21.0 Cumulative Impacts

21.1. Introduction

The Long Bridge Project would result in direct and indirect effects to a range of resources, as described in prior sections. These effects can be beneficial or adverse. Some of the Long Bridge Project's impacts, whether minor or major, when combined with the effects of other past, present, or reasonably foreseeable future actions, may result in substantive effects to environmental or social (human) resources. These combined impacts are referred to as **cumulative impacts**.

Because this section evaluates the cumulative impacts for multiple resources, the structure of this chapter differs somewhat from the previous chapters that focused on impacts on a single resource category. Rather than documenting the affected environment, this chapter provides an overview of the resources evaluated, the geographic time span considered, and the past, present, and future actions included in the cumulative analysis (see **Section 21.2.2, Methodology**). This chapter discusses permanent or long-term cumulative effects for each relevant resource and then summarizes temporary cumulative effects by the category of cumulative action. **Chapter 24, Section 4(f) Evaluation**, shares a similar divergence from the standard chapter structure.

21.2. Regulatory Context and Methodology

This section describes the most pertinent regulatory context for evaluating cumulative impacts, and summarizes the methodology used to evaluate those impacts. **Appendix D1, Methodology Report**, provides the complete list of laws, regulations, and other guidance considered, and a full description of the analysis methodology followed for these resources.

21.2.1. Regulatory Context

The analysis provided in this chapter evaluates cumulative direct and indirect changes to the environment consistent with Council on Environmental Quality and other agency guidance documents:

- Considering Cumulative Effects Under the National Environmental Policy Act (NEPA)[1]
- Guidance on the Consideration of Past Actions in Cumulative Effects Analysis[2]
- Secondary and Cumulative Impact Assessment in the Highway Project Development Process[3]

[1] Council on Environmental Quality Executive Office of the President. 1997. *Considering Cumulative Effects Under the National Environmental Policy Act.* Accessed from https://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-ConsidCumulEffects.pdf. Accessed August 2, 2017.
[2] Council on Environmental Quality Executive Office of the President. 2005. *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis*. Accessed from https://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-PastActsCumulEffects.pdf. Accessed August 2, 2017.
[3] Federal Highway Administration. 1992. *Secondary and Cumulative Impact Assessment in the Highway Project Development Process*. Position Paper. Accessed from https://www.environment.fhwa.dot.gov/guidebook/content/Secondary_Cumulative_Impact_Assessmt.asp. Accessed June 7, 2017.

- Interim Guidance: Questions and Answers Regarding Indirect and Cumulative Impact Considerations in the NEPA Process[4]
- National Cooperative Highway Research Program (NCHRP) 25-25 Task 11: Indirect and Cumulative Impact Analysis[5]
- NCHRP Report 423A: Land Use Impacts of Transportation: A Guidebook[6]

21.2.2. Methodology

21.2.2.1. Resources Evaluated

For each resource area, the analysis summarizes impacts of other past, present, and reasonably foreseeable future projects without the Long Bridge Project and assesses the cumulative impacts including the Long Bridge Project. The analysis considers how impacts in one category (for example, traffic changes) might affect other categories (for example, air quality). Some resources would have negligible impacts from any of the Long Bridge Project alternatives, while most resources would have minor or moderate impacts.

21.2.2.2. Geographic Area and Time Span

The cumulative impacts analysis defines a time frame and geographic range for the evaluation, and accounts for changes from other projects within this time frame that contribute to cumulative effects on the resources. For most resources, the analysis evaluates prior changes for the period from 2007 to 2017. This period captures the end of the previous development boom and the post-recession development in the area. The analysis does not assess the cumulative impact of past actions on an individual basis but considers the aggregate effects of relevant past actions.[7] For each resource, the analysis considers future impacts in the time frame of the Planning Year (2040). Spatial boundaries for the analysis vary by resource, according to the specific characteristics of the resource, regulatory jurisdictions, and the availability of meaningful data.

For each resource, the analysis considered past changes to the selected resources that resulted from development trends or major projects within the Local Study Area defined for each resource area. These resource-specific Study Areas may differ from each other based on resource-specific concerns. The analysis based assumptions about future changes to the selected resources on historic or recent trends, or specific projects, including all reasonably foreseeable projects (those projects that are undergoing or have completed major environmental permitting actions or NEPA reviews) and projects programmed for construction.

[4] Federal Highway Administration. 2003. *Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process*. Accessed from https://www.environment.fhwa.dot.gov/guidebook/qaimpact.asp. Accessed June 7, 2017.
[5] Transportation Research Board. 2006. *NCHRP 25-25 Task 11: Indirect and Cumulative Impact Analysis*. Accessed from http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/25-25(11)_FR.pdf. Accessed August 8, 2017.
[6] Transportation Research Board. 1999. *NCHRP Report 423A: Land Use Impacts of Transportation: A Guidebook.*
[7] Transportation Research Board. 2006. *NCHRP 25-25 Task 11: Indirect and Cumulative Impact Analysis.* Accessed from http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/25-25(11)_FR.pdf. Accessed August 8, 2017.

The projects that may or have affected the same resources affected by the Long Bridge Project belong to three categories: transportation, private development, and park planning and development. **Figure 21-1** shows the resource-specific Local Study Areas used to identify these projects. **Section 21.2.3, Past, Present, and Reasonably Foreseeable Actions**, briefly describes each of these projects. The Local Study Areas are:

- Transportation (see **Chapter 9, Transportation and Navigation**) within 0.25 miles of the Long Bridge Corridor
- Private Development Projects (see **Chapter 12, Land Use and Property**) within 0.5 miles of the Long Bridge Corridor
- Parks (see **Chapter 16, Recreation and Parks**) within 0.25 miles of the Long Bridge Corridor

The cumulative impacts analysis did not identify a Regional Study Area because cumulative effects are focused on those areas where the impacts of the Long Bridge Project overlap with impacts of other past, present, and reasonably foreseeable future projects, and these impacts are captured within the Local Study Area.

Because most of the reasonably foreseeable projects identified as part of the cumulative scenario are in early planning stages and are at the conceptual design stage, effects to environmental resources have largely not been quantified. The cumulative impacts analysis therefore assessed the impacts of these projects qualitatively based on the presumed level of impact. If impacts have been identified in a NEPA document, the impact assessment that included that information was incorporated.

21.2.3. Past, Present, and Reasonably Foreseeable Actions

The analysis of cumulative impacts includes projects within the relevant Study Areas that are in the past, are currently under construction, or are reasonably foreseeable—in other words, projects that are planned or programmed for construction within the time frame of this analysis or which are likely to occur. In addition, the cumulative analysis considered projects with the potential for cumulative environmental effects with the Long Bridge Project.

21.2.3.1. Transportation and Infrastructure Projects

The cumulative scenario includes the existing transportation network, plus all proposed transportation and infrastructure projects by the planning year of 2040 within the transportation Local Study Area (0.25 miles of the existing Long Bridge Corridor). **Section 3.2.1, No Action Alternative**, describes these projects in detail (see **Table 21-1**).

