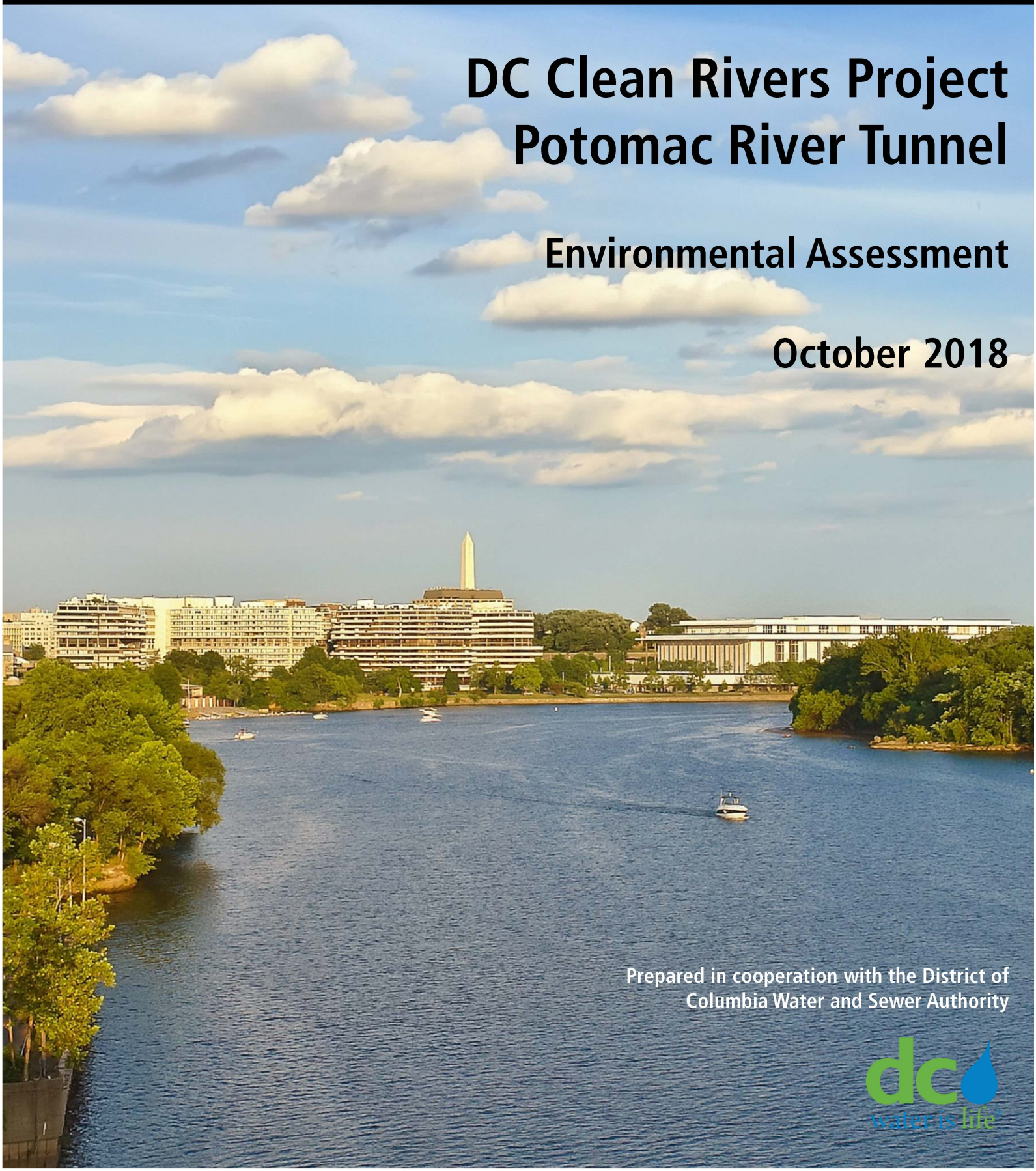
National Park Service
U.S. Department of the Interior

