356 **22.2.1.1. Permanent or Long-Term Effects**

357 **Terrestrial Vegetation**

358 The Preferred Option would have minor permanent direct adverse impacts to terrestrial vegetation on
359 the Virginia side of the Potomac River where the bridge would connect to the MVT and Long Bridge Park
360 via ramps, as shown in **Figure 22-6**. The Preferred Option would permanently impact 7,225 square feet
361 (0.2 acres) of early succession scrub-shrub habitat just south of the GWMP roadway for the ramp
362 connecting to Long Bridge Park. The Preferred Option would not directly impact the natural forest
363 between the existing tracks and Roaches Run.

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



365

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

373 **Wetland Vegetation**

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

377 **Submerged Aquatic Vegetation**

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

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

386 **Wildlife**

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

395 **Aquatic Biota**

396 The Preferred Option would have negligible permanent direct adverse impacts to aquatic biota
397 associated with disturbance to benthic habitat. The Preferred Option would involve construction of a
398 separate bridge structure spanning the Potomac River upstream of the railroad bridge. It would include
399 22 bridge piers placed on concrete footers, disturbing benthic habitat by 622 square feet (<0.1 acres).
400 Soft-bottom benthic habitat would be lost, impacting benthic invertebrates that use such substrate. This
401 area is relatively small in comparison to available habitat in adjacent areas in the Potomac River.
402 Permanent effects to the benthic invertebrate community would be negligible and localized. Because

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

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

409 **Rare, Threatened, and Endangered Species (RTE)**

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

416 **22.2.1.2. Temporary Effects**

417 **Terrestrial Vegetation**

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

425 **Wetland Vegetation**

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

428 **Submerged Aquatic Vegetation**

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

432 **Wildlife**

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

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

441 **Aquatic Biota**

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

450 **RTE Species**

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

458 **22.2.1.3. Avoidance, Minimization, and Mitigation**

459 **Terrestrial Vegetation**

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

473 **Wetland Vegetation**

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

476 **Submerged Aquatic Vegetation**

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

481 **Wildlife**

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

491 **Aquatic Biota**

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

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

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

506 Time-of-year restrictions on in-stream construction work would be required by regulatory agencies to
507 avoid impacting migratory fish species during specific periods when they are most likely to be present in
508 the Project Area. The Potomac River supports regular spring spawning runs of four anadromous herring
509 and shad species: blueback herring (*Alosa aestivalis*), hickory shad (*Alosa mediocris*), alewife (*Alosa*
510 *pseudoharengus*), and American shad (*Alosa sapidissima*). Although variable among species and across
511 years, spawning events generally occur between late March and early June for all four species.¹⁴ Striped
512 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.

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

517 **RTE Species**

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

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

533 **22.2.2. Water Resources and Water Quality**

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

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

542 **22.2.2.1. Permanent or Long-Term Effects**

543 **Water Quality**

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

551 **Groundwater**

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

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

561 **Surface Water**

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

565 The Preferred Option would have negligible permanent direct adverse impacts on surface water quality
566 within the Potomac River given the anticipated pollutant load from the area relative to the volume of
567 the receiving surface water body. Currently, rain falls directly into the river in this location. Under the
568 Preferred Option, stormwater would wash from the deck into the river. Because the Preferred Option
569 would not be used by vehicles, pollutant load would be negligible and primarily from aerial deposition.

570 **Stormwater**

571 The Preferred Option would not have permanent direct or indirect adverse impacts to stormwater
572 infrastructure. The Preferred Option would have negligible permanent indirect adverse impacts on
573 surface water quality within the Potomac River given the anticipated pollutant load from the area
574 relative to the volume of the receiving surface water body.

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

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

586 **Wetlands and Other Waters of the United States**

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

594 When combined with the Action Alternatives, total impacts to waters of the United States would be
595 23,730 square feet (0.5 acres). See **Chapter 6.4.2, Water Quality and Water Resources, Wetlands and**
596 **Waters of the United States**.

597 **Flood Hazards and Floodplain Management**

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

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

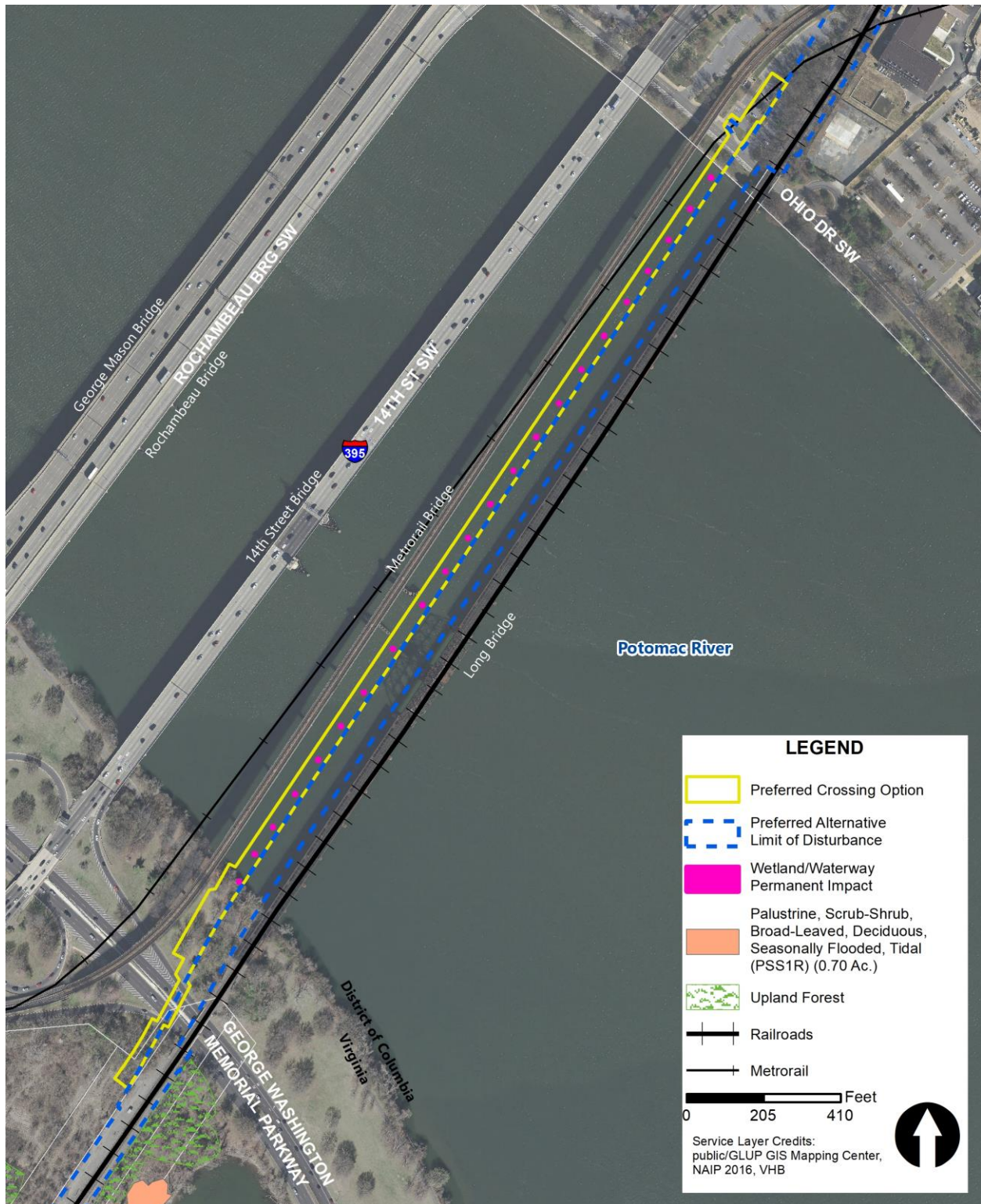
608 **Chesapeake Bay Preservation Areas**

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

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

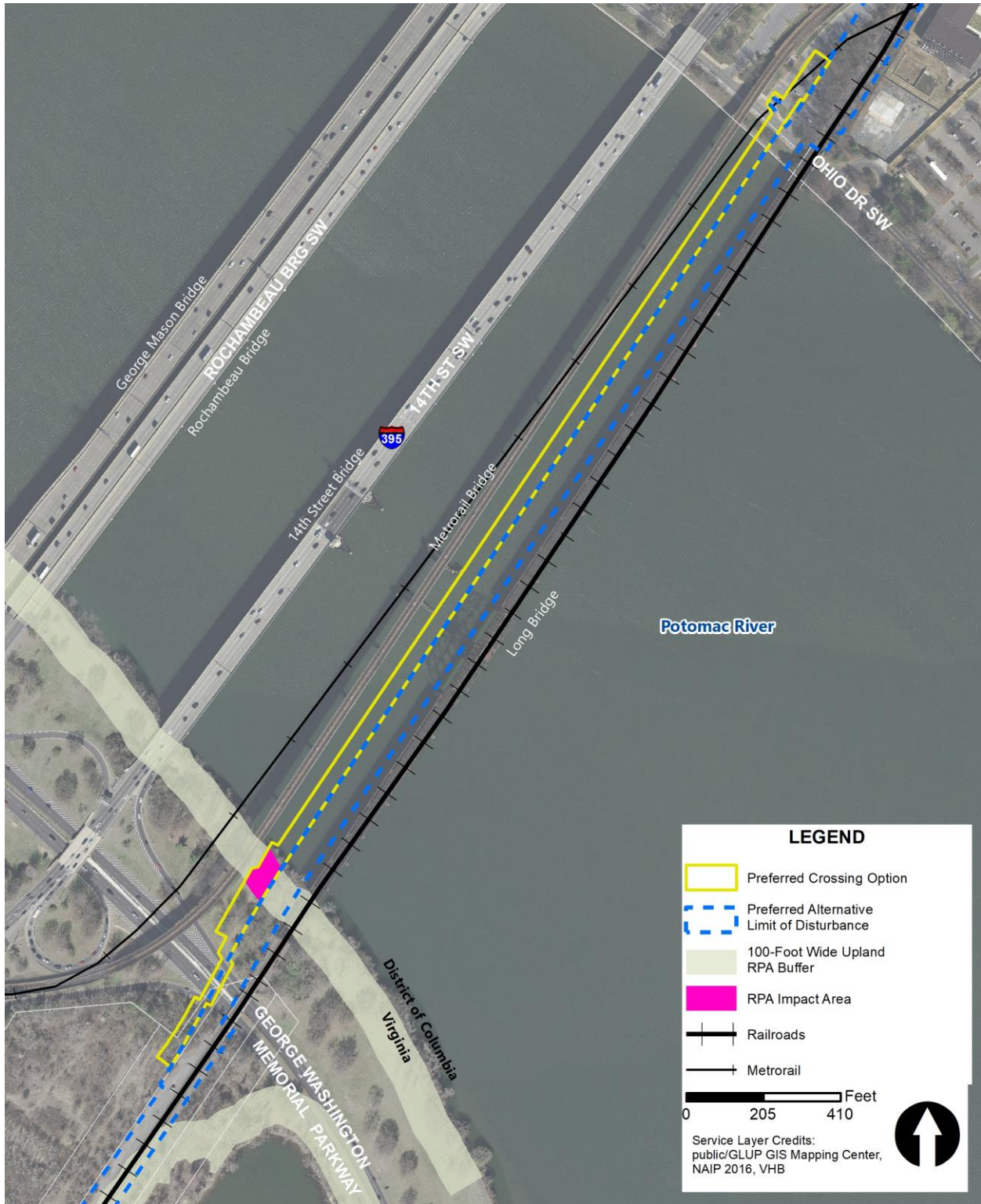
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619 **Figure 22-7** | Preferred Option Impacts to Wetlands and Waterways