Figure 21-1 | Local Study Areas Used to Identify Cumulative Actions

89 **Table 21-1** | Transportation Projects Included in the No Action Alternative

Project	Location	Description	Year Complete	Reference
RAILROAD PROJECTS				
Fourth Track from AF to RO Interlocking[1]	Arlington and Alexandria, VA	Add fourth track from AF to RO Interlocking, with associated improvements to RO Interlocking, as part of corridor-wide upgrades to support higher operating speeds.	2025	Washington, DC to Richmond Southeast High Speed Rail (DC2RVA) Final Environmental Impact Statement (FEIS) and Record of Decision (ROD)
Virginia Railway Express (VRE) L'Enfant Station Improvements	VRE L'Enfant Station (DC)	Create an island platform and allow for simultaneous boarding of two tracks at L'Enfant Station, and extend and widen platform to accommodate eight-car trains and a future fourth track.	2024	VRE Capital Improvement Plan (CIP)
L'Enfant North and South Storage Tracks	VRE L'Enfant Station (DC)	Convert existing side tracks at VRE L'Enfant Station to storage tracks while permanent Midday Storage Facility is under construction.	2019	VRE CIP
Fourth Track LE to Virginia (VA) Interlocking	12th Street Expressway to 3rd Street SW (DC)	Provide additional main track between VA and LE Interlocking in DC.	2023	VRE CIP
Virginia Avenue Tunnel[2]	Under Virginia Avenue between 2nd Street SE and 11th Street SE (DC)	Replace existing tunnel with two new tunnels to accommodate double-stack intermodal freight trains.	2018	Virginia Avenue Tunnel FEIS and ROD
ROADWAY PROJECTS				
Boundary Channel Drive Interchange	Boundary Channel Drive/I-395 Interchange in Arlington, VA	Redesign and reconstruction of Long Bridge Park Drive interchange with I-395 and Boundary Channel Drive to increase safety and better accommodate multimodal transportation.	2021	Arlington County CIP

[1] "AF" and "RO" are the proper names of the interlockings. They are not acronyms.
[2] The Virginia Avenue Tunnel is not within the Local Study Area, but directly relates to the operations and infrastructure of the corridor and therefore was included as part of the No Action Alternative Infrastructure.

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In addition to the transportation projects listed in **Table 21-1**, the cumulative impacts analysis includes the following projects that lie just outside the 0.25-mile Local Study Area:

- The **Washington, DC Optimization of Airspace and Procedures in the Metroplex (DC OAPM)** project involved implementing optimized air traffic control procedures that standardize aircraft routing to and from airports in the Washington Metropolitan Region, including Ronald Reagan Washington National Airport.[8] Planes traveling to and from the airport cross the Local Study Area and contribute to cumulative impacts on soundscapes.
- The **Potomac River Tunnel** project will include construction of a tunnel and supporting infrastructure to provide control for seven combined sewage overflow (CSO) outfalls along the Potomac River. With this project, instead of being discharged directly to the river, the captured combined sewage would be stored and conveyed to a treatment facility.[9]
- The **Potomac Yard Metrorail Station** project will construct a new Metrorail station at Potomac Yard, including tracks, a new platform, and pedestrian bridges. This project is located just south of the Local Study Area in Alexandria and will have visual and property impacts to the George Washington Memorial Parkway (GWMP).[10]
- The **VRE Crystal City Station Improvements** project will construct a longer platform at the VRE Crystal City station, to be served by two tracks (currently the station is served by a single track). If construction of this project were to occur concurrently with the Long Bridge Project, coordination would be required.[11]

21.2.3.2. Private Development Projects

Due to the rapidly evolving nature of land use within the Local Study Area, assessing potential land use impacts requires a baseline understanding of anticipated land use changes by the Long Bridge Project's 2040 opening date. The analysis based assumptions about future land use on local planning guidance in the District and Arlington County, as well as ongoing and future development projects currently under construction or in the planning stages. **Figure 12-4** in **Chapter 12, Land Use and Property**, and **Appendix D2, Affected Environment Report**, show planned future land use in Arlington County and the District.

Table 21-2 summarizes 16 recently completed and reasonably foreseeable development projects within the Study Area for land use as of October 2018. Several projects are in early planning stages and the exact land use and size of the development is still to be determined. This table is not an exhaustive list of private development taking place within the Local Study Area for land use (0.5 miles of the existing Long Bridge Corridor); however, it provides context for the large-scale redevelopment taking place as part of the cumulative scenario for the Long Bridge Project.

[8] Federal Aviation Administration. 2013. *Draft Environmental Assessment for Washington, D.C. Optimization of Airspace and Procedures in the Metroplex*. Accessed from http://www.metroplexenvironmental.com/dc_metroplex/dc_docs.html. Accessed October 24, 2018.
[9] National Park Service. 2018. *DC Clean Rivers Project, Potomac River Tunnel Environmental Assessment*. Accessed from https://parkplanning.nps.gov/documentsList.cfm?projectID=50548. Accessed May 15, 2019.
[10] City of Alexandria. 2019. *Potomac Yard Metrorail Station Project*. Website. Accessed from https://www.alexandriava.gov/PotomacYardMetro. Accessed July 23, 2019.
[11] Virginia Railway Express. 2018. *Crystal City Station Improvements*. Website. Accessed from https://www.vre.org/development/station-improvements/crystal-city-station-improvements/. Accessed July 23, 2019.

Table 21-2 | Reasonably Foreseeable Development Projects in Local Study Area

Project Name	Location	Project Status	Land Use/Size
1770 Crystal Drive Expansion	Arlington County	Planning	Office: 11,642 square feet (sf)
The Altaire	Arlington County	In Construction	Residential: 453 units
Boeing Site (Phase II)	Arlington County	Planning	Office: 131,338 sf
Potomac Yard – Land Bay C (National Gateway 3-4-5-6)	Arlington County	Planning	Office: 1,064,298 sf Retail: 4,1325 sf
Amazon's HQ2	Arlington County	Planning	TBD
Waterfront Station West/East Residential Towers	Washington, DC	Completed 2014	Residential: 424 units
400 E Street SW (Parcel 69)	Washington, DC	Completed 2015	Retail: 1,200 sf Hotel: 143,800 sf Municipal: 17,750 sf
450 6th Street SW (Old Engine Co 13)	Washington, DC	In Construction	Retail: 13,000 sf Residential: 160 units Hotel: 95,000 sf
The Wharf (SW Waterfront) Phase I	Washington, DC	Completed 2015	Office: 465,000 sf Retail: 205,000 sf Residential: 841 units Hotel: 441,500 sf Municipal: 140,000 sf
The Wharf (SW Waterfront) Phase II	Washington, DC	Planning	Office: 531,590 sf Retail: 88, 613 sf Residential: 486,502 sf Hotel: 82,516 sf
Waterfront Station – Eliot on 4th	Washington, DC	In Construction	Retail: 5,000 sf Residential: 365 units
Waterfront Station II	Washington, DC	Planning	Retail: 30,000 sf Residential: 443 sf
500 L'Enfant Plaza	Washington, DC	In Construction	Office and Conference Center: 20,000 sf Green space: 70,000 sf
The Portals Residential Tower (Portals V)	Washington, DC	In Construction	Residential: 373 units
Riverside Baptist Church Redevelopment	Washington, DC	Planning	Retail: 9,100 sf Residential: 170 units Church space: TBD
Spy Museum at L'Enfant Plaza Complex	Washington, DC	In Construction	Museum space: 140,000 sf

Sources: DC Office of Planning, the DC Department of Consumer and Regulatory Affairs, the DC Office of Zoning, the DC Zoning Commission, the DC Board of Zoning Adjustment, the DC Office of the Deputy Mayor for Planning and Economic Development, the Southwest Business Improvement District, Arlington County, and the local Advisory Neighborhood Commissions