National Capital Region

DC Clean Rivers Project
Potomac River Tunnel

Environmental Assessment

October 2018



Prepared in cooperation with the District of Columbia Water and Sewer Authority

dc water is life

PROJECT SUMMARY

The District of Columbia Water and Sewer Authority (DC Water) is proposing to construct the Potomac River Tunnel, a major component of DC Water's Long Term Control Plan (LTCP), also known as the DC Clean Rivers (DCCR) Project. The purpose of the project is to substantially reduce untreated discharges from the combined sewer system to the Potomac River by increasing system storage and conveyance capacity. The project is needed to reduce combined sewer overflows (CSOs) that contribute to water quality impairment of the Potomac River and ultimately the Chesapeake Bay; and to comply with the 2005 Federal Consent Decree entered into by DC Water, the District of Columbia (the District), the Environmental Protection Agency (EPA), and the US Department of Justice, as amended January 2016 (EPA 2017). This Environmental Assessment (EA) describes the Potomac River Tunnel project (the proposed action) and the no-action alternative and analyzes the environmental consequences of implementing the alternatives on water quality, riverine wetlands, visitor / community use and experience, historic structures and districts, archeological resources, and cultural landscapes.

The proposed action involves construction of the Potomac River Tunnel and supporting infrastructure to provide control for seven CSO outfalls along the Potomac River. The proposed controls are estimated to reduce CSOs to the Potomac River by 93 percent by volume and limit their frequency to an estimated four times in a year of average rainfall. The project would include construction of diversion facilities to redirect CSOs from the existing combined sewer system into the proposed tunnel when the capacity of the existing sewer system is exceeded during storms. Once diverted to the tunnel, excess flows would be conveyed by gravity to DC Water's Blue Plains Advanced Wastewater Treatment Plant (Blue Plains) to be treated before being discharged to the Potomac River. Other supporting infrastructure, including a ventilation control facility, an emergency overflow structure, and drop, mining, and ventilation shafts would also be constructed. In addition, green infrastructure (GI) may be implemented in lieu of the tunnel for three of the CSO outfalls.

Under the no-action alternative, DC Water would continue to operate and maintain the existing combined sewer system that drains to the Potomac River CSO outfalls. CSOs would continue to occur at current levels resulting in a total discharge of approximately 654 million gallons into the Potomac River during approximately 74 CSO events in a year of average rainfall (DC Water 2015). The no-action alternative would also result in failure to meet DC Water's obligations under its Amended Federal Consent Decree and National Pollutant Discharge Elimination System (NPDES) permit, subjecting DC Water to significant stipulated penalties and other regulatory enforcement actions.

DC Water, in cooperation with the National Park Service (NPS), has prepared this EA to assess the alternatives and their potential impacts on the environment in accordance with the National Environmental Policy Act (NEPA) of 1969; the Council on Environmental Quality (CEQ) "Regulations for Implementing the Procedural Provisions of NEPA" (40 Code of Federal Regulations [CFR] 1500-1508); NPS Director's Order #12: *Conservation Planning, Environmental Impact Analysis, and Decision-Making* (NPS 2011); and the NPS NEPA Handbook (NPS 2015). Concurrently, DC Water and NPS have prepared an Assessment of Effects (AOE) Report to document the effects of the proposed undertaking on historic properties in accordance with Section 106 of the National Historic Preservation Act.