620

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



622

623 **Coastal Zone Consistency**

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

631 **22.2.2.2. Temporary Effects**

632 **Water Quality**

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

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

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

649 **Groundwater**

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

652 **Surface Water**

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

660 **Stormwater**

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

667 **Wetlands and Other Waters of the United States**

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

672 **Flood Hazards and Floodplain Management**

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

675 **Chesapeake Bay Preservation Areas**

676 The construction of the Preferred Option along with the Preferred Alternative would result in no
677 additional access or staging areas and no additional adverse impacts to RPAs. However, if the Preferred
678 Option is constructed separately following the completion of the Project, it would have additional
679 temporary adverse impacts if construction staging or access areas are placed within the RPAs (**Figure 22-**
680 **8**).

681 **22.2.2.3. Avoidance, Minimization, and Mitigation**

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

685 **Water Quality**

686 The following mitigation measures are recommended to minimize or mitigate for adverse impacts to
687 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.

688 **Construction-Phase Mitigation**

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

694 **Post-Construction Stormwater BMPs**

695 If necessary, permanent adverse impacts to water quality in the Roaches Run and Potomac River
696 watersheds, would be mitigated through stormwater BMPs. Design of stormwater BMPs would be
697 completed during final design. If designed in accordance with the DOEE *Stormwater Management*
698 *Guidebook*¹⁸ or the Arlington County *Stormwater Manual*,¹⁹ these BMPs would decrease runoff volume
699 and peak flow rate and would provide the prescribed treatment volume to mitigate adverse impacts to
700 surface water and stormwater. These BMPs would also provide the prescribed recharge volume to
701 mitigate adverse impacts to groundwater.

702 Due to the limited space within the right-of-way in the Project Area, installation of open-air infiltration-
703 type stormwater BMPs, such as bioretention areas and infiltration basins, is likely infeasible. Treatment
704 BMPs such as oil/grit separators could be implemented to treat runoff prior to discharge; however,
705 these BMPs would not mitigate increases in runoff volume or peak flow rate, which would be negligible.

706 **Wetlands and Other Waters of the United States**

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

715 **Flood Hazards and Floodplain Management**

716 Although impacts to the floodplain would be unavoidable, efforts would be taken to minimize floodplain
717 impacts during the design and construction phases. Minimization efforts would include a pier support
718 design having an elliptical shape that would allow smoother flood flow conveyance underneath the
719 bridge with minimal turbulence and hydraulic force against the pier walls. Additionally, adverse effects
720 to the floodplain would be minimized through retaining walls. The vertical retaining walls would reduce
721 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.

722 Chesapeake Bay Preservation Areas

723 The nature of the project as bridge construction over an RPA, the Potomac River, and its buffer means
724 complete avoidance of the RPA is not feasible. In areas of bare ground, proper erosion and sediment
725 control techniques would help reduce runoff that could negatively affect RPAs. Efforts made to avoid
726 forest and vegetation impacts as part of the terrestrial vegetation avoidance and minimization would
727 also provide avoidance and minimization in the RPA buffer.

728 22.2.3. Geologic Resources

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

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

738 22.2.3.1. Permanent or Long-Term Effects

739 Geologic Resources

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

749 Soils

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

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

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

766 **22.2.3.2. Temporary Effects**

767 **Geologic Resources**

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

779 **Soils**

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

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

800 **22.2.3.3. Avoidance, Minimization, and Mitigation**

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

803 **Geologic Resources**

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

811 **Soils**

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

819 **22.2.4. Solid Waste and Hazardous Materials**

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

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

829 **22.2.4.1. Permanent or Long-Term Impacts**

830 **Solid Waste**

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

837 **Hazardous Materials**

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

841 **22.2.4.2. Temporary Effects**

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

845 **Solid Waste**

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

852 **Hazardous Materials**

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

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

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

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

883 **22.2.4.3. Avoidance, Minimization, and Mitigation**

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

887 **Solid Waste**

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

898 **Hazardous Materials**

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

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

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

923 **22.2.5. Transportation and Navigation**

924 This section assesses the potential short-term and long-term impacts of the Preferred Option on
925 transportation and navigation. The **transportation system** includes all transportation modes, including
926 passenger and freight railroad (Amtrak, VRE, CSX Transportation, and Norfolk Southern), the transit
927 system (Metrorail and local bus operations), the pedestrian and bicycle network, and the surrounding
928 roadway network. This section also evaluated navigation and the marine transportation system.
929 **Navigable waterways** are waters subject to the ebb and flow of tides and are presently used, have been
930 used in the past, or may be used for transportation. This section also discusses proposed avoidance,
931 minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter**
932 **9, Transportation and Navigation** for a description of the regulatory context and Local and Regional
933 Study Areas.

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

940 **22.2.5.1. Permanent or Long-Term Effects**

941 **Railroad Infrastructure and Operations**

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

945 **Transit**

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

950 **Pedestrian and Bicycle Network**

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

954 beneficial impact on, the existing pedestrian and bicycle network. The new bike-pedestrian connection
955 between the District and Arlington would be a pathway dedicated solely to cyclists and pedestrians and
956 would provide an enhanced connection between (via Long Bridge Park), the MVT, and destinations in
957 the District. It is expected that some bicycle and pedestrian traffic would be diverted from the existing
958 14th Street Bridge particularly for people traveling to and from Long Bridge Park, Crystal City, Pentagon
959 City, and surrounding neighborhoods. The Preferred Option would serve as a more direct connection
960 from these areas. Also, since the Preferred Option would be separated from automobile traffic, travel on
961 the Preferred Option would likely be preferable for pedestrians and bicyclists.

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

971 **Roadway Network**

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

982 **Parking**

983 The Preferred Option would have a minor permanent direct adverse impact to parking. The Preferred
984 Option would include a new bike-pedestrian ramp in the NPS Parking Lot C in East Potomac Park.
985 Approximately fifty parking spaces would be eliminated due to the construction of the Project. The exact
986 number of parking spots to be removed would be determined as design of the bike-pedestrian crossing
987 and ramp is advanced, as the surface parking areas would be reconfigured to minimize permanent loss
988 of parking spaces. The addition of the bike-pedestrian ramp would result in less space for
989 reconfiguration of the parking spaces. The removal of parking and additional constraint of the remaining
990 surface parking would amount to a minor direct adverse impact as the current spaces are generally
991 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.

992 **Navigation**

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

999 **Aviation**

1000 There would be no permanent or long-term effects on aviation because of the Preferred Option. The top
1001 of structure of the Preferred Option would be within the limit set by the Federal Aviation
1002 Administration.

1003 **22.2.5.2. Temporary Effects**

1004 The Preferred Option would have minor temporary direct adverse effects to transportation and
1005 navigation. As a separate facility, the Preferred Option may be constructed along with the construction
1006 of the Project or as a separate construction project at a later time. If constructed along with the Project,
1007 the Preferred Option would make use of the same construction access and staging areas, rerouting of
1008 the MVT, diverting sidewalks, and extend the duration of construction. However, if constructed
1009 separately, construction access and staging would be required in similar areas as the Preferred
1010 Alternative along the GWMP and Ohio Drive SW. Separate construction of the Selected Crossing over
1011 the GWMP would require traffic control measures, temporary lane closures, and temporary lane shifts
1012 on the GWMP for delivery of materials and equipment, and for construction activities for the
1013 abutments, piers, and superstructure while maintaining a safe work zone. Construction material for the
1014 Preferred Option could be barged in on the river and staging areas would have to be established. To
1015 encourage traffic to make use of other routes, additional access points would be identified.

1016 **22.2.5.3. Avoidance, Minimization, and Mitigation**

1017 Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those
1018 for the Project (see **Chapter 9.6, Transportation and Navigation, Avoidance, Minimization, and**
1019 **Mitigation**). As there are no anticipated permanent adverse effects to transportation or navigation
1020 except for loss of parking, mitigation measures are proposed to mainly address temporary impacts and
1021 are the same as the mitigation measures of the Project's Preferred Alternative.

1022 The construction of the Preferred Option would require typical maintenance of traffic measures such as
1023 lane and shoulder closures, lane shifts, potential detours and a host of temporary traffic mitigation
1024 strategies to minimize the impacts to the traveling public. The implementation of these measures and
1025 strategies would be necessary in order construct the project safely while allowing for reasonable
1026 production of construction operations. The contractor would be required to develop, in coordination
1027 with DDOT, a project-wide Traffic Management Plan (TMP) that includes temporary traffic control plans,
1028 the analysis of traffic operations, and a public outreach campaign. During development of the TMP,
1029 additional coordination with the Project stakeholders and public at large would inform the specific
1030 measures laid out in the plan.