In November 2018, Amazon announced they had selected National Landing in Arlington as the site of one of its new East Coast headquarters.[12] The headquarters will eventually bring more than 25,000 jobs

[12] Arlington County. "Northern Virginia's National Landing Selected for Major New Amazon Headquarters." November 13, 2018. Accessed from https://www.arlingtoneconomicdevelopment.com/resources/news/news-releases/northern-virginias-national-landing-selected-for-major-new-amazon-headquarters/. Accessed December 20, 2018.

to Crystal City and Pentagon City. The new headquarters will not change future land use plans in the Local Study Area. As stated in the proposal for the new headquarters, "all buildings, existing or proposed, are fully master plan approved, with all zoning in place."[13]

Projects taking place in a heavily developed urban environment are typically redevelopment of previously disturbed sites. Therefore, the analysis of cumulative impacts below presumes the following:

- These developments would not cause any noticeable increase in impervious surface,
- They would take place in a way consistent with existing plans, and
- They would not cause any other substantial impacts on natural and cultural resources beyond those described in the sections below.

21.2.3.3. Park Planning and Development

Park lands of various ownership comprise a substantial portion of the land surrounding the Long Bridge Corridor. Several park projects have the potential to contribute impacts to the cumulative scenario. The sections below describe these past, present, and reasonably foreseeable future actions related to park planning and development that are located both in Arlington County and the District.

Long Bridge Park Development

Long Bridge Park, located on the north end of Crystal City in Arlington County, consists of 30 acres of recreation and open space. Arlington County completed Phase I in 2011, which included environmental remediation, utilities installation, and construction of three full-sized athletic fields, the first section of the Esplanade, picnic groves, rain gardens, and walkways. Phase II, currently underway, will include construction of the 120,420-square-foot aquatics and fitness center. This phase will also include the development of another 10.5 acres of park land, including the extension of the Esplanade, rain gardens, public gathering areas, parking, and support spaces.

Dwight D. Eisenhower Memorial

The Dwight D. Eisenhower Memorial is under construction along Independence Avenue SW at its intersection with Maryland Avenue SW. Designed by renowned architect Frank Gehry, this memorial will be a 4-acre urban park off the National Mall. The memorial is anticipated to be completed and dedicated in 2020.

[13] *Innovation Lives Here: Northern Virginia Amazon HQ2 Submission,* p. 208. 2017. Accessed from https://hqnova.com/downloads.html. Accessed December 20, 2018.

Benjamin Banneker Park Connection

In 2017, the National Park Service (NPS), in cooperation with the National Capital Planning Commission (NCPC), and in collaboration with the District and Hoffman-Madison Waterfront, constructed a connection at Benjamin Banneker Park that includes a stairway and Architectural Barriers Act Accessibility Standard (ABAAS)-compliant ramp to provide universal accessibility between 10th Street SW and Maine Avenue SW, along the Southwest Waterfront.

NPS National Capital Region Campus Renovation Project and Park Police District 1 Substation

NPS is undertaking a project to renovate the existing National Capital Region (NCR) buildings and construct a new U.S. Park Police (USPP) building on the NCR campus within East Potomac Park. This project will include renovating the existing NCR building, which will be reused as a shared building for both NCR and USPP. The existing temporary trailers will be removed. The existing USPP building will be renovated and reused for the National Mall and Memorial Parks (NAMA) headquarters. A new 13,000-square-foot facility for the USPP District 1 police station will be constructed within the footprint of the existing surface parking area, which will be reconfigured to include secure parking for police cruisers. Construction for the NCR campus renovation has not yet started, but the USPP District 1 police station is currently under construction.

Arlington County and Vicinity Boathouse

NPS is undertaking a project to create a public rowing and paddling facility along the Virginia shoreline of the Potomac River. Part of this project would include a soft launch point for paddlecraft at Roaches Run. A short, floating dock would be installed and existing riprap would be removed. An existing road would be used for pedestrian access and would connect to an existing parking area to minimize disturbance.

21.3. Permanent or Long-Term Effects

The following sections define the impacts of other past, present, and reasonably foreseeable future actions and describe the contribution of the Long Bridge Project to the overall permanent cumulative effect. If the Long Bridge Project does not have the potential to have a direct or indirect impact on a resource, the potential for cumulative impacts on that resource does not exist.

For both Action Alternatives, there would be no cumulative impact for the following resources areas (for more detail, see **Appendix D3, Environmental Consequences**):

- **Environmental Justice:** Minority or low-income persons would not disproportionately bear the environmental impacts of Action Alternative A or B, nor would the Action Alternatives disproportionately affect facilities or service of importance to such persons. Completion of Action Alternative A and Action Alternative B would not displace any persons. Therefore, there would be no cumulative impact associated with Environmental Justice.
- **Recreation and Parks:** Neither Action Alternative would result in permanent impacts on most of the park and recreation resources within the Local Study Area, as discussed in **Chapter 16, Recreation and Parks**. Therefore, there would be no permanent cumulative impacts on those

resources. The following cumulative impact analyses are for the four park resources on which the Action Alternatives would result in permanent impacts:

- **Long Bridge Park:** Action Alternatives A and B would result in negligible adverse impacts on Long Bridge Park due to the widened railroad right of way. However, the affected area is a wooded area unused by the public. The Long Bridge Park Development project footprint would not overlap with the Action Alternatives footprint and would not impact the same park and recreation resources. Therefore, there would be no cumulative impacts on Long Bridge Park.
- **George Washington Memorial Parkway (GWMP):** Action Alternatives A and B would both result in moderate direct adverse impacts to the GWMP. The Potomac Yard Metrorail Station Project, approximately 2.8 miles to the south, would also impact a portion of the GWMP. However, given the relatively small area impacted by each project and the distance between them, there would be no cumulative impacts on the GWMP. Additional discussion of the cumulative impacts to the visual and cultural resource of the GWMP is below.
- **Mount Vernon Trail (MVT):** No other past, present, or reasonably foreseeable actions were identified that would result in impacts on the MVT. Therefore, there would be no cumulative impacts on MVT.
- **East Potomac Park:** Although the NPS National Capital Region Campus Renovation is taking place within East Potomac Park, its footprint is confined to the existing campus and surface parking areas and does not overlap with any recreational resources. No other past, present, or reasonably foreseeable actions were identified that would result in impacts on the same elements of East Potomac Park that would be affected by the Long Bridge Project. Therefore, there would be no cumulative impacts on East Potomac Park.

The majority of other past, present, and reasonably foreseeable future actions would take place within portions of the Study Area that are already highly developed. For both Action Alternatives, the cumulative impact would be negligible to minor for the following resources areas (for more detail, see **Appendix D3, Environmental Consequences**):

- **Natural Ecological Systems and Endangered Species**: Some limited vegetation removal may take place for modified footprints or new development. Given the already developed nature of the Local Study Area, the cumulative impacts would not affect the function or integrity of wildlife habitat, resulting in a minor impact.
- **Water Resources and Water Quality:** Most other past, present, and reasonably foreseeable future actions would take place within the already developed portion of the Local Study Area, and therefore would not affect wetlands and waters of the United States. The Potomac River Tunnel project would result in long-term beneficial impacts on water quality of the Potomac River. Projects would adhere to local and state regulations related to construction in floodplains and Chesapeake Bay Preservation Areas. Therefore, these projects would not cause cumulative impacts to these resources. These projects would add impervious surface. However, outside of parklands, the existing ground cover consists of substantial amounts of impervious surface. As a

result, other actions would have negligible long-term adverse impacts on groundwater quantity through the reduction in groundwater recharge. If designed in accordance with the District Department of Energy and Environment *Stormwater Management Guidebook* or the Arlington County *Stormwater Manual*,[14] best management practices (BMPs) would provide the prescribed recharge volume to mitigate any long-term adverse impacts to groundwater quantity. Similarly, overland surface water quality would be maintained through implementation of BMPs. Therefore, the cumulative impacts would not affect the function or integrity of water resources or water quality, resulting in a minor impact.