Note to reviewers and respondents: You may submit comments electronically at the NPS Planning, Environment and Public Comment (PEPC) website at http://parkplanning.nps.gov/PotomacRiverTunnel or you may mail written comments by November 30, 2018, to:

ATTN: Potomac River Tunnel EA
DC Clean Rivers Project
Blue Plains Advanced Wastewater Treatment Plant
5000 Overlook Avenue, SW
Washington, DC 20032

Before including personal identifying information in your comment, you should be aware that your entire comment – including your personal identifying information – may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

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ACRONYMS AND ABBREVIATIONS

ANC	Advisory Neighborhood Commission
AOE	Assessment of Effects
APE	Area of Potential Effect
Blue Plains	Blue Plains Advanced Wastewater Treatment Plant
C&O Canal NHP	Chesapeake and Ohio Canal National Historical Park
CEQ	Council on Environmental Quality
CFA	Commission of Fine Arts
CFR	Code of Federal Regulations
CSO	Combined Sewer Overflow
dBA	A-weighted decibels
DCCR	DC Clean Rivers
DC Inventory	District of Columbia Inventory of Historic Places
DCMR	District of Columbia Municipal Regulations
DC SHPO	District of Columbia State Historic Preservation Office
DC Water	District of Columbia Water and Sewer Authority
DOEE	District Department of Energy and Environment
DDOT	District Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FGDC	Federal Geographic Data Committee
GI	green infrastructure
JBAB	Joint Base Anacostia-Bolling
Kennedy Center	John F. Kennedy Center for the Performing Arts
L_{eq}	equivalent continuous sound level
LOS	Level of Service
LTCP	Long Term Control Plan
MGD	Million Gallons per Day
NCPC	National Capital Planning Commission
NEPA	National Environmental Policy Act
NMC	Nine Minimum Controls
NMFS	National Oceanic and Atmospheric Administration, National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
National Register	National Register of Historic Places
NWI	National Wetlands Inventory
PEPC	Planning, Environment and Public Comment
PEPCO	Potomac Electric Power Company
PCB	polychlorinated biphenyl
TBM	tunnel boring machine
TMDL	Total Maximum Daily Load
UPI	Upper Potomac Interceptor
UPIRS	Upper Potomac Interceptor Relief Sewer
USACE	US Army Corps of Engineers
WMATA	Washington Metropolitan Area Transit Authority

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1.0 PURPOSE AND NEED

1.1 PURPOSE OF AND NEED FOR ACTION

The District of Columbia Water and Sewer Authority (DC Water) is proposing to construct the Potomac River Tunnel, a major component of DC Water's Long Term Control Plan (LTCP), also known as the DC Clean Rivers (DCCR) Project. The purpose of the project is to substantially reduce untreated discharges from the combined sewer system to the Potomac River by increasing combined sewer overflow (CSO) storage and conveyance capacity. The project would include construction of diversion facilities to redirect CSOs from the existing combined sewer system to a new storage tunnel when the capacity of the existing sewer system is exceeded during storms. Once diverted to the tunnel, excess flows would be conveyed by gravity to DC Water's Blue Plains Advanced Wastewater Treatment Plant (Blue Plains) to be treated before being discharged to the Potomac River. Other supporting infrastructure, including a ventilation control facility, an emergency overflow structure, and drop, mining, and ventilation shafts would also be constructed. In addition, green infrastructure (GI) may be implemented in lieu of the tunnel to provide CSO control for CSOs 027, 028, and 029.

The average flow of the Potomac River is approximately seven billion gallons per day. In a year of average rainfall, an estimated 654 million gallons of untreated sewage and stormwater enter the Potomac River during approximately 74 CSO events. These CSOs contribute to the Environmental Protection Agency's (EPA) listing of the water quality of the Potomac River as impaired under Section 303(d) of the Clean Water Act. Waterbodies or waterbody segments are considered impaired when they do not meet EPA mandated water quality standards. CSOs impair water quality by increasing water bacteria levels, contributing to low dissolved oxygen in water, increasing the potential for fish stress or fish kills and impacts to other aquatic life, and increasing the amount of trash in waterways. This project is needed to reduce CSOs that contribute to water quality impairment of the Potomac River and ultimately the Chesapeake Bay; and to comply with the 2005 Federal Consent Decree entered into by DC Water, the District of Columbia (the District), the EPA, and the US Department of Justice, as amended January 2016 (EPA 2017).