1031 For impacts to parking during construction, temporary parking or parking shuttles would be considered
1032 as potential mitigation for the loss of parking spaces at NPS Parking Lot C, especially during periods of
1033 heavy usage, such as during the National Cherry Blossom Festival. Permanent loss of parking would not
1034 be mitigated since parking is generally underused.

1035 For impacts to the MVT, the mitigation would be the same as the Preferred Alternative. Wayfinding
1036 signage would be installed, as appropriate, to redirect pedestrian and bicycle traffic during temporary
1037 closures due to construction. In addition, temporary crossings of trails for materials delivery would be
1038 scheduled during evening hours to the extent practicable, to minimize impacts to trail users.

1039 The construction of the Preferred Option would require the installation of navigation lights, the quantity
1040 to be determined through agency coordination, the development of an inspection and maintenance
1041 program for the crossing and navigation lights, and to inform recreational boaters of the new bike-
1042 pedestrian crossing and proper clearances for watercraft.

1043 **22.2.6. Air Quality and Greenhouse Gas Emissions**

1044 This section assesses the potential short-term and long-term impacts of the Preferred Option on air
1045 quality and greenhouse gas emissions. This section also discusses proposed avoidance, minimization,
1046 and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 10, Air Quality
1047 and Greenhouse Gas Emissions** for a description of the regulatory context and Local and Regional Study
1048 Areas.

1049 The analysis of impacts to air quality and greenhouse gas emissions due to the bike-pedestrian crossing
1050 applied a similar methodology to that used for evaluating impacts of the Action Alternatives (See
1051 **Chapter 10.2.2, Air Quality and Greenhouse Gases, Methodology**). The bike-pedestrian crossing is
1052 within the footprint of the Action Alternatives' Study Areas for air quality and greenhouse gas emissions.
1053 Due to its use for non-motorized transportation and its smaller size and scope, it was assumed that the
1054 bike-pedestrian crossing emissions from permanent and temporary activities would be below those of
1055 the Action Alternatives and would not exceed *de minimis* thresholds for criteria pollutants and would
1056 therefore not require a General Conformity determination.

1057 **22.2.6.1. Permanent or Long-Term Effects**

1058 The Preferred Option would not have permanent direct adverse air quality impacts and would have
1059 minor permanent indirect benefits to air quality. The current pedestrian-bike crossing on the 14th Street
1060 Bridge carries approximately 2,000 trips per weekday during the warmer months. The proposed crossing
1061 and connection to Crystal City via Long Bridge Park would likely encourage additional pedestrian and
1062 bicycle trips, thereby slightly reducing vehicle trips and the corresponding vehicular pollutant emissions
1063 including carbon monoxide (CO), volatile organic carbon (VOC), nitrogen oxide (NO_x), particulate matter
1064 (PM), and CO₂.

1065 **22.2.6.2. Temporary Effects**

1066 The Preferred Option would have minor temporary adverse effects to air quality and GHG. The
1067 emissions associated with construction activities for the Preferred Option are assumed not to exceed *de
1068 minimis* thresholds for criteria pollutants. This is based on the conclusion that construction of the
1069 Preferred Alternative (with its much larger construction scope) would be below *de minimis* thresholds.

1070 The Preferred Option would be constructed either along with the Project or constructed separately
1071 following the completion of the Project. Similar to construction of the Preferred Alternative, pollutant
1072 emissions during construction would occur because of emissions from on-site diesel equipment,
1073 increased truck traffic to and from the construction site on local roadways, and fugitive dust.

1074 **22.2.6.3. Avoidance, Minimization, and Mitigation**

1075 Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those
1076 for the Project (see **Chapter 10.6, Air Quality and Greenhouse Gases, Avoidance, Minimization, and**
1077 **Mitigation**).

1078 No permanent air quality mitigation is proposed, as the bike-pedestrian bridge would have no
1079 permanent adverse impacts to air quality. Although no major temporary adverse impacts are
1080 anticipated during construction of the Preferred Option, measures would be taken to reduce pollutant
1081 emissions during construction in accordance with all applicable laws and regulations.

1082 The District's and Virginia's anti-idling laws would be enforced during all construction phases for the
1083 Preferred Option. Construction in the District would comply with the District's 20 DCMR 900 limiting
1084 non-road engine idling to 3 minutes. Construction components in Virginia would comply with
1085 9 VAC 5-40-5670 limiting motor vehicle idling to 3 minutes unless providing auxiliary power for purposes
1086 other than heating or air conditioning. Idling restriction signs would be placed on the premises to
1087 remind drivers and construction personnel of the idling regulations.

1088 Construction contractors would be required to use ultra-low-sulfur diesel fuel for all off-road
1089 construction vehicles as an additional measure to reduce air emissions from construction activities. Any
1090 non-road diesel equipment rated 50 horsepower or greater would meet EPA's Tier 4 emission limits or
1091 be retrofitted with appropriate emission reduction equipment. Emission reduction equipment could
1092 include EPA-verified or California Air Resources Board verified diesel oxidation catalysts or diesel
1093 particulate filters.

1094 Protective measures around the construction and demolition work would be required to protect
1095 pedestrians and prevent dust and debris from leaving the site or entering the surrounding community in
1096 accordance with 20 DCMR 605. Appropriate methods of dust control would be determined by the
1097 surfaces affected (such as roadways or disturbed areas) and would include, as necessary, the application
1098 of water, the use of stone in construction roads, and vegetative cover. Dust generated from earthwork
1099 and other construction activities, such as stockpiled soils, would be controlled by spraying with water to
1100 mitigate wind erosion on open soil areas. Other dust suppression methods, such as wheel washing, may
1101 be implemented to minimize the off-site transport of dust. Regular sweeping of the pavement of
1102 adjacent roadway surfaces may be required during the construction period to minimize the potential for
1103 vehicular traffic to create airborne dust and particulate matter. Another way to reduce air quality
1104 impacts would be to recycle construction waste.

1105 **22.2.7. Energy**

1106 This section assesses the potential short-term and long-term impacts of the Preferred Option on energy
1107 resources. **Energy resources** refer to energy end-use, or consumption. Energy use is divided into
1108 operational and construction energy consumption. Energy sources considered include electricity and

1109 other fuels as applicable, such as natural gas, gasoline, diesel fuel, and propane. This section also
1110 discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the
1111 Preferred Option. See **Chapter 11, Energy** for a description of the regulatory context and Local and
1112 Regional Study Areas.

1113 The analysis calculated energy use for the bike-pedestrian crossing for lighting, maintenance, and
1114 construction. These calculations used reasonable assumptions as precise data was not available for
1115 quantifying energy consumption for these features.

1116 **22.2.7.1. Permanent or Long-Term Effects**

1117 The Preferred Option would have minor permanent direct adverse impacts to energy due to use of
1118 lighting and other equipment, as well as a minor permanent direct beneficial impact to energy due to
1119 shifting trips from motorized to non-motorized modes. The Preferred Option would be on a separate
1120 structure upstream from the new railroad bridge. Energy consumed by lighting and other equipment on
1121 the new crossing would be minor and estimated to be 52.31 million British Thermal Units (BTU)
1122 annually, a negligible amount when compared to the overall annual energy use of the Washington
1123 Metropolitan Region of 174 trillion BTU.

1124 Vehicles and equipment would consume energy used for ongoing maintenance of the Preferred Option.
1125 Energy consumption is assumed at a negligible 14.95 million BTU annually. In addition, the Preferred
1126 Option would provide a new route for non-motorized travel, reducing energy use by shifting some users
1127 from motorized transportation to bicycling or walking.

1128 **22.2.7.2. Temporary Effects**

1129 There would be minor temporary direct adverse impacts to energy as a result of the Preferred Option.
1130 Temporary effects for the Preferred Option include the energy consumed by vehicles and equipment
1131 during construction. The Preferred Option would require trucks and other equipment that consume fuel
1132 throughout the course of their operation, most likely in the form of diesel fuel. At this level of design,
1133 the precise number of vehicle trips, distance traveled, or hours of operation have not yet been
1134 determined for the Preferred Option alone, and therefore, fuel usage cannot be precisely quantified.
1135 However, construction of the bike-pedestrian crossing was estimated at 0.001 trillion BTU.

1136 **22.2.7.3. Avoidance, Minimization, and Mitigation**

1137 Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those
1138 for the Project (see **Chapter 11.6, Energy, Avoidance, Minimization, and Mitigation**).

1139 The most energy efficient technologies would be used wherever feasible in the operations the Preferred
1140 Option. These technologies and anticipated continued improvements in energy efficiency would reduce
1141 energy use, normalized per piece of equipment. These reductions would be associated with on-bridge
1142 equipment (for example, lighting), maintenance equipment, construction equipment and trains, due to
1143 adoption of technologies such as LED lights and higher efficiency engines.

1144 Temporary impacts during construction would primarily result from fuel consumed in vehicles and
1145 equipment. Construction staging and access areas would be strategically planned to minimize the
1146 distance traveled by construction vehicles or trucks hauling materials to or from the site. In addition,

1147 construction plans would emphasize minimizing, to the greatest extent possible, vehicle idling times.
1148 While some vehicles and equipment may require ongoing engine use, other applicable vehicles should
1149 adhere to this policy. The policy would encourage contractors to use fuel efficient or alternative fuel
1150 vehicles to the greatest extent feasible. Solar-powered generators would be considered as an alternative
1151 to diesel generators wherever feasible.

1152 **22.2.8. Land Use and Property**

1153 This section assesses the potential short-term and long-term impacts of the Preferred Option on land
1154 use and property. **Land use** is characterized by the arrangements, activities, and inputs people
1155 undertake in a certain land cover type to produce, change, or maintain it.²¹ Examples of typical land uses
1156 include residential and commercial development, transportation, resource management, and
1157 agricultural lands. This section also discusses proposed avoidance, minimization, and mitigation
1158 measures to reduce adverse impacts of the Preferred Option. See **Chapter 12, Land Use and Property**
1159 for a description of the regulatory context and Local and Regional Study Areas.