- **Geologic Resources:** Other past, present, and reasonably foreseeable future projects may require some earthwork and foundation installation. When combined with the earthwork and foundations required for the new structures as well as due to the potential soil loss following construction, the cumulative impacts would not affect the function or integrity of geologic resources, resulting in a minor impact.

- **Solid Waste and Hazardous Materials:** Other past, present, and reasonably foreseeable future actions have the potential to generate solid waste during construction and long-term operation, and railroad developments are likely to require disposal of potentially contaminated soils. The Long Bridge Park development had a beneficial impact on hazardous materials due to the associated remediation of the brownfield site on which it is located. Overall, the permanent impacts of Action Alternatives A and B when combined with these projects would not affect the function or integrity of the resource, resulting in a minor cumulative impact on waste disposal and hazardous materials.

- **Air Quality and Greenhouse Gases (GHG):** Other past, present, and reasonably foreseeable future actions have the potential to increase pollutant and GHG emissions. Combined with the minor impacts to air quality and GHG emissions from Action Alternatives A and B, these impacts would not change the integrity of the resource. Therefore, the cumulative impacts would be minor.

- **Energy:** The combined effect of increased energy demand of the Long Bridge Project, increased railroad operations under other transportation projects, and new buildings under other private development and park development projects would result in a minor cumulative impact on energy. While the increased demand would be noticeable, it could be accommodated by the regional energy supply network.

- **Land Use and Property:** Other past, present, and reasonably foreseeable future actions may cause negligible to minor changes in land use due to acquisition for railroad right-of-way. The permanent impacts of Action Alternatives A and B when combined with these impacts would result in an overall minor cumulative impact.

- **Public Health, the Elderly, and Persons with Disabilities**: New private development would meet current accessibility standards, which may result in beneficial impacts on persons with disabilities, particularly if it improves access over the existing infrastructure. The Benjamin Banneker Park Connection resulted in beneficial impacts due to the ABAAS-compliant ramp that

[14] Arlington County Department of Environmental Services. *Stormwater Manual: A Guide to Stormwater Requirements for Land Disturbing Activities in Arlington County.* January 2015. Accessed from http://arlingtonva.s3.amazonaws.com/wp-content/uploads/sites/21/2014/06/DES-Stormwater-Management-Ordinance-Guidance-Manual.pdf. Accessed January 12, 2018.

provides universal accessibility between 10th Street SW and Maine Avenue SW. Combined with the beneficial impacts due to the new pedestrian bridge at Maine Avenue SW being fully accessible, this would cause a minor beneficial impact on persons with disabilities.

The sections below describe resources for which cumulative impacts would be greater than minor.

21.3.1. Transportation and Navigation

21.3.1.1. Action Alternative A (Preferred Alternative)

Impact from Long Bridge Project: As described in **Chapter 9, Transportation and Navigation**, Action Alternative A would result in a range of permanent impacts on a variety of transportation-related resources. Action Alternative A would result in major beneficial direct impacts due to increased capacity for railroad operations, including railroad-based transit service. Action Alternative A would also result in moderate adverse direct impacts related to removal of approximately 50 public parking spaces at the NPS Parking Lot C and approximately one-third of the parking spaces at the Washington Marina parking lot. Action Alternative A would result in no permanent impacts on navigation because the new bridge structure would provide 20 feet above mean high water in vertical clearance, more than the 18 feet provided by existing Long Bridge.

Impacts from Past, Present, and Reasonably Foreseeable Future Actions: Other past, present, and reasonably foreseeable future actions that have the potential to result in permanent impacts on transportation and navigation include transportation projects, private development, the NPS NCR Campus Renovation Project and USPP District 1 Substation, and the Benjamin Banneker Park Connection. Planned railroad projects would increase capacity for railroad and Metrorail operations (including railroad-based transit service), which would be a beneficial direct impact. The roadway and multimodal projects would have moderate beneficial direct impacts on the pedestrian and bicycle network within the Local Study Area due to the enhanced pedestrian and bicycle connections and would improve roadway safety.

The renovation project at the NPS NCR headquarters has the potential to result in negligible adverse impacts on parking due to the reconfiguration of the existing surface parking area, which may reduce the overall number of parking spaces available. Private development in the area may increase both the availability of and demand for parking within the Local Study Area. It is uncertain how this may affect the cumulative transportation scenario; however, it is possible that some of the new developments may provide parking that could offset some of the parking lost during construction of the Proposed Action. Private development also has the potential to cause construction-related detours of pedestrian, bicycle, and roadway networks.

Cumulative Impact: The permanent impacts of Action Alternative A when combined with the permanent impacts of other past, present, and reasonably foreseeable future projects would result in an overall moderate beneficial cumulative impact on transportation and navigation.

21.3.1.2. Action Alternative B

Action Alternative B would cause the same permanent impacts as Action Alternative A, as discussed in **Chapter 6, Transportation and Navigation**. Therefore, the cumulative impact would be the same as discussed under Action Alternative A.

21.3.2. Noise and Vibration

21.3.2.1. Action Alternative A (Preferred Alternative)

Impact from Long Bridge Project: As discussed in **Chapter 13, Noise and Vibration**, Action Alternative A would result in moderate to major direct adverse impacts due to the close proximity of proposed railroad tracks to several receptor locations and due to the expected increase in train operations through the Corridor. The increased noise level would exceed the FTA moderate noise criteria at two locations and would exceed the FTA severe noise criteria at three locations. There would be no vibration impacts resulting from Action Alternative A because the overall vibration levels would not exceed the FTA General Vibration Assessment criteria and because the vibration spectra would not exceed the FTA Detailed Vibration Assessment criteria, as discussed in **Chapter 13.4.2, Vibration.** Therefore, there would be no cumulative impact related to vibration.

Impacts from Past, Present, and Reasonably Foreseeable Future Actions: Other past, present, and reasonably foreseeable future actions that have the potential to affect noise include the DC OAPM project. The DC OAPM project has resulted in altered flight paths to and from Ronald Reagan National Airport, which has increased noise levels related to air traffic within the Local Study Area.[15]

Cumulative Impact: The permanent impacts of Action Alternative A when combined with the permanent impacts of other past, present, and reasonably foreseeable future projects would result in an overall moderate to major adverse cumulative impact on noise. This is because of the cumulative increase in noise from Action Alternative A and the DC OAPM project. There would be no cumulative impact related to vibration.

21.3.2.2. Action Alternative B

Action Alternative B would cause the same permanent impacts as Action Alternative A, as discussed in **Chapter 13, Noise and Vibration**. Therefore, the cumulative impact would be the same as discussed under Action Alternative A.