The study area for the Potomac River Tunnel project generally follows along the Potomac River from Georgetown to the north to Joint Base Anacostia-Bolling (JBAB) to the south (**Figure 1-1**). Much of the study area falls within Chesapeake and Ohio Canal National Historical Park (C&O Canal NHP), Rock Creek Park, and National Mall and Memorial Parks administrative units of the National Park Service (NPS). As the existing CSOs are primarily located on NPS property, DC Water will require Special Use and Right-of-Way Permits for construction and operation of the structures necessary to meet its Consent Decree obligations. Therefore, DC Water, in cooperation with the NPS, has prepared this Environmental Assessment (EA) to assess alternatives and their potential impacts on the environment in accordance with the National Environmental Policy Act (NEPA) of 1969; the Council on Environmental Quality (CEQ) "Regulations for Implementing the Procedural Provisions of NEPA" (40 Code of Federal Regulations [CFR] 1500-1508); NPS Director's Order #12: *Conservation Planning, Environmental Impact Analysis, and Decision-Making* (NPS 2011); and the NPS NEPA Handbook (NPS 2015). Concurrently, DC Water and NPS have prepared an Assessment of Effects (AOE) Report to document the effects the proposed undertaking would have on historic properties in accordance with Section 106 of the National Historic Preservation Act.

The project was originally scoped as an Environmental Impact Statement (EIS), and a Notice of Intent was published in the Federal Register on July 2, 2014. However, since the Federal Register notice was published, DC Water and the NPS have identified opportunities to reduce potential project impacts through improvements to the tunnel design and the relocation of certain supporting tunnel infrastructure outside NPS lands away from significant park resources. Most notably, the initial project design proposed a diversion structure and large diameter shaft for CSO 029 along the Capital Crescent Trail within C&O Canal NHP. This structure has since been relocated entirely outside of the C&O Canal NHP, greatly reducing the potential for impacts to the Capital Crescent Trail, C&O Canal embankment, and C&O Canal towpath. In addition, initial designs proposed a large underground pumping station to be constructed within the National Mall and Memorial Parks to dewater the tunnel and transport collected combined sewage to Blue Plains for treatment. DC Water has since reconfigured the tunnel to convey flows to Blue Plains via gravity, eliminating the need for this pumping station. The NPS has determined that based upon these design improvements and associated reduction of potential impacts, an EA rather than an EIS is the appropriate level of documentation for the proposed project.