1160 The analysis of impacts to land use and property due to the bike-pedestrian crossing applied the same
1161 data, mapping, and methods used for assessing the impacts of the Action Alternatives (see **Chapter**
1162 **12.2.2, Land Use and Property, Methodology**). The analysis determined impacts to land use and
1163 property by overlaying the bike-pedestrian crossing's footprint on mapping of land use and property
1164 ownership.

1165 **22.2.8.1. Permanent or Long-Term Effects**

1166 **Land Use**

1167 Construction of the Preferred Option would result in a minor permanent direct adverse impact to
1168 parkland due to loss of Long Bridge Park and GWMP land where the crossing connects to the parks.
1169 However, the Preferred Option would be consistent with existing park and recreational land uses. At
1170 Long Bridge Park, the Preferred Option would connect with a loop trail planned as part of new park
1171 facilities currently under construction. The alignment of the crossing would impact a portion of Arlington
1172 County property that is currently undeveloped and forested; this land is envisioned to serve as an edge
1173 and buffering adjacent to park facilities. As such, the bike-pedestrian crossing would complement, but
1174 not adversely impact, park facilities by providing a connection across the GWMP that would link Long
1175 Bridge Park to parkland on both sides of the Potomac River.

1176 The Preferred Option would be on a separate structure adjacent to the new railroad bridge across the
1177 river. In East Potomac Park, the ramp would land near Ohio Drive SW in NPS Parking Lot C. Overall,
1178 moderate permanent direct adverse impacts would result from the loss of portions of the surface
1179 parking area. In the long term, moderate beneficial impacts would result from the construction of the
1180 ramp, due to the improved pedestrian access the new connection would provide to and between areas
1181 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.

1182 **Property**

1183 The Preferred Option would have minor permanent direct adverse impacts on one Federally owned
 1184 parcel in Virginia, and one Federally owned parcel in the District. This would yield a total property
 1185 impact area of 1.07 acres, as shown in **Table 22-2**. None of the property impacts would result in
 1186 displacement of residences or businesses.

1187 **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.
¹Range provided due to difference in and overlap of data sources from NPS and Arlington County

1188 **Consistency with Local and Federal Plans**

1189 The Preferred Option would have minor permanent direct beneficial impacts to local and Federal Plans.
 1190 The Preferred Option is largely consistent with Federal and local plans, including local plans that do not
 1191 directly address the construction of a new bike-pedestrian connection over the Potomac River. By
 1192 providing additional pedestrian and bicycle access to and among Crystal City, the MVT, and East
 1193 Potomac Park, the Preferred Option would also further the goal of improving access to the Potomac
 1194 River and Federal parkland espoused by numerous local and Federal plans. The Preferred Option is
 1195 consistent with plans that specifically call out a new bike-pedestrian connection across the river in the
 1196 Long Bridge Corridor, specifically the *NPS Paved Trails Study*,²² *moveDC*,²³ and the plans for Long Bridge
 1197 Park.²⁴

1198 **22.2.8.2. Temporary Effects**

1199 The Preferred Option would have negligible temporary direct adverse impacts to land use. As a separate
 1200 facility, the Preferred Option would be constructed either along with the Project or constructed
 1201 separately following the completion of the Project. If constructed along with the railroad bridges, the
 1202 crossing would make use of the same construction access and staging areas and rerouting of the MVT
 1203 (see **Chapter 12.5, Land Use and Property, Temporary Effects**). However, if constructed following
 1204 completion of the Project, access and staging would be required from Long Bridge Park, the GWMP, and
 1205 East Potomac Park. These would result in negligible impacts requiring pedestrian sidewalks, bicycle
 1206 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.

1207 **22.2.8.3. Avoidance, Minimization, and Mitigation**

1208 Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those
1209 for the Project (see **Chapter 12.6, Land Use and Property, Avoidance, Minimization, and Mitigation**).

1210 **Land Use**

1211 The Preferred Option, including the crossing and ramps would be designed and implemented to
1212 minimize the footprint and land use impacts to the extent practicable. During construction, visitor use of
1213 parkland and trails near the Preferred Option would be maintained to the extent practicable. Following
1214 construction of the Preferred Option, land or property adversely impacted by construction activities
1215 (including trees, other vegetation, and landscaping) would be restored to the extent practicable.

1216 **Property**

1217 Ownership of the Preferred Option is still to be determined. If the structure is owned by an entity other
1218 than NPS, a land exchange may be required for any NPS-administered property acquisition.

1219 **22.2.9. Noise and Vibration**

1220 This section assesses the potential short-term and long-term impacts of the Preferred Option on noise
1221 and vibration. This section also discusses proposed avoidance, minimization, and mitigation measures to
1222 reduce adverse impacts of the Preferred Option. See **Chapter 13, Noise and Vibration** for a description
1223 of the regulatory context and Local and Regional Study Areas.

1224 The analysis of noise and vibration impacts as a result of the bike-pedestrian crossing used a qualitative
1225 assessment of noise and vibration generation based on operations and construction.

1226 **22.2.9.1. Permanent or Long-Term Effects**

1227 There would be no noise or vibration impacts from the Preferred Option. The Preferred Option would be
1228 a bike and pedestrian facility that would not generate operational noise or vibration. Noise impacts from
1229 the operation of the Action Alternatives would range from 67 to 71 dBA in the areas affected by the
1230 bike-pedestrian crossing. These impacts would not change due to operation of the bike-pedestrian
1231 crossing. In addition, operation of the bike-pedestrian crossing would not exceed FTA criteria for
1232 vibration.

1233 **22.2.9.2. Temporary Effects**

1234 The Preferred Option would have minor temporary direct adverse impacts from noise as it would exceed
1235 the Arlington nighttime noise limit at one receptor (Mount Vernon Trail) due to construction activities
1236 related to pile driving construction of the new bridge over the GWMP. The Preferred Option would
1237 involve construction of a bike-pedestrian path from Long Bridge Park to a bridge over the GWMP, a
1238 bridge over the Potomac River, and ramps and landings at the MVT and NPS Parking Lot C in East
1239 Potomac Park. The piers within the Potomac River would be constructed using circular concrete drilled
1240 shafts. The construction activities for the Preferred Option would generate much less noise than
1241 construction of the railroad bridge as installation of the drilled shaft piers would not require pile driving
1242 equipment.

1243 **22.2.9.3. Avoidance, Minimization, and Mitigation**

1244 As no permanent or temporary noise or vibration impacts are anticipated from the Preferred Option, no
1245 avoidance, minimization, or mitigation is required. Avoidance, minimization, and mitigation approaches
1246 for temporary noise impacts of the Preferred Option would be similar to those for the Project (see
1247 **Chapter 13.6, Noise and Vibration, Minimization, and Mitigation**).

1248 **22.2.10. Aesthetics and Visual Resources**

1249 This section assesses the potential short-term and long-term impacts of the Preferred Option on
1250 aesthetics and visual resources. This section also discusses proposed avoidance, minimization, and
1251 mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter 14, Aesthetics and**
1252 **Visual Resources** for a description of the regulatory context and Local and Regional Study Areas.

1253 The analysis of impacts to aesthetic and visual resources due to the bike-pedestrian crossing applied a
1254 similar methodology to that used for the analysis of impacts due to the Action Alternatives (See **Chapter**
1255 **14.2.2, Aesthetics and Visual Resources, Methodology**). The assessment of the aesthetic and visual
1256 impacts of the bike-pedestrian crossing was based on field observations, consideration of photographs,
1257 and the findings of other photo simulations prepared for the Action Alternatives.

1258 **22.2.10.1. Permanent or Long-Term Effects**

1259 This section considers the permanent direct and indirect impacts of the Preferred Option on aesthetics
1260 and visual resources organized by geographical sub-areas with a common visual character.

1261 **George Washington Memorial Parkway**

1262 The Preferred Option would cause moderate permanent direct adverse impacts to visual quality along
1263 the GWMP. Construction of the railroad bridge(s) would remove 5 trees within the Preferred Option's
1264 Limits of Disturbance (LOD). Locating the bike-pedestrian bridge within the construction LOD of the new
1265 railroad bridge would impact the number of trees that the Project would be able to replant to mitigate
1266 the visual impacts of both the bike-pedestrian bridge and the railroad bridge. The reduction of
1267 additional property upon which to replant trees would therefore diminish the GWMP's visual integrity
1268 through loss of trees visible from the roadway and contribute to the tunnel-like effect that results from
1269 the sequence of bridges along this segment of the GWMP.

1270 Visitors and commuters traveling southbound along the GWMP by motor vehicle would serve as the
1271 primary viewers of the Preferred Option. The overall sensitivity of these viewers to changes in visual
1272 character would be moderate overall, as the high number of daily viewers and the proximity of views, as
1273 well as the routine nature of trips along the GWMP, would be counterbalanced by the short duration of
1274 these views and viewers' secondary focus on them.

1275 While noticeable, the Preferred Option over the GWMP would be moderately compatible with this
1276 segment of the roadway, where multiple bridges already exist in close proximity to each other and an
1277 additional bridge would exist as part of the Preferred Alternative. However, ramp structures like the
1278 proposed connection to the MVT are currently not present along the trail and would provide an
1279 additional contrast with the natural harmony of the area between the GWMP and the Potomac River.

1280 In addition to introducing a sixth bridge structure as a new visual element with a contrasting form and
1281 design to other bridges along the GWMP, the Preferred Option would limit the ability to replant
1282 vegetation removed for construction of the new railroad bridge, including some mature trees associated
1283 with the 1932 Planting Plan, along both sides of the roadway. This vegetation buffers and frames views
1284 while contributing to the essential visual experience and natural harmony of the GWMP. Cumulatively
1285 with the five other bridges along this segment of the GWMP, the addition of the Preferred Option would
1286 adversely impact continuous views along the GWMP by expanding and further accentuating the tunnel-
1287 like environment created by transportation infrastructure along this segment of the Parkway.

1288 The proposed ramp structure for the Preferred Option would be set back from the GWMP yet visible to
1289 passing motorists on the roadway and I-395 ramp. It would reduce the natural harmony of its context by
1290 removing trees, including some mature trees, in the open area between the Metrorail Bridge and Long
1291 Bridge. Combined with the loss of trees resulting from the Preferred Alternative, a previously natural
1292 area would be increasingly defined by transportation infrastructure, altering the planned visual
1293 character of the GWMP.