21.3.3. Aesthetics and Visual Resources

21.3.3.1. Action Alternative A (Preferred Alternative)

Impact from Long Bridge Project: As discussed in **Chapter 14, Aesthetics and Visual Resources**, Action Alternative A would cause negligible to moderate adverse direct impacts on aesthetics and visual resources due to the addition of a new bridge and the removal of trees and mature vegetation within the viewshed. The negligible to minor direct impacts would occur in areas where viewers see Long

[15] Federal Aviation Administration. 2013. Draft Environmental Assessment for Washington, D.C. Optimization of Airspace and Procedures in the Metroplex. Accessed from http://www.metroplexenvironmental.com/dc_metroplex/dc_docs.html. Accessed October 24, 2018.

Bridge from a distance or where vegetation or other structures screen it from view. The moderate direct impacts would occur in areas where Long Bridge is closer to the viewer or where it is highly visible. There would be no impacts on nighttime conditions because the light emissions from the new bridge would be negligible.

Impacts from Past, Present, and Reasonably Foreseeable Future Actions: Other past, present, and reasonably foreseeable future actions that have the potential to affect aesthetics and visual resources include transportation projects, private development projects, and park planning and development. All of these actions have the potential to introduce new structures into the viewshed of the Long Bridge Project. In particular, the Long Bridge Park Development project would introduce a new large building into what was previously an open area. The Potomac Yard Metrorail Station would introduce new visual elements and remove vegetation, which would alter the views from GWMP. Similarly, the Potomac River Tunnel project would introduce new visual elements to East and West Potomac Parks. Additionally, the Wharf Phase I and Phase II projects have and will introduce new multi-story buildings along the Southwest Waterfront, which affects views from the GWMP, the Potomac River, and East Potomac Park. Specific impacts of other projects would depend on the design and location of specific developments. Given the highly developed nature of the area, the introduction of new structures within the viewshed would result in negligible to minor adverse direct impacts on aesthetics and visual resources.

Cumulative Impact: The permanent impacts of Action Alternative A when combined with the permanent impacts of other past, present, and reasonably foreseeable future projects would result in an overall minor adverse cumulative impact, given the highly developed nature of the area.

21.3.3.2. Action Alternative B

Impact from Long Bridge Project: As discussed in **Chapter 14, Aesthetics and Visual Resources**, Action Alternative B would cause similar impacts related to the new bridge as described under Action Alternative A. However, Action Alternative B would cause additional impacts from the removal of the existing Long Bridge and its replacement with a bridge of a different appearance. These changes in the viewshed would cause moderate adverse direct impacts because they would remove the historic bridge, which is also a visual landmark, and replace it with a bridge lacking the truss and arched substructure of the existing bridge. However, removing the exiting truss would open up views to the Monumental Core, which would be a minor beneficial direct impact on those views.

Impacts from Past, Present, and Reasonably Foreseeable Future Actions: Other past, present, and reasonably foreseeable future actions that have the potential to affect aesthetics and visual resources include transportation projects, private development projects, and park planning and development. All these actions have the potential to introduce new structures into the viewshed of the Long Bridge Project. Given the highly developed nature of the area, the introduction of new structures within the viewshed would result in negligible to minor adverse direct impacts on aesthetics and visual resources.

Cumulative Impact: The permanent impacts of Action Alternative B when combined with the permanent impacts of other past, present, and reasonably foreseeable future projects would result in an overall moderate cumulative impact, given the highly developed nature of the area.

21.3.4. Cultural Resources

21.3.4.1. Action Alternative A (Preferred Alternative)

Impact from Long Bridge Project: As discussed in **Chapter 15, Cultural Resources**, Action Alternative A would cause negligible to moderate permanent impacts on cultural resources due to the alteration of historic character and views from the addition of a new bridge structure and the removal of contributing vegetation. Action Alternative A would cause negligible adverse direct impacts on the Richmond, Fredericksburg and Potomac (RF&P) Railroad Historic District and the National Mall Historic District. Moderate adverse direct impacts would occur on the GWMP, the Mount Vernon Memorial Highway (MVMH), and the East and West Potomac Parks historic districts due to the removal of contributing vegetation and introduction of new railroad infrastructure within the boundaries of the historic district. Action Alternative A would cause negligible adverse impacts on cultural resources because the new bridge structures would be visible but would not diminish the integrity of contributing resources.

Impacts from Past, Present, and Reasonably Foreseeable Future Actions: Other past, present, and reasonably foreseeable future actions that have the potential to affect cultural resources include transportation projects, private development projects, and park planning and development projects. These projects all have the potential to cause changes to the historic setting and viewsheds of cultural resources within the Area of Potential Effect by introducing new structures, removing vegetation, or otherwise altering features near these resources. The Potomac Yard Metrorail Station would introduce non-historic visual elements and remove vegetation within the historic viewshed of the GWMP Historic District. These new non-historic elements would impact the integrity of the designed historic landscape and degrade the scenic quality and contemplative experience for travelers in this area. The Potomac River Tunnel project would introduce non-historic elements into the East and West Potomac Parks Historic District cultural landscape. The Wharf Phase I and Phase II projects have and will introduce new buildings along the Southwest Waterfront, which would alter the historic viewshed of East Potomac Park. The Benjamin Banneker Park Connection project added a new stairway and pathway and removed a section of Japanese yew vegetation, which is partially visible from the Local Study Area. Specific impacts of other reasonably foreseeable future projects would depend on the design and location of these projects. Given the highly developed nature of the area, these actions would cause negligible to minor impacts on cultural resources.

Cumulative Impact: The permanent impacts of Action Alternative A when combined with the permanent impacts of other past, present, and reasonably foreseeable future projects would result in an overall minor adverse cumulative impact, given the highly developed nature of the area.

21.3.4.2. Action Alternative B

Impact from Long Bridge Project: As discussed in **Chapter 15, Cultural Resources**, Action Alternative B would cause the same permanent impacts on the RF&P Railroad Historic District and the National Mall Historic District as Action Alternative A. However, Action Alternative B would also cause major adverse direct impacts on the GWMP, the MVMH, and the East and West Potomac Parks Historic District by removing the existing Long Bridge, which is a contributing resource, and removing additional contributing vegetation. Action Alternative B would cause the same adverse impacts as Action Alternative A for the RF&P Railroad, East and West Potomac Park, and the National Mall historic districts. However, it would cause moderate adverse impacts on the GWMP and MVMH historic districts

because removing the existing Long Bridge and truss would diminish the integrity of setting and association of these cultural resources.

Impacts from Past, Present, and Reasonably Foreseeable Future Actions: Other past, present, and reasonably foreseeable future actions that have the potential to affect recreation and parks include transportation projects, private development projects, and park planning and development projects. These impacts are discussed under Action Alternative A above. Specific impacts would depend on the design and location of these projects; however, given the highly developed nature of the area, these actions are likely to result in negligible to minor impacts on cultural resources.

Cumulative Impact: The permanent impacts of Action Alternative B when combined with the permanent impacts of other past, present, and reasonably foreseeable future projects would result in an overall moderate cumulative impact, given the highly developed nature of the area.

21.3.5. Safety and Security

21.3.5.1. Action Alternative A (Preferred Alternative)

Impact from Long Bridge Project: As described in **Chapter 17, Safety and Security**, Action Alternative A would cause permanent, moderate beneficial direct impacts on railroad operational safety due to the redundancy provided by the new tracks. Although a new bridge would add a new piece of critical infrastructure that would require local, regional, and Federal agencies to update safety, security, and emergency management plans, these adverse impacts would be negligible.