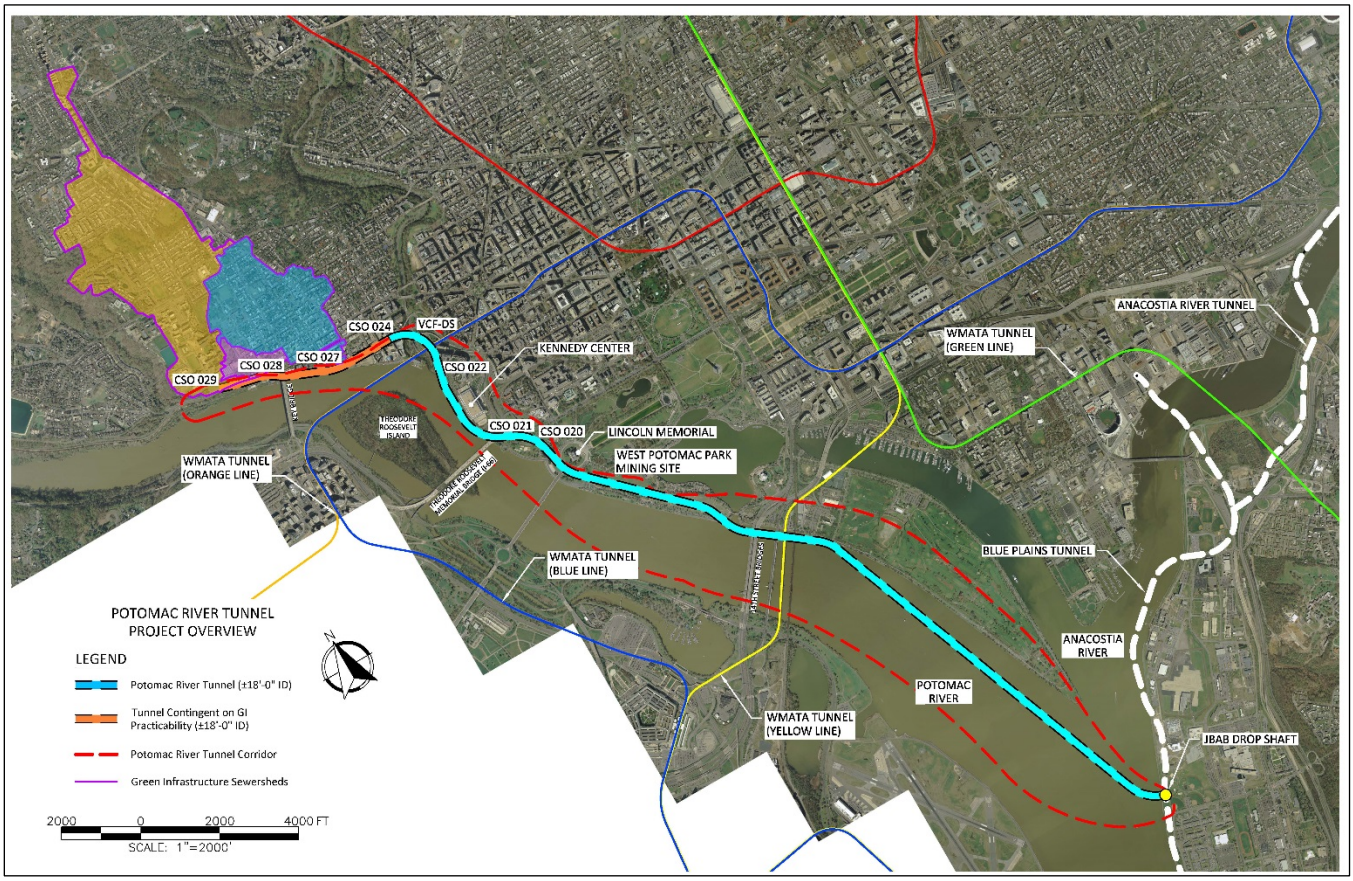

Figure 1-1: Potomac River Tunnel Project Overview Map

1.2 HISTORY OF THE DC CLEAN RIVERS PROJECT

Like many older cities in the United States, the sewer system in the District is comprised of both combined sewers and separate sanitary sewers (**Figure 1-2**). A combined sewer carries both sewage and runoff from storms. Modern practice is to build separate sewers for sewage and stormwater, and no new combined sewers have been built in the District since the early 1900s. Approximately one-third of the District (12,478 acres) is served by combined sewers (**Figure 1-3**), mostly in the older developed sections.