1294 Additional adverse impacts would result from extending the GWMP crossing into Long Bridge Park,
1295 which would require removing an area of trees and scrub vegetation along southbound side of the
1296 GWMP. The loss of trees and the tallest vegetation immediately adjacent to the GWMP would open
1297 views into Long Bridge Park in a location where the vegetation currently screens the railroad and
1298 contributes to the GWMP's natural character and sense of enclosure. The Preferred Option would
1299 connect to a loop trail planned as part of the Long Bridge Park improvements but would not impact the
1300 visual character of the remainder of the park.

1301 **Mount Vernon Trail**

1302 The Preferred Option would have a moderate permanent direct adverse impact on visual quality along
1303 the MVT, particularly from the ramp structure on the areas of parkland and vegetation adjacent to the
1304 crossing. Adding a ramp would change the nature and visual setting by replacing portions of an open
1305 area of parkland with transportation infrastructure clearly visible from both directions along the trail.
1306 Similar to the GWMP, locating the bike-pedestrian bridge and ramp within the construction LOD of the
1307 new railroad bridge would impact the number of trees that the Project would be able to replant to
1308 mitigate the visual impacts of both the bike-pedestrian bridge and the railroad bridge.

1309 Along the segment of the MVT near the Preferred Option, viewers would consist primarily of trail users
1310 traveling on bicycle and on foot. Overall viewer sensitivity would range from moderate to high,
1311 depending on the individual viewer, reflecting the scenic aspects of the view, the proximity of the view,
1312 and the routine nature of travel along the trail. Construction of a bike-pedestrian ramp near the
1313 Preferred Alternative bridges would be moderately incompatible with the visual environment. While
1314 there are existing bridges near the Preferred Option, ramp structures are currently not present along
1315 the trail and would pose an additional contrast with the natural harmony of this segment of the trail.

1316 **Potomac River**

1317 Overall, the Preferred Option would have minor permanent direct adverse impacts to visual quality on
1318 the Potomac River because of its contribution to the tunnel-like effect created by the concentration of

1319 five other bridges along this segment of the river. Impacts would be limited, however, by the structure's
1320 location at a midway point of the five other bridges along this segment of the Potomac River

1321 Viewers of the Preferred Option would be primarily Metrorail Yellow Line passengers and operators. The
1322 crossing would also be visible to travelers by boat and visitors to the MVT and East Potomac Park.
1323 Viewer sensitivity would be highest facing the Metrorail bridge, where a high number of travelers would
1324 have close-up views of the Preferred Option, often on a routine basis.

1325 The Preferred Option crossing would run parallel to the upstream side of the Preferred Alternative
1326 bridge across the Potomac River. The Preferred Option's height relative to the adjacent railroad bridge
1327 would limit its visibility from downstream locations, but the structure would be clearly visible from
1328 Yellow Line Metrorail trains. In combination with other bridges spanning this portion of the Potomac
1329 River, the Preferred Option would accentuate the tunnel-like nature of the nearby bridges. As the
1330 structure would have additional piers supporting it, it would further reduce the transparency beneath
1331 the Preferred Alternative bridges to a minor extent.

1332 **East Potomac Park**

1333 Overall, the Preferred Option would have negligible permanent direct adverse impacts to the visual
1334 quality of East Potomac Park. While there would be noticeable changes in visual character, adverse
1335 impacts would be diminished in part by the existing dominance of transportation infrastructure in the
1336 surrounding visual environment and by the location of the ramp structure on the site of the existing
1337 surface parking area.

1338 Viewers of the Preferred Option from East Potomac Park would consist primarily of East Potomac Park
1339 users and some commuters traveling on foot, in motor vehicles, and on bicycles as well as commuters
1340 traveling by Metrorail. Viewer exposure would be moderate overall, depending on the speed at which
1341 viewers are traveling through the area, due to the proximity of the bridges, the amount of time available
1342 to notice the view on bicycle or on foot, and the high number of potential viewers. Overall viewer
1343 sensitivity would be moderate, depending on the individual viewer.

1344 The construction of the Preferred Option would be moderately compatible with the existing visual
1345 environment due to the two existing bridges along an approximately 230-foot stretch of Ohio Drive SW
1346 and a third added as part of the Preferred Alternative. However, compatibility would be limited by the
1347 contrast between the new built element and the park's natural harmony, as well as by the proximity of
1348 the new bridge to the viewer. Potential impacts would be reduced since the visual setting is already
1349 predominantly of transportation infrastructure, paved areas, with trees and landscaping lacking in this
1350 portion of the park.

1351 The ramp structure of the Preferred Option would have the greatest visual impact as it would be clearly
1352 visible and would constitute a noticeably new visual element within East Potomac Park. Its impact would
1353 be minimized, however, by its location in a previously paved area (the existing NPS Parking Lot C surface
1354 parking area) and outside the linear vista along Ohio Drive SW. The Preferred Option would add another
1355 overhead visual element, further accentuating the visual dominance of bridges in this portion of the
1356 park. Similar to the GWMP, locating the bike-pedestrian bridge and ramp within the construction LOD of
1357 the new railroad bridge would impact the number of trees that the Project would be able to replant to
1358 mitigate the visual impacts of both the bike-pedestrian bridge and the railroad bridge.

1359 **Nighttime Conditions**

1360 The Preferred Option's impacts on nighttime conditions would be determined by the final design of the
1361 bike-pedestrian bridge, including the extent, location, and type of lighting. Pedestrian- and bicycle-scale
1362 lighting would result in potential light spillage and make the bridge visible from a distance. Lighting
1363 would be minimal and understated overall and limited to that which is necessary for bicycle and
1364 pedestrian safety. Any light spillage would not be incompatible with the Potomac River's visual
1365 environment, given the amount of light that currently emanates from the 14th Street Bridge Complex,
1366 but would be more visible and noticeable in East Potomac Park and the along the MVT, where existing
1367 lighting is minimal or nonexistent. Any light spillage along the GWMP would be absorbed by existing
1368 roadway lighting along the GWMP and the I-395 ramp.

1369 **22.2.10.2. Temporary Effects**

1370 The Preferred Option would have moderate temporary direct adverse impact to visual quality as a result
1371 of construction. Construction of the Preferred Option would occur either along with the Project or
1372 separately following the completion of the Project. If constructed along with the Preferred Alternative,
1373 temporary impacts due to construction of the Preferred Option would be the same as those described
1374 for the Preferred Alternative. Construction activities would cause generally moderate temporary
1375 adverse impacts to visual quality due to construction and staging areas, construction equipment access,
1376 construction activities, removal of vegetation, reduction of screening vegetation, and rerouting of the
1377 MVT. See **Chapter 14, Visual and Aesthetic Resources** for more details on temporary effects of the
1378 Preferred Alternative to aesthetics and visual resources.

1379 **22.2.10.3. Avoidance, Minimization, and Mitigation**

1380 Mitigation approaches for the Preferred Option would be similar to those for the Project (see **Chapter**
1381 **14.6, Aesthetic and Visual Resources, Avoidance, Minimization, and Mitigation**).

1382 Potential measures that would be employed to mitigate permanent adverse impacts of the Preferred
1383 Option on aesthetics and visual resources are the same as those for the Project's Preferred Alternative
1384 and include the following:

- 1385 • Any vegetation within areas of temporary impact, including landscape plantings, ground cover,
1386 and trees, would be restored following construction. Monitoring to ensure vegetation survival
1387 may also be required.
- 1388 • Final landscaping, including planting, plant selection, and berms, would be implemented in a
1389 manner that mitigates visual impacts on the GWMP, MVT, and East Potomac Park, and includes
1390 NPS as a participant in the design process.
- 1391 • Bridge structure design and materials may be refined in later design phases to mitigate impacts
1392 on visual resources and ensure aesthetic compatibility with built, natural, and cultural resources
1393 in the surrounding visual environment.

1394 Potential measures that would be employed to mitigate temporary adverse impacts of the Preferred
1395 Option on aesthetics and visual resources include the following:

- 1396 • Construction fencing and barriers would be as aesthetically pleasing as feasible and would block
1397 potentially unattractive views into construction areas.
- 1398 • Visitor use of parkland and trails near the Preferred Option would be maintained to the
1399 maximum extent feasible during construction.
- 1400 • Signage for construction, traffic control, and MVT relocation would be clear, legible, attractive,
1401 and designed in consultation with NPS.

1402 **22.2.11. Cultural Resources**

1403 This section assesses the potential short-term and long-term impacts of the Preferred Option on cultural
1404 resources. This section also discusses proposed avoidance, minimization, and mitigation measures to
1405 reduce adverse impacts of the Preferred Option. See **Chapter 15, Cultural Resources** for a description of
1406 the regulatory context and Local and Regional Study Areas.

1407 The analysis of impacts to cultural resources due to the bike-pedestrian crossing applied a similar
1408 methodology to that used to assess impacts of the Action Alternatives (See **Chapter 15.2.2, Cultural
1409 Resources, Methodology**). The analysis took into consideration physical impacts to cultural resources
1410 including removal of contributing vegetation as well as visual impacts based on the analysis described in
1411 **Section 22.2.10, Aesthetics and Visual Resources**.

1412 In addition to the impacts to historic districts discussed below, FRA and DDOT conducted a Phase IA
1413 Archaeological Assessment for the Project (see **Appendix E4, Phase IA Archaeological Assessment
1414 Technical Report**), including the LOD for the Preferred Option. The analysis identified three terrestrial
1415 areas of high potential for archaeological resources within the LOD one submerged area of moderate
1416 potential. FRA has not evaluated these sites for NRHP eligibility or their value for preservation in place.²⁵
1417 Additional investigations will be identified in consultation with the appropriate SHPO and will be
1418 conducted during Final Design.