Impacts from Past, Present, and Reasonably Foreseeable Future Actions: Other past, present, and reasonably foreseeable future actions that have the potential to affect safety and security include other railroad projects. The fourth track from AF to RO interlocking, the fourth track from L'Enfant (LE) to Virginia (VA) interlocking, and the Virginia Avenue tunnel all provide redundancy in railroad infrastructure, a major benefit to railroad and safety operations within the Local Study Area.

Cumulative Impact: The permanent impacts of Action Alternative A when combined with the permanent impacts of other past, present, and reasonably foreseeable future projects would result in a moderate beneficial cumulative impact on safety and security.

21.3.5.2. Action Alternative B

As discussed in **Chapter 17, Safety and Security**, Action Alternative B would result in the same permanent impacts as described under Action Alternative A. Therefore, the cumulative impact would be the same as discussed under Action Alternative A.

21.4. Temporary Effects

This section defines the cumulative construction impacts and describes the contribution of the Long Bridge Project to the overall temporary cumulative effect. The duration of construction under Action Alternative B would be approximately 3 years and 3 months longer than under Action Alternative A. Although this would extend the duration of construction impacts, it would not change the intensity of the cumulative impact. Therefore, the temporary cumulative impacts would be the same for both Action Alternatives A and B.

As outlined above in **Section 21.2.3.1, Transportation Projects**, several other major railroad infrastructure projects to the north and south of the Long Bridge Corridor are in the planning phase. While the timing of construction depends on numerous factors including funding, these projects may advance to construction around the same time as the Long Bridge Project. Because this and other major railroad infrastructure projects in the planning phase are yet to be funded, it is unknown if concurrent construction would be possible. The Long Bridge Project may be constructed at separate times from these other projects. To the extent that construction timing for these projects overlaps, coordination between projects would be essential to best manage operational outages and construction staging.

Construction of other development and infrastructure projects, as well as roadway maintenance such as repaving projects, may occur at the same time as the Long Bridge Project. It is likely that construction for The Wharf Phase II would be completed before construction for the Long Bridge Project begins. For the NPS NCR Campus Renovation Project, the timeline for the start of construction is unclear at this time. Thus, renovation of the NPS NCR Campus could overlap with construction of the Long Bridge Project. For the other reasonably foreseeable projects, construction staging and access would not occur near the major staging and access areas for the Long Bridge Project.

21.4.1. Resources with No Cumulative Temporary Effects

If construction were to occur concurrently with construction of the projects described above, either Action Alternative would result in no potential cumulative effects for the resources described below.

- **Recreation and Parks:** Four reasonably foreseeable future actions (the Long Bridge Park Aquatics and Fitness Facility and Park Expansion, the Potomac Yard Metrorail Station, the NPS NCR Campus Renovation, and the VRE L'Enfant Station Improvements) would likely have temporary impacts in parks that would also be affected by construction of the Long Bridge Project. However, no cumulative effects to park resources are anticipated for the reasons described below.
    - **Long Bridge Park:** The Action Alternatives would require a construction access and staging area within Long Bridge Park, near the construction of the Long Bridge Park Aquatics and Fitness Facility and Park Expansion. Because the facility has started construction, it is unlikely that construction timelines would be concurrent. In addition, the overlap in construction areas would occur in an area of the park that is currently undeveloped and unused by park visitors. Therefore, there would be no cumulative impacts on Long Bridge Park.
    - **GWMP:** The Potomac Yard Metrorail Station would make use of 0.25 to 0.42 acres of the GWMP and 2.86 to 3.09 acres of the Greens Scenic Area Easement for construction staging and laydown areas associated with construction. Construction vehicles would not use the GWMP for access. A design-build contract has been awarded for station construction; therefore, it is likely that construction timelines would be concurrent. In addition, given the relatively small area impacted by each project and the distance between them, there would be no cumulative impacts on the GWMP.
    - **East Potomac Park:** Although the NPS NCR Campus Renovation is taking place within East Potomac Park, its footprint is confined to the existing campus and

surface parking areas and does not overlap with any recreational resources. No other past, present, or reasonably foreseeable actions were identified that would result in impacts on the same recreational resources of East Potomac Park that would be affected by construction of the Long Bridge Project. Therefore, there would be no cumulative impacts on East Potomac Park.

- **Hancock Park:** The VRE L'Enfant Station Improvements will require access to the railroad right-of-way and therefore may make use of the same access point from Hancock Park as planned for the Action Alternatives. However, even if construction of the two projects were to overlap, equipment would make use of the same access point and would not be expected to require additional areas of the park.

- **Environmental Justice:** Minority or low-income persons would not disproportionately bear the temporary environmental impacts of Action Alternative A or B, nor would the Action Alternatives disproportionately affect facilities or services of importance to such persons. Construction of Action Alternative A and Action Alternative B would not displace any persons. Therefore, there would be no cumulative temporary impact associated with Environmental Justice.

21.4.2. Resources with Negligible to Minor Cumulative Temporary Effects

If construction were to occur concurrently with construction of the projects described above, either Action Alternative could result in the potential negligible to minor cumulative effects described below.

- **Natural Ecological Systems and Endangered Species**: The temporary impacts of either Action Alternative when combined with the temporary impacts of other past, present, and reasonably foreseeable future projects could result in an overall minor adverse cumulative impact on natural ecosystems and endangered species due to limited vegetation removal that may be required for construction access and staging.

- **Water Resources and Water Quality:** The temporary impacts of either Action Alternative when combined with the temporary impacts of other past, present, and reasonably foreseeable future projects could result in an overall minor adverse cumulative impact on water resources and water quality due to impacts on Chesapeake Bay Preservation Areas, a small loss of flood storage within the floodplain, increased sedimentation, and increased stormwater runoff caused by land disturbance.

- **Geologic Resources:** The temporary impacts of either Action Alternative when combined with the temporary impacts of other past, present, and reasonably foreseeable future projects could result in an overall minor adverse cumulative impact on geologic resources due to temporary disturbance of existing vegetation during earthwork activities and potential for soil erosion during construction activities.

- **Solid Waste Disposal and Hazardous Materials:** The temporary impacts of either Action Alternative when combined with the temporary impacts of other past, present, and reasonably foreseeable future projects could result in an overall minor adverse cumulative impact on solid waste disposal and hazardous materials due to the generation of solid waste during construction and disposal of potentially contaminated materials.

- **Air Quality and Greenhouse Gases:** Construction activities have the potential to cause increases in emissions from on-site diesel equipment, increased truck traffic to and from the construction site on local roadways, and fugitive dust. When combined, the construction activities from either Action Alternative and other past, present, and reasonably foreseeable future projects could result in an overall minor adverse cumulative impact on air quality and greenhouse gas emissions.

- **Energy:** The temporary impacts of either Action Alternative when combined with the temporary impacts of other past, present, and reasonably foreseeable future projects could result in an overall minor adverse cumulative impact on energy consumption due to the additional energy and fuel needed to operate construction equipment and vehicles.

- **Land Use and Property:** Construction of either Action Alternative and other past, present, and reasonably foreseeable future projects may require construction staging and access in the same area. To the extent that construction of these projects occurs concurrently, multiple properties could be affected, resulting in minor cumulative impacts to land use and property. If construction occurs sequentially, the projects may be able to use some areas already disturbed by a previous project for construction staging. While this would reduce the potential for cumulative impacts from multiple staging areas, it would also increase the amount of time any one parcel is in use for construction, potentially creating a minor cumulative impact.