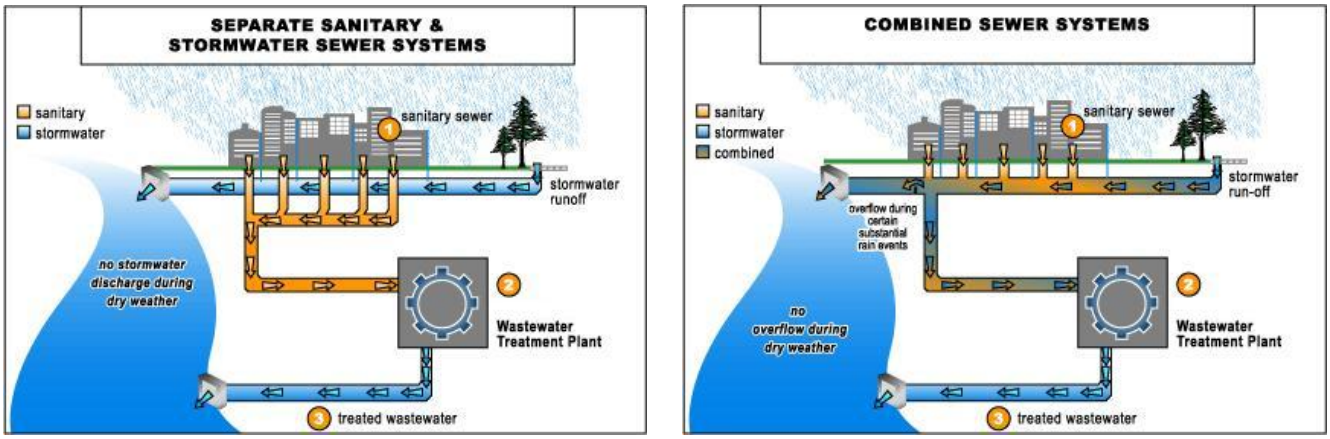

Figure 1-2: Separate and Combined Sewer Systems Diagrams

In a combined sewer system, during dry weather conditions, sewage from homes and businesses is conveyed to Blue Plains, located in southwest Washington, DC, on the east bank of the Potomac River. There, wastewater is treated to remove pollutants before being discharged to the Potomac River. When the capacity of a combined sewer is exceeded

during storm events, the excess flow, which is a mixture of sewage and stormwater runoff, is discharged directly to the Potomac River, Anacostia River, Rock Creek, and their tributaries at numerous outfalls. This excess discharge during storm events is called a combined sewer overflow, or CSO. A total of 47 active CSO outfalls for the combined sewer system are listed in DC Water's National Pollutant Discharge Elimination System (NPDES) permit issued by the EPA.

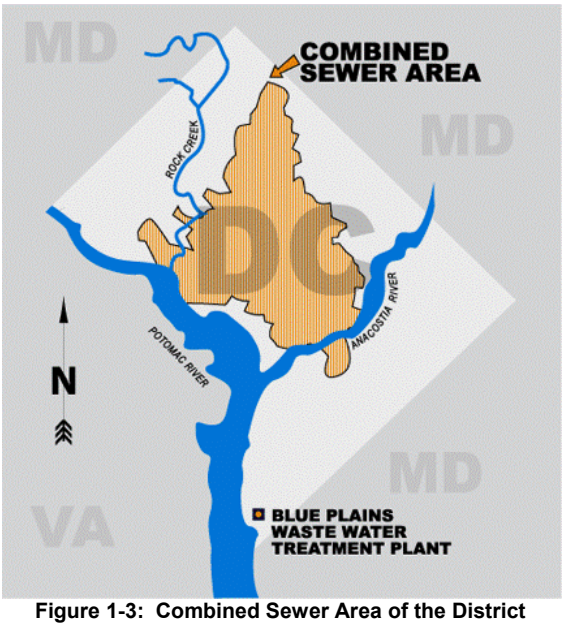

Figure 1-3: Combined Sewer Area of the District

In 2001, in accordance with the EPA's 1994 CSO Control Policy, Section 402 (q) of the Clean Water Act, and NPDES permit requirements, DC Water developed a Draft LTCP that outlined CSO control measures to meet local and federal water quality standards. The principal components of the Draft LTCP included a system of storage / conveyance tunnels along the Potomac River, Anacostia River, and Rock Creek; pumping station rehabilitation; targeted sewer separation; and Low Impact Development. The Draft LTCP was submitted to the EPA in 2001, and after an extensive public participation program, DC Water submitted a Final LTCP to the EPA in 2002. The District Department of Energy and Environment (DOEE) (formerly the Department of Health and the District Department of the Environment) and the EPA approved the Final LTCP and determined that CSOs remaining after implementation of the plan would not cause or contribute to the exceedance of water quality standards, subject to post construction monitoring. Regulatory agencies also determined that the CSOs remaining after implementation of the plan would comply with total maximum daily loads (TMDLs) established for the receiving waters. The Final LTCP was approved in December 2004 (DC Water 2017a). In 2005, DC Water entered into a Federal Consent Decree that established a judicially enforceable schedule to implement the CSO control measures outlined in the LTCP.