1419 **22.2.11.1. Permanent or Long-Term Effects**

1420 This section describes impacts to cultural resources resulting from the Preferred Option, organized by
1421 Historic District. This section only addresses cultural resources with identified impacts. For a complete
1422 description of the permanent or long-term effects, see **Appendix E3, Section 106 Assessment of Effects
1423 Report**. FRA and DDOT produced the Assessment of Effects Report in compliance with the Section 106
1424 process. FRA and DDOT considered adverse impacts with an intensity of moderate or above to be
1425 adverse effects for the Section 106 evaluation.

1426 **George Washington Memorial Parkway Historic District**

1427 The Preferred Option would have a moderate permanent direct adverse impact on the GWMP. The
1428 Preferred Option’s LOD includes approximately 29,000 square feet of the GWMP. In addition to the
1429 infringement on undeveloped parkland, construction of the Preferred Option and access ramps would
1430 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.

1431 planting plan of the GWMP, which were intended to visually screen the railroad bridge from the
1432 motorway, resulting in a moderate permanent direct adverse impact.

1433 The existing, non-contributing bridges along this portion of the GWMP have already compromised the
1434 GWMP's integrity of feeling, association, and setting. Although the addition of the Preferred Option
1435 would be visible, it would not diminish the integrity of the historic district and resulting indirect
1436 permanent adverse impacts would be negligible.

1437 **Mount Vernon Memorial Highway Historic District**

1438 The Preferred Option would have a moderate permanent direct adverse impact on the Mount Vernon
1439 Memorial Highway (MVMH). Effects to the MVMH would be similar and additive to those described
1440 above affecting the GWMP. The Preferred Option's LOD includes approximately 25,000 square feet of
1441 the historic district.

1442 **East and West Potomac Parks Historic District**

1443 The Preferred Option would have a moderate permanent direct adverse impact on the East and West
1444 Potomac Parks. The Preferred Option's LOD includes approximately 14,000 square feet of the historic
1445 district. In addition to the infringement on undeveloped parkland, construction of a bike-pedestrian
1446 crossing and access ramp would affect the ability to replant Japanese cherry blossom plantings removed
1447 for construction of the new railroad bridge, resulting in a moderate permanent direct adverse impact.

1448 **National Mall Historic District**

1449 The Preferred Option would have no permanent direct or indirect adverse impacts on the National Mall
1450 Historic District. The Preferred Option's LOD include approximately 14,000 square feet within the
1451 National Mall Historic District. As there are no identified contributing features within the Preferred
1452 Option's alignment, there would be no adverse impacts on the historic district.

1453 **22.2.11.2. Temporary Effects**

1454 As a separate facility, the Preferred Option could be constructed on a different schedule from the
1455 Preferred Alternative. If constructed along with the Project, the crossing would make use of the same
1456 construction access and staging areas and would not have additional temporary effects (see **Chapter**
1457 **15.5, Cultural Resources, Temporary Effects**). However, if constructed separately, access and staging
1458 areas would be required within the GWMP, MVMH, East and West Potomac Parks, and areas of East
1459 Potomac Park that would result in moderate temporary adverse direct impacts to the National Mall
1460 Historic District.

1461 Potential impacts on archaeological resources would be minimized or avoided by locating construction
1462 access and staging activities away from areas of high archaeological potential or within sites that are
1463 paved or have been previously disturbed.

1464 **22.2.11.3. Avoidance, Minimization, and Mitigation**

1465 Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those
1466 for the Project (see **Chapter 15.6, Cultural Resources, Avoidance, Minimization, and Mitigation**).

1467 The permanent and temporary impacts resulting from the bike-pedestrian crossing requires mitigation
1468 measures, including the replacement of mature, contributing vegetation within the GWMP, MVMH, and
1469 East and West Potomac Parks Historic Districts. The Section 106 consultation process is ongoing. FRA
1470 and DDOT will continue to consult with DC State Historic Preservation Office, Virginia Department of
1471 Historic Resources, and the Consulting Parties to identify ways to avoid, minimize, and mitigate adverse
1472 impacts. The Section 106 agreement document, a Programmatic Agreement (PA), describes these
1473 measures and stipulates that consultation will continue through the final design and construction
1474 processes. The Draft PA is available for review in **Appendix E5, Section 106 Draft Programmatic**
1475 **Agreement.**

1476 **22.2.12. Recreation and Parks**

1477 This section assesses the potential short-term and long-term impacts of the Preferred Option on parks
1478 and recreation resources. Park and recreation resources were defined as areas providing leisure,
1479 entertainment, and recreational pursuits. Such resources include public spaces, facilities, parks, open
1480 space areas, trails, and built structures for recreation. This section also discusses proposed avoidance,
1481 minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter**
1482 **16, Recreation and Parks** for a description of the regulatory context and Local and Regional Study Areas.

1483 The analysis of impacts to parks and recreation resources due to the bike-pedestrian crossing applied
1484 the same methodology used for assessing impacts of the Action Alternatives (see **Chapter 16.2.2,**
1485 **Recreation and Parks, Methodology**).

1486 **22.2.12.1. Permanent or Long-Term Impacts**

1487 **Impacts to Park Property**

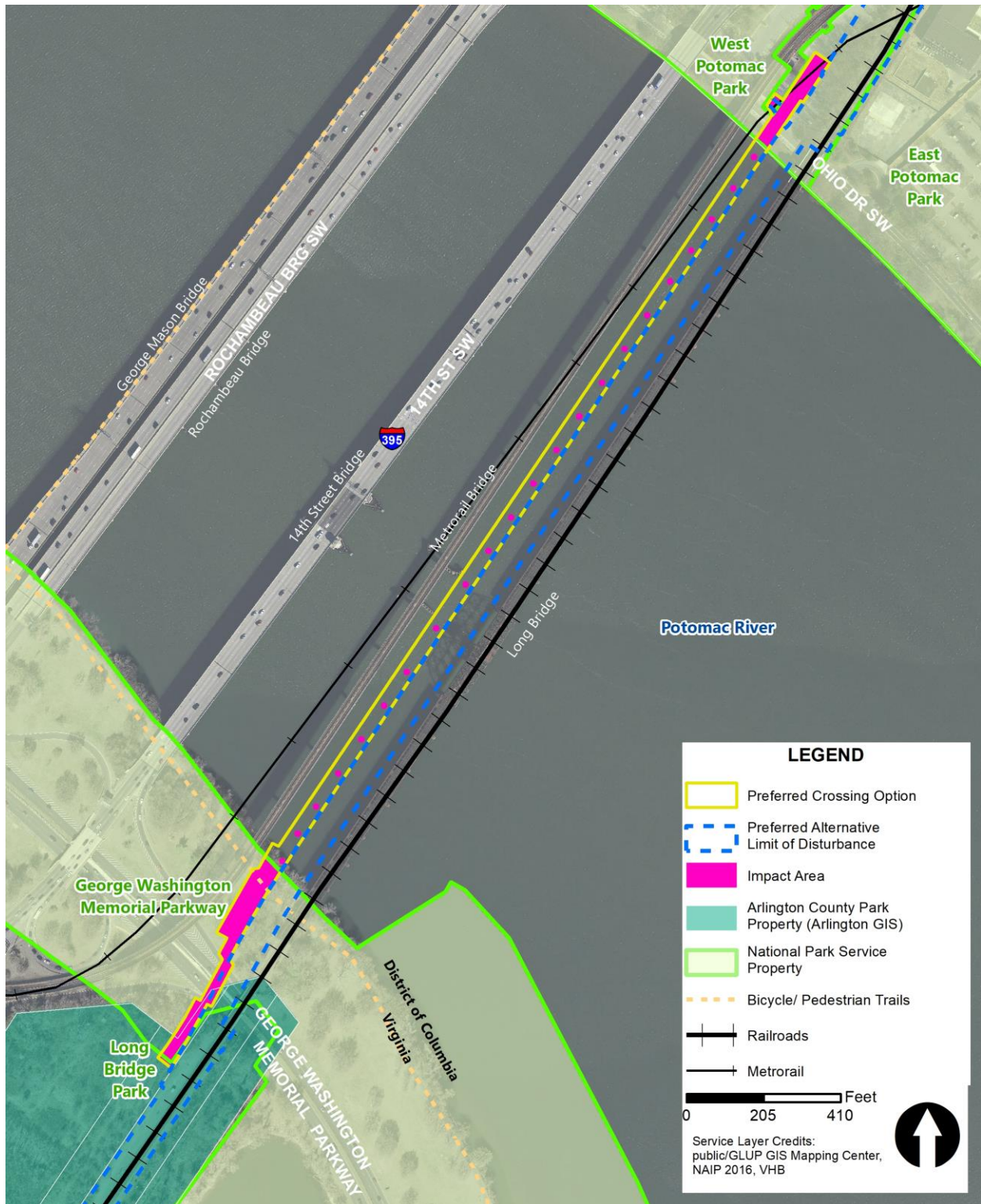
1488 The Preferred Option would have minor direct adverse impacts to park property. **Table 22-2** lists the
1489 parks that construction of the Preferred Option would directly affect, and the total acres of parkland
1490 impacted (**Figure 22-9**). It also shows the total acres of parkland impacted when the Preferred Option is
1491 combined with the Action Alternatives.

1492 The Preferred Option would impact between approximately 0.14 and 0.27 acres of Long Bridge Park.²⁶
1493 This land is currently undeveloped, forested, and serves as an edge and buffer adjacent to existing and
1494 planned facilities at Long Bridge Park. The Preferred Option would impact between approximately 0.49
1495 and 0.62 acres of GWMP land as it crosses over the GWMP roadway to access the MVT.

1496

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



1498

1499 The Preferred Option would terminate on East Potomac Park land, where it would impact 0.31 acres.
 1500 The bike-pedestrian bridge would end in a ramp near the sidewalk for Ohio Drive SW and NPS Parking
 1501 Lot C. Approximately 50 of 67 parking spaces would be eliminated due to the construction of the
 1502 Project. The exact number of parking spots to be removed would be determined as design of the bike-
 1503 pedestrian crossing and ramp is advanced, as the parking lots would be reconfigured to minimize
 1504 permanent loss of parking spaces. The addition of the bike-pedestrian ramp would result in less space
 1505 for reconfiguration of the parking spaces.