- **Noise and Vibration:** Noise and vibration due to construction of most of the other reasonably foreseeable future projects would impact different receptors than those affected by either Action Alternative and would therefore have no potential for cumulative impacts. For receptors that could be affected by the Action Alternatives and other projects, the potential for cumulative impacts is described below.

    - **Long Bridge Park:** Either Action Alternative would have noise impacts for park users at the northern end of Long Bridge Park. While this area could also be affected by noise from construction of the Long Bridge Park Aquatics and Fitness Center and Park Expansion, park users would not make use of that portion of the park until the aquatics center project is complete. Therefore, there is no potential for cumulative noise impacts.

    - **East Potomac Park:** Either Action Alternative would have noise impacts for park users in East Potomac Park, as well as for office workers at the NPS NAMA Headquarters building. Combined with noise impacts due to construction activities for the renovation of the NPS NCR Campus, the Action Alternatives could have minor cumulative noise impacts to these receptors.

    - **Buildings between Maine Avenue SW and Hancock Park:** Either Action Alternative would have noise impacts to people in the buildings along the railroad corridor between Maine Avenue SW and Hancock Park. Combined with noise impacts due to construction activities for the VRE L'Enfant Station Improvements, the Action Alternatives could have minor cumulative noise impacts to receptors between Hancock Park and LE Interlocking.

- **Aesthetics and Visual Resources:** Either Action Alternative would cause disruptions to visual coherence from fencing, vehicles, and structures within the Local Study Area. In park and

landscaped areas, such as Long Bridge Park and GWMP, there would be a disruption to the natural harmony of these areas due to the removal of vegetation for construction. Some views within the Local Study Area would be altered and possibly partially obscured due to construction activities. Construction activities for reasonably foreseeable future actions also have the potential to alter or possibly obscure views within the Local Study Area. To the extent that construction activities for either Action Alternative and these other projects would occur within the same viewshed, they would likely result in minor cumulative impacts on aesthetics and visual resources given the highly developed nature of the area.

- **Cultural Resources:** Either Action Alternative would cause moderate adverse impacts on the GWMP, MVMH, East and West Potomac Parks, and National Mall historic districts because construction staging and access would be visible within these resources and would diminish the integrity of setting. No cumulative impacts would be expected to the GWMP and MVMH historic districts because the construction activities for the Long Bridge Project and the Potomac Yard Metrorail Station are not expected to overlap. The NPS NCR Campus Renovation would also locate construction staging and access within the East and West Potomac Parks and National Mall historic districts. If constructed at the same time, these activities would likely result in minor cumulative impacts on cultural resources.
- **Social and Economic Resources:** The temporary impacts of either Action Alternative when combined with the temporary impacts of other past, present, and reasonably foreseeable future projects would result in an overall minor to moderate beneficial cumulative impact due to the creation of new jobs, assuming several construction projects would overlap within the same communities.
- **Safety and Security:** The temporary impacts of either Action Alternative when combined with the temporary impacts of other past, present, and reasonably foreseeable future projects could result in an overall minor adverse cumulative impact on safety and security due to construction activities in close proximity to active railroad tracks for multiple projects.
- **Public Health, the Elderly, and Persons with Disabilities:** The temporary impacts of either Action Alternative when combined with the temporary impacts of other past, present, and reasonably foreseeable future projects could result in an overall minor adverse cumulative impact on public health, elderly, and persons with disabilities due to potential exceedances of noise limits that could result in annoyance and activity disruption negatively affecting the welfare and public health of people within or near the corridor. On-site diesel equipment during construction, increased truck traffic to and from the construction sites, and fugitive dust would cause pollutant emissions. Construction activities may also require the excavation and transportation of contaminated soils or sediments, and risk potential spills from construction-related equipment. Sidewalk closures and detours may increase walking distances for the elderly and persons with disabilities. To the extent that construction timing for these projects overlaps, coordination between projects would be essential to best manage sidewalk closures and detours.

21.4.3. Resources with Moderate Cumulative Temporary Effects

Transportation is the only resource for which construction activities have the potential to cause moderate cumulative temporary effects as described in the following paragraphs. Cumulative impacts to

railroad operations could be beneficial as well as negative, given the potential to coordinate track outages across multiple projects. Construction of both railroad and non-railroad projects have the potential to contribute additional vehicular traffic on roadways in the Local Study Area.

As the owner of the Long Bridge Corridor, CSXT has the final say over any activities that might affect railroad operations within its right-of-way. CSXT has the authority to approve schedules and the timing and duration of track outages. Through CSXT, track outages would be coordinated across multiple projects to minimize overall impact on railroad operators. Contractors for the multiple projects including the Long Bridge Project would also be required to coordinate with projects outside of CSXT's right-of-way, such as Washington Union Station. This could result in a moderate beneficial cumulative effect due to the opportunity to conduct track work requiring track outages concurrently thereby reducing cumulative track outage time. However, this coordination could result in negative impacts to individual project schedules. There also may be times when it is not possible to coordinate track outages, resulting in negative cumulative effects to railroad operations.

If construction occurs in separate timeframes, there could be greater adverse effects to railroad service due to track outages of a longer duration than if construction takes place concurrently. Further coordination would be undertaken as these projects move forward and as funding becomes available to minimize adverse effects to the extent possible.

Additionally, construction of the Long Bridge Project would contribute additional vehicular traffic in the Local Study Area, which already experiences heavy traffic volumes. The other railroad projects north and south of the Long Bridge Corridor would also contribute additional vehicular traffic near access points and construction areas. However, the projects would occur along a linear corridor, resulting in little potential overlap among these areas. Concurrent construction would therefore have the potential to result in minor, temporary, adverse cumulative impacts on transportation.

If timed sequentially, the projects may be able to use some areas already disturbed by a previous project for construction staging, reducing the potential for cumulative impacts from multiple staging areas. If construction timing overlaps, implementation of operational plans for both normal and emergency operations would minimize any adverse effects to service to the maximum extent possible.

Construction of any reasonably foreseeable project has the potential to require road closures and detours during construction, which could interrupt local and commuter bus routes, the pedestrian and bicycle network, and the roadway network. The Wharf Phase II would result in road closures and detours along Maine Avenue SW, which would also be affected by construction of the Long Bridge Project, as described in **Chapter 9.0, Transportation and Navigation**. However, it is likely that construction for The Wharf Phase II would be completed before construction for the Long Bridge Project begins. For the NPS NCR Campus Renovation Project, the timeline for the start of construction is unclear at this time. Thus, renovation of the NPS NCR Campus could overlap with construction of the Long Bridge Project. If renovation and construction timelines overlap, the schedules would be coordinated to minimize closures of public areas or other disruptions to public services.

21.5. Bike-Pedestrian Crossing

The cumulative impacts analysis evaluated the effects of the bike-pedestrian crossing in combination with past, present, and reasonably foreseeable future actions. For each resource area, the analysis assessed impacts of other past, present, and reasonably foreseeable future projects combined with the bike-pedestrian crossing. See **Chapter 22, Bike-Pedestrian Crossing** for a description of the development of the Preferred Option for the bike-pedestrian crossing and its impacts.