In 2007, the EPA modified DC Water's NPDES permit to include a total nitrogen limit for Blue Plains. The limit was developed to achieve nutrient reduction goals set forth by the Chesapeake Bay Program. Additionally, the original NPDES permit required DC Water to develop a treatment plan for wet weather flows at Blue Plains. In response, DC Water prepared a first revision to the LTCP titled *Blue Plains Total Nitrogen Removal / Wet Weather Plan* to address these requirements (DC WASA 2007). The EPA approved the first revision to the LTCP later that year.

A second revision to the LTCP was finalized in 2015 that proposed modifications to the control strategies for the CSOs which discharge to the Potomac River and Rock Creek. The revision modified the proposed tunnel design to allow captured flows to drain to Blue Plains via gravity, rather than the initial proposal of dewatering the tunnel via a new pumping station. For the smaller, most upstream CSOs on the Potomac River (CSOs 027, 028, and 029), the revised LTCP requires evaluation of GI to control CSOs, which would potentially replace portions of the proposed storage / conveyance tunnel (DC Water 2015). The potential outcomes for tunnel and GI implementation are discussed in further detail in *Chapter 2*. The *First Amendment to Consent Decree*, incorporating the revisions, was entered by the US District Court for the District of Columbia in January 2016 (EPA 2017). The Amended Consent Decree stipulates placing the Potomac River Tunnel in operation by March 23, 2030.

The Amended Consent Decree provides for control of all CSOs along the Potomac River. However, CSOs 025 and 026 are being addressed by separate and independent projects and are not evaluated in this EA. CSOs 025 and 026 will be controlled by upstream sewer separation. This action will not occur on NPS property and therefore will not require NPS permits.

In March 2018, DC Water achieved an important milestone when it completed the first major phase of the Anacostia River Tunnel System in advance of the Consent Decree deadline. The newly operational system consists of over 7 miles of 23-feet diameter tunnel, reaching from Blue Plains to RFK Stadium, and includes connections to all of the CSOs along the Anacostia River. Captured flows are delivered to Blue Plains, where newly constructed pumping and treatment facilities process the water before discharging it to the Potomac River. As of October 1, 2018, in just over six months of operation, the system has captured and treated over three billion gallons of CSOs that would have otherwise been discharged untreated into the Anacostia River.

1.3 ISSUES AND IMPACT TOPICS RETAINED FOR DETAILED ANALYSIS ISSUES

The NPS and DC Water determined that the following issues and associated impact topics identified during scoping warranted further consideration and are therefore retained for detailed analysis in this EA.

The water quality of the Potomac River would be improved. In the event the Potomac River Tunnel project is not constructed, CSOs would continue to degrade water quality through the release of untreated discharges into the Potomac River containing nutrients, fecal coliform bacteria (*Escherichia coli*), and other pollutants (e.g. pathogens, solids, toxics, and floatable matter). However, substantial improvements to water quality would occur from implementation of the proposed action as CSOs to the Potomac River would be reduced by approximately 93 percent by volume in a year of average rainfall. These issues are analyzed under the *Water Quality* impact topic.

Construction activities could temporarily contribute to water quality degradation. Ground disturbance during construction of supporting tunnel infrastructure could result in the transport of sediment-laden water into the Potomac River. Also, construction of an emergency overflow structure could disturb river bottom sediments. These issues are analyzed under the *Water Quality* impact topic.

Construction could result in disturbances to the Potomac River. Construction of the emergency overflow structure would require disturbance within the Potomac River that could result in a loss of riverine wetlands. This issue is analyzed under the *Riverine Wetlands* impact topic, and a Wetland Statement of Findings has been prepared that is included as **Appendix C**.