1506 **Impacts to Visitor Experience**

1507 The Preferred Option would have moderate permanent direct beneficial impacts on recreation users by
 1508 connecting public park spaces for visitors and providing an alternative bike and pedestrian connection.
 1509 The Preferred Option would consist of a ramp west of the existing railroad corridor, beginning in Long
 1510 Bridge Park, the crossing spanning the Potomac River, and a ramp ending in East Potomac Park. The
 1511 Preferred Option would have a moderate permanent direct beneficial impact to Long Bridge Park users.
 1512 The new crossing would terminate in Long Bridge Park on a ramp that would connect with a loop trail
 1513 planned as part of new park facilities currently under construction. Users of Long Bridge Park would be
 1514 able to access the East and West Potomac Parks facilities using the crossing, which would provide a
 1515 connection between parklands on both sides of the Potomac River.

1516 The Preferred Option would have a major permanent direct beneficial impact on GWMP users by
 1517 providing a connection between parklands on both sides of the Potomac River. Users of the MVT would
 1518 be able to access East and West Potomac Park facilities using the crossing. Improved bike access to a
 1519 Potomac River crossing would also be a beneficial impact on MVT users, including bike commuters, who
 1520 currently use the I-395 bridge to cross the river. By providing a direct connection between the District
 1521 and Long Bridge Park, the Preferred Option would eliminate the need for bicyclists traveling between
 1522 the District and Crystal City to use the MVT, thereby reducing congestion on the trail.

1523 The Preferred Option would have negligible permanent direct adverse impacts for recreational users of
 1524 the Potomac River. Because of its location between the new railroad bridge and the Metrorail bridge, it
 1525 would not impact views from the river. However, it would add additional shade for users passing under
 1526 the complex of bridges.

1527 The Preferred Option would have minor permanent direct adverse impacts on East Potomac Park users
 1528 by removing parking spaces. This surface parking area is heavily used by visitors at certain times of the
 1529 year, such as in the spring for the blooming of the Japanese cherry blossom plantings. The Preferred
 1530 Option would also provide moderate permanent direct beneficial impacts for users of East and West
 1531 Potomac Parks by providing bicycle and pedestrian access across the river to the MVT and Long Bridge
 1532 Park.

1533 **22.2.12.2. Temporary Impacts**

1534 If the Preferred Option is constructed along with the Project, the crossing would make use of the same
 1535 construction access and staging areas and would not have additional temporary direct or indirect
 1536 impacts (see **Chapter 16.5, Recreation and Parks, Temporary Impacts**). However, if constructed
 1537 following completion of the Project, access and staging would be required at Long Bridge Park, the
 1538 GWMP, and East Potomac Park. Constructing the Preferred Option would have temporary direct adverse

1539 impacts to parklands and the GWMP roadway. Impacts to the GWMP roadway would include traffic
1540 control measures, temporary lane closures, temporary lane shifts, and limited use of the roadway for
1541 construction vehicles. Impacts to the parklands would include loss of vegetation and trees due to
1542 construction staging.

1543 **22.2.12.3. Avoidance, Minimization, and Mitigation**

1544 Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those
1545 for the Project (see **Chapter 16.6, Recreation and Parks, Avoidance, Minimization, and Mitigation**).
1546 During construction visitor use of parkland and trails near the Preferred Option would be maintained to
1547 the extent practicable. Following construction of the Preferred Option, parkland and recreation areas
1548 adversely impacted by construction activities (including trees, other vegetation, and landscaping) would
1549 be restored to the extent practicable. Permanent loss of parking would not be mitigated since parking is
1550 generally underused.

1551 **22.2.13. Social and Economic Resources**

1552 This section assesses the potential short-term and long-term impacts of the Preferred Option on social
1553 and economic resources. Social and economic resources are related to demographics, jobs, current
1554 economic conditions, taxes, revenue, community facilities, local government services, and commercial
1555 activity. This section also discusses proposed avoidance, minimization, and mitigation measures to
1556 reduce adverse impacts of the Preferred Option. See **Chapter 17, Social and Economic Resources** for a
1557 description of the regulatory context and Local and Regional Study Areas.

1558 The analysis of impacts to social and economic resources due to the bike-pedestrian crossing applied
1559 similar methodologies as those used for the impact analysis of the Action Alternatives (See **Chapter**
1560 **17.2.2, Social and Economic Resources, Methodology**). However, the analysis of the temporary
1561 economic impacts of the bike-pedestrian crossing used a qualitative analysis.

1562 **22.2.13.1. Permanent or Long-Term Effects**

1563 The Preferred Option would have a minor permanent direct beneficial impact on community cohesion
1564 by increasing connectivity of the existing pedestrian and bicycle network and providing a new
1565 connection between Arlington and the District. Community facilities would be affected in that the
1566 Preferred Option would result in both adverse and beneficial impacts to East Potomac Park and Long
1567 Bridge Park (see **Section 22.2.12, Recreation and Parks**, for impacts to parks and recreation areas).

1568 The Preferred Option would have minor permanent direct adverse impacts to NPS Parking Lot C in East
1569 Potomac Park by removing parking spaces, which would reduce metered parking revenue to NPS.
1570 However, no additional parking spaces would be removed beyond the 50 spaces proposed in the
1571 Preferred Alternative. No other impacts to economic conditions are anticipated under the Preferred
1572 Option.

1573 **22.2.13.2. Temporary Effects**

1574 Construction of the Preferred Option would result in minor temporary effects to social conditions typical
1575 of construction projects such as minor traffic impacts on the GWMP due to construction access vehicles.
1576 As a separate facility, the Preferred Option could be constructed along with the Project or as a separate

1577 construction contract at another time. If constructed along with the Project, the Preferred Option would
1578 make use of the same construction access and staging areas and would not have no additional
1579 temporary direct or indirect impacts. However, if constructed separately, access and staging would be
1580 required at Long Bridge Park, the GWMP, and East Potomac Park. In that case, the Preferred Option
1581 would result in minor temporary direct impacts such as traffic.

1582 The Preferred Option would result in a minor temporary direct beneficial impact to construction
1583 employment for the duration of the construction period commensurate with the construction costs. No
1584 other temporary impacts to economic conditions are expected.

1585 **22.2.13.3.Avoidance, Minimization, and Mitigation**

1586 Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those
1587 for the Project (see **Chapter 17.6, Social and Economic Resources, Avoidance, Minimization, and**
1588 **Mitigation**).

1589 **22.2.14. Safety and Security**

1590 This section assesses the potential short-term and long-term impacts of the Preferred Option on safety
1591 and security. **Safety** is defined as being protected from or unlikely to cause danger, risk, or injury, while
1592 **security** is the state of being free from danger or threat. This section also discusses proposed avoidance,
1593 minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter**
1594 **18, Safety and Security** for a description of the regulatory context and Local and Regional Study Areas.

1595 The analysis of impacts to safety and security due to the bike-pedestrian crossing applied the same
1596 methodologies as those used for the impact analysis of the Action Alternatives (See **Chapter 18.2.2,**
1597 **Safety and Security, Methodology**).

1598 **22.2.14.1. Permanent or Long-Term Effects**

1599 **Railroad Safety**

1600 The Preferred Option would have negligible permanent direct adverse impacts to railroad safety. The
1601 Preferred Option would be on a separate superstructure than the railroad bridge. Because of the
1602 distance between structures (25 feet), railroad safety impacts would have a negligible effect. The
1603 potential for trespassing, incursions, or refuse being thrown onto the tracks from the Preferred Option is
1604 unlikely.

1605 **Public Safety**

1606 The Preferred Option would have minor permanent direct adverse impacts on public safety. The
1607 Preferred Option would be served by public and private emergency response services, depending on the
1608 jurisdiction (the District or Arlington). The distance of the bridge over the Potomac River of 2,300 feet
1609 could result in increased time for emergency response to an incident on the bridge. In addition, the
1610 potential isolation of users during times when the bridge is not well used could provide the opportunity
1611 for criminal activity.

1612 Constructing the Preferred Option would result in long-term safety benefits to the public by separating
1613 the bike-pedestrian crossing over the Potomac River from the roadway crossings on the 14th Street
1614 Bridge.

1615 **Security**

1616 The Preferred Option would have no permanent impacts to security. The Preferred Option would limit
1617 incursions onto the railroad right-of-way due to the distance between the structures. The Preferred
1618 Option would also be covered by police with jurisdiction of the area. Therefore, there are no anticipated
1619 security issues.

1620 **22.2.14.2. Temporary Effects**

1621 **Railroad Safety**

1622 The Preferred Option would have no temporary impacts to railroad safety.

1623 **Public Safety**

1624 The Preferred Option would have negligible temporary direct adverse impacts to public safety.
1625 Construction staging and laydown areas for the Preferred Option would be secured to prevent public
1626 entry and injury using construction BMPs. Impacts to public safety would be negligible. There would be
1627 potential traffic control and lane closures on the GWMP and Ohio Drive under the Preferred Option
1628 during the evening hours, which may impact accessibility of emergency services.

1629 **Security**

1630 The Preferred Option would have negligible temporary direct adverse impacts to security. The Preferred
1631 Option would temporarily add security risk due to the addition of several construction staging areas and
1632 access points, and the proximity of these areas to public right-of-way. However, all construction staging
1633 areas and access points would be secured and security impacts would be negligible.

1634 **22.2.14.3. Avoidance, Minimization, and Mitigation**

1635 Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those
1636 for the Project (see **Chapter 18.6, Safety and Security, Minimization, and Mitigation**).

1637 **Railroad Safety**

1638 The Preferred Option would be on a separate structure from the railroad bridge. Therefore, no
1639 mitigation, minimization, or avoidance is required. However, fencing on the crossing could further
1640 provide safety and minimize objects being thrown from the crossing.

1641 **Public Safety**

1642 To ensure adequate access for emergency responders and deter crime, mitigation measures would
1643 include providing access for emergency responders, coordinating the design with emergency
1644 responders, and use of BMPs in design of the crossing, such as emergency call boxes, fencing, lighting, or

1645 closed-circuit television (CCTV) cameras. Additional police and emergency response resources to ensure
1646 the safety of the public would also be identified.