The analysis of cumulative impacts included projects within 0.5 miles of the Preferred Option (the Local Study Area) that are reasonably foreseeable—in other words, projects planned or programmed for construction within the time frame of this analysis or which are likely to occur. The analysis included transportation and park projects. Land use within 0.5 miles of the Preferred Option is dominated by parks and recreation, along with transportation infrastructure. There is no private development within the Local Study Area (0.5-mile buffer), so private development projects were not included in the cumulative impacts analysis.

The cumulative scenario includes the existing transportation network, transportation improvements within the previous 10 years, and all proposed transportation projects by the planning year of 2040 within 0.5 miles of the bike-pedestrian crossing. As shown in **Figure 21-2** and described above in **Section 21.2.3.1, Transportation Infrastructure Projects**, these projects include:

- Potomac River Tunnel Project
- Potomac Yard Metrorail Station[16]
- Boundary Channel Drive Interchange
- Washington, DC Optimization of the Airspace and Procedures in the Metroplex (DC OAPM)
- DC to Richmond Southeast High Speed Rail (DC2RVA)

Park lands of various ownership comprise a substantial portion of the land within the Local Study Area. The cumulative scenario therefore includes the planned improvements at Long Bridge Park and East Potomac Park.

[16] This project is included because, while it is located just south of the Local Study Area in Alexandria, it will have visual and property impacts to the George Washington Memorial Parkway (GWMP).

682 **Figure 21-2** | Projects within the 0.5-Mile Radius of the Preferred Option

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21.5.1. Permanent or Long-Term Effects

The Preferred Option would not contribute to cumulative impacts to hazardous materials, noise and vibration, or environmental justice communities because it would have no effect on those resources (see **Chapter 22.2.4, Solid Waste and Hazardous Materials, Chapter 22.2.9, Noise and Vibration,** and **Chapter 22.2.16, Environmental Justice**). In addition, the Preferred Option would not contribute to cumulative impacts to air quality or GHG emissions because it would have minor permanent beneficial impacts (see **Chapter 22.2.6, Air Quality and Greenhouse Gas Emissions**) while other past, present, and reasonably foreseeable future actions would have negligible to minor permanent adverse impacts.

21.5.1.1. Negligible to Minor Adverse Cumulative Impacts

The Preferred Option when combined with the impacts of other past, present, and reasonably foreseeable future actions would result in overall **negligible to minor adverse cumulative impacts** on:

- **Natural systems and endangered species** (see **Chapter 22.2.1, Natural Ecological Systems and Endangered Species**) due to removal of some early succession scrub-shrub areas and maintained lawn and landscaping. Given the already developed nature of the Local Study Area, the cumulative impacts would not affect the function or integrity of wildlife habitat, resulting in a minor impact.
- **Water resources and water quality** (see **Chapter 22.2.2, Water Resources and Water Quality**) due to increases in impervious area that would allow for buildup and wash-off of pollutants, which would cause a minor adverse cumulative impact on water quality in the Potomac River and Roaches Run watershed.
- **Geologic resources** (see **Chapter 22.2.3, Geologic Resources**) due to minor alterations to geomorphic features such as grading and filling in the floodplain to link the Preferred Option with existing infrastructure on the north and south sides of the Potomac River.
- **Solid waste disposal** (see **Chapter 22.2.4, Solid Waste Disposal and Hazardous Materials**) due to increases in solid waste generation by users of the Preferred Option.
- **Energy** (see **Chapter 22.2.7, Energy**) due to electricity demands for lighting, vehicles and equipment for maintenance, and the Long Bridge Aquatic and Fitness Center energy needs.
- **Land use and property** (see **Chapter 22.2.9, Land Use and Property**) impacts due to direct impacts to Long Bridge Park, the GWMP, and East Potomac Park because of the Preferred Option. The cumulative impacts would not affect the function or integrity of these parks because the Preferred Option would be consistent with existing parkland and recreational land uses.
- **Cultural Resources** (see **Chapter 22.2.11, Cultural Resources**) due to the Preferred Option and the Potomac Yard Metrorail Station impacting the GWMP and MVMH. Both projects would affect views from the GWMP and MVMH and therefore adversely impact the continuous viewshed. However, these impacts would not diminish the integrity of the historic districts and the resulting adverse cumulative impact would be minor.

- **Safety and security** (see **Chapter 22.2.14, Safety and Security**) due to the need for additional police and emergency response resources to ensure the safety and security of bridge and park users.

21.5.1.2. Moderate Adverse Cumulative Impacts

The Preferred Option when combined with the impacts of other past, present, and reasonably foreseeable future projects would result in overall **moderate adverse cumulative impacts** on:

- **Aesthetics and Visual Resources** (see **Chapter 22.2.10, Aesthetics and Visual Resources**) due to the Preferred Option and the Potomac Yard Metrorail Station impacting aesthetics and visual resources related to views from the GWMP. Views from the GWMP would be affected by the addition of bridge structures, removal of vegetation, and introduction of ramp structures. There would be no cumulative impacts from other past, present, and reasonably foreseeable future actions since neither the Boundary Channel Drive Interchange nor the Long Bridge Park development would affect views from the GWMP, MVT, Potomac River, or East Potomac Park, which are the views that would be affected by the Preferred Option.

21.5.1.3. Beneficial Cumulative Impacts

The Preferred Option when combined with the impacts of other past, present, and reasonably foreseeable future projects would result in overall **minor beneficial cumulative impacts** on:

- **Social and economic resources** (see **Chapter 22.2.13, Social and Economic Resources**) due to improved safety for bicyclists and pedestrians, additional connections among neighborhoods, and enhanced recreational resources.
- **Public health** (see **Chapter 22.2.15, Public Health, Elderly, and Persons with Disabilities**) due to creation of additional opportunities for active recreation.

The Preferred Option when combined with the impacts of other past, present, and reasonably foreseeable future projects would result in overall **moderate beneficial cumulative impacts** on:

- **Transportation** (see **Chapter 22.2.5, Transportation and Navigation**) due to enhanced connectivity within the bicycle and pedestrian network.
- **Recreation and parks** (see **Chapter 22.2.12, Recreation and Parks**) due to enhanced bicycle and pedestrian connectivity and the creation of additional recreational opportunities with the development of Long Bridge Park.

21.5.2. Temporary Effects

The Preferred Option is assumed to be constructed along with the Project; however, if constructed separately following completion of the Project there would be changes to temporary effects. Constructing the Preferred Option along with the Project would have no potential for temporary cumulative impacts; however temporary impacts would be prolonged. Constructing the Preferred Option at a later time from the Preferred Alternative would increase temporary impacts to transportation, water quality, aesthetic and visual, parks and recreation, and cultural resources (see **Chapter 22.2.5, Transportation and Navigation, Chapter 22.2.2, Water Resources and Water Quality,**

Chapter 22.2.10, Aesthetics and Visual Resources, Chapter 22.2.12, Recreation and Parks, and **Chapter 22.2.11, Cultural Resources)**. There would be no cumulative impacts from construction of reasonably foreseeable future actions since the construction footprint from these projects would not overlap with the construction footprint of the Preferred Option.

21.6. Avoidance, Minimization, and Mitigation

The Action Alternatives would include measures to avoid, minimize, and mitigate direct and indirect impacts, which will serve to avoid, minimize, and mitigate cumulative effects. **Chapters 5** through **20** describe these measures for each resource area.