1647 Construction staging areas can be targets for theft or vandalism, with materials and construction
1648 equipment stored there for extended periods of time. Throughout the construction period, the proper
1649 measures would be in place to prohibit trespassing, such as barriers, fences, or barricades. Entrances
1650 and exits to construction sites would be locked. Areas would be well lit and equipped with automatic
1651 protective lighting systems.

1652 **Security**

1653 The crossing area would be secured through passive security means (such as lighting), and potentially
1654 active security measures (such as CCTV cameras). Security would also be managed by jurisdictional
1655 police authorities that incorporate the Preferred Option. Additional police and emergency response
1656 resources to ensure the security of the public would also be identified.

1657 All construction sites would be secured through fencing or other passive security measures (such as
1658 lighting), as well as active security measures (such as cameras or intrusion detection), security
1659 personnel, monitoring of various activities, and adherence to strict protocols for entrance of
1660 construction workers to construction sites. The inspection of materials would also be employed at the
1661 construction sites.

1662 **22.2.15. Public Health, Elderly, and Persons with Disabilities**

1663 This section assesses the potential short-term and long-term impacts of the Preferred Option on public
1664 health, the elderly, and persons with disabilities. This section also discusses proposed avoidance,
1665 minimization, and mitigation measures to reduce adverse impacts of the Preferred Option. See **Chapter**
1666 **19, Public Health, Elderly, and Persons with Disabilities** for a description of the regulatory context and
1667 Local and Regional Study Areas.

1668 The analysis of impacts to public health, elderly, and persons with disabilities due to the bike-pedestrian
1669 crossing applied the same methodologies as those used in the impact analysis of the Action Alternatives
1670 (See **Chapter 19.2.2, Public Health, Elderly, and Persons with Disabilities, Methodology**). Assessments
1671 of impacts to **public health, elderly, and people with disabilities** for the purposes of this analysis include
1672 the resources and crucial issues or concerns relating to human health and welfare.

1673 **22.2.15.1. Permanent or Long-Term Effects**

1674 **Public Health**

1675 The Preferred Option would provide a minor permanent direct beneficial effect to public health.
1676 Constructing the Preferred Option adjacent to the new railroad bridge would not result in adverse
1677 impacts to public health related to water quality, air quality, noise and vibration, or safety and security.
1678 There are no healthcare facilities identified in the Local Study Area. Therefore, no permanent adverse
1679 direct or indirect impacts to healthcare facilities are expected.

1680 The long-term public safety benefits of constructing the Preferred Option would result in beneficial
1681 permanent health and safety improvements to the public. A major benefit would be providing a crossing

1682 over the Potomac River separate from roadways over the Potomac River such as the 14th Street Bridge.
1683 The Preferred Option would not pose risks of motor-vehicle accidents, would connect multiple regional
1684 trails, and would provide a public health benefit by encouraging active recreation (bicycling, running,
1685 and walking).

1686 **Elderly Persons**

1687 The Preferred Option would provide minor permanent beneficial direct impacts to elderly persons by
1688 encouraging active recreation. The Preferred Option would connect multiple regional trails and would
1689 provide a public health benefit that includes the elderly by encouraging active recreation (bicycling,
1690 running, and walking) between Arlington and the District.

1691 **Persons with Disabilities**

1692 There would be no permanent direct or indirect adverse impacts to persons with disabilities due to the
1693 Preferred Option. The Preferred Option would be fully ADA compliant and would provide access to the
1694 crossing for persons with disabilities. This would provide long-term beneficial impacts to persons with
1695 disabilities by increasing the number of bike and pedestrian facilities that are ADA compliant and
1696 provide access to the network of trails on either side of the Potomac River.

1697 **22.2.15.2. Temporary Effects**

1698 **Public Health**

1699 The Preferred Option would have minor temporary direct adverse impacts on public health. Overall
1700 public health impacts from construction activities would be the result of minor water quality, solid waste
1701 disposal and hazardous materials, air quality, noise and vibration, or safety and security effects. As
1702 described in their respective sections, unmitigated temporary impacts on public health related to
1703 construction are expected to be negligible.

1704 **Elderly Persons**

1705 The Preferred Option would have negligible temporary indirect adverse impacts on elderly persons
1706 because of construction. There are no nursing homes or assisted living facilities within 0.5 miles of the
1707 Preferred Option. The negligible impacts would result from diversion of pedestrian sidewalks and bicycle
1708 trails that may be used by elderly persons; however, these impacts are not specific to elderly persons.

1709 **Persons with Disabilities**

1710 The Preferred Option would have negligible temporary direct adverse impacts on persons with
1711 disabilities. The Preferred Option may result in negative impacts to persons with disabilities from
1712 changes in pedestrian walkways and sidewalks, if temporary replacement facilities are not fully
1713 accessible. If applicable, curb cuts or curb ramps would be used to enable ADA accessibility when
1714 construction activities inhibit sidewalk usage. All temporary walkways would be required to be ADA
1715 compliant when possible.

1716 **22.2.15.3. Avoidance, Minimization, and Mitigation**

1717 Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those
1718 for the Project (see **Chapter 19.6, Public Health, Elderly, and Persons with Disabilities, Avoidance,**
1719 **Minimization, and Mitigation**).

1720 **Public Health**

1721 For the Preferred Option, resource-specific mitigation measures are the same as those discussed in their
1722 applicable sections (**Section 22.2.2, Water Resources and Water Quality; Section 22.2.4, Solid Waste**
1723 **Disposal and Hazardous Materials; Section 22.2.6, Air Quality and Greenhouse Gas Emissions; Section**
1724 **22.2.9, Noise and Vibration; and Section 22.2.14, Safety and Security**). Unmitigated temporary impacts
1725 would be negligible; therefore, no mitigation measures are proposed.

1726 **Elderly Persons**

1727 Both permanent and temporary effects to elderly persons because of the Preferred Option would be
1728 negligible. The proper signage and mitigation measures to ensure pedestrian and bicyclist safety would
1729 be used during the temporary relocation of walking trails. No additional temporary mitigation measures
1730 are proposed.

1731 **Persons with Disabilities**

1732 Temporary negative impacts to persons with disabilities because of the Preferred Option would be
1733 negligible. Temporary walkways would be required to be ADA compliant when possible. No additional
1734 temporary mitigation measures are proposed.

1735 **22.2.16. Environmental Justice**

1736 This section assesses the potential short-term and long-term impacts of the Preferred Option on
1737 environmental justice (EJ). This section also discusses proposed avoidance, minimization, and mitigation
1738 measures to reduce adverse impacts of the Preferred Option. See **Chapter 20, Environmental Justice** for
1739 a description of the regulatory context and Local and Regional Study Areas.

1740 The analysis of impacts to environmental justice populations due to the bike-pedestrian crossing applied
1741 the same methodology used in the impact analysis for the Action Alternatives (See **Chapter 20.2.2,**
1742 **Environmental Justice, Methodology**).

1743 **22.2.16.1. Permanent or Long-Term Effects**

1744 The Preferred Option would not result in disproportionately high adverse permanent impacts to EJ
1745 populations. EJ populations would not be denied benefits from the new connection. None of the
1746 environmental impacts from establishing the new connection would be disproportionately borne by
1747 minority or low-income persons, or disproportionately affect facilities or service of importance to such
1748 persons. Completion of the new connection would not displace any persons.

1749 None of the adverse effects of the Preferred Option would overlap with EJ populations. However, as
1750 noted in **Chapter 20.3, Environmental Justice, Affected Environment**, local District residents including
1751 EJ populations who live nearby use East Potomac Park for activities such as cycling along Ohio Drive,

1752 walking on trails, and picnicking along the waterfront. However, the adverse impacts to the park due to
1753 the loss of approximately 50 parking spaces would not cause disproportionately high adverse effects on
1754 EJ populations. This is because the affected parking lot is currently lightly used and there is plentiful
1755 parking elsewhere in the park, closer to the activities described above.

1756 The Preferred Option would provide a net benefit for EJ populations. The new connection would
1757 generally result in beneficial effects on transportation, and recreation and parks by creating a new
1758 crossing over the Potomac River for bicyclists and pedestrians, and indirect beneficial effects on social
1759 cohesion. This crossing would enhance access between communities on either side of the river; access
1760 between East Potomac Park, the GWMP, and Long Bridge Park; and access to the regional trail network.
1761 Minority or low-income persons would enjoy these benefits as much as the general population.

1762 **22.2.16.2. Temporary Effects**

1763 Constructing the Preferred Option would not cause any disproportionately high temporary adverse
1764 effects on EJ populations. None of the environmental impacts caused by construction would be
1765 disproportionately borne by minority or low-income persons, or disproportionately affect facilities or
1766 service of importance to such persons. Construction would not displace any persons.

1767 All temporary adverse effects would occur immediately adjacent to the railroad corridor. These areas
1768 immediately adjacent to the railroad corridor do not meet the thresholds used to identify areas of EJ
1769 concern. As noted above, local residents including EJ populations who live nearby make use of East
1770 Potomac Park and therefore may be affected by temporary impacts to the park, including use of surface
1771 parking for construction staging. However, the bulk of activities in East Potomac Park take place south of
1772 Buckeye Drive SW in areas that would not be adversely affected by construction. All users regardless of
1773 race, ethnicity, or socioeconomic status would experience the temporary impacts north of Buckeye
1774 Drive SW. Therefore, the Preferred Option would not cause disproportionately high adverse effects on
1775 EJ populations, and no further analysis was conducted.

1776 **22.2.16.3. Avoidance, Minimization, and Mitigation**

1777 Avoidance, minimization, and mitigation approaches for the Preferred Option would be similar to those
1778 for the Project (see **Chapter 20.6, Environmental Justice, Avoidance, Minimization, and Mitigation**).
1779 The Preferred Option would not cause disproportionately high adverse effects on EJ populations.
1780 Therefore, no avoidance, minimization, nor mitigation measures are warranted beyond those already
1781 described for other resources where direct and indirect effects on those resources are described
1782 (including **Section 22.2.5, Transportation and Navigation**; **Section 22.2.6, Air Quality and Greenhouse**
1783 **Gas Emissions**; and **Section 22.2.8, Land Use and Property**).