Implementation of the proposed action could affect historic properties. The Potomac River Tunnel and supporting infrastructure would be constructed within several historic districts and near numerous individual properties that are listed, or eligible for listing, in the National Register of Historic Places (National Register). Construction activities and the addition of new permanent infrastructure above-ground could result in potential visual intrusions that may affect historic viewsheds or character-defining features of historic properties. New noncontributing elements may be added into historic districts and cultural landscapes and existing character-defining features of historic districts may be modified. Vibrations and ground settlement caused by tunnel boring or from construction at the ground surface could also affect the integrity of historic structures. These issues are analyzed under the *Historic Structures and Districts* and *Cultural Landscapes* impact topics.

Construction could disturb known archeological resources and other areas of high archeological potential. Two known archeological sites that are registered by the DC State Historic Preservation Office (DC SHPO) occur within proposed construction areas (51NW075 and 51NW120) and preliminary archeological investigations conducted in several other areas have determined a need for more detailed evaluations. This issue is analyzed under the *Archeological Resources* impact topic.

The proposed action could detract from visitor / community use and experience during construction and after supporting tunnel infrastructure has been installed. Construction could disrupt visitor / community use and detract from the visitor experience by temporarily eliminating the ability for park visitors to use certain open space; requiring temporary closures or detours of roads, bicycle trails, and pedestrian trails and sidewalks; temporarily obstructing scenic or historic views; temporarily disrupting access to monuments, memorials, businesses, and other popular area attractions; and removing flowering cherry trees and other vegetation to accommodate construction activities. Once construction is complete, several permanent structures related to the operation of the tunnel would remain and could potentially result in the loss of open space or the occasional disruption from routine maintenance activities. Scenic or historic views may also be permanently altered. These issues are analyzed under the *Visitor / Community Use and Experience* impact topic.

Temporary noise could be generated near sensitive receptors, monuments and memorials, and other important park sites. Construction activities are projected to temporarily generate noise that may exceed District of Columbia Municipal Regulations (DCMR) limits. Noise would be generated near sensitive receptors where occupants are more susceptible to the effects of noise. Construction-related noise would also occur on parkland that may temporarily detract from the visitor experience at monuments, memorials, and other important park sites. These issues are analyzed under the *Visitor / Community Use and Experience* impact topic.

1.4 ISSUES DISMISSED FROM DETAILED ANALYSIS

The following issues have been dismissed from detailed analysis for the reasons provided.

Construction could require tree removal and disturb submerged aquatic vegetation. Selective tree removal may be required to accommodate construction of supporting tunnel infrastructure. DC Water anticipates removing an estimated 140 to 250 trees depending on the sites selected for implementation, and potentially clearing approximately 4,000 square feet of a densely-vegetated area of small trees and shrubs at one of the proposed diversion facility locations for CSO 029. Of the trees to be removed, approximately 16 to 30 are flowering cherry trees. Selective tree removal may also occur to construct GI facilities in the CSO 027, 028, and 029 sewersheds if GI is determined feasible. There is potential for tree removal to be reduced as designs are fully developed. Each removed tree would be replaced in kind or with native species at a ratio coordinated with the NPS. Additionally, no in-water construction activities would occur near established submerged aquatic vegetation; therefore, issues relating to the disturbance of terrestrial or aquatic vegetation have been dismissed from detailed analysis because a permanent net loss of vegetation is not anticipated. The potential removal of flowering cherry trees and other vegetation, and the resultant affects to the landscape are discussed under the *Historic Structures and Districts*, *Cultural Landscapes*, and *Visitor / Community and Experience* impact topics.

Construction could disturb federally listed species and critical habitat. During project planning, the NPS and DC Water determined that construction activities within the Potomac River could result in temporary disturbances to the federally listed endangered Atlantic sturgeon (*Acipenser oxyrhinchus*) and shortnose sturgeon (*Acipenser brevirostrum*). However, in a letter dated July 27, 2018, the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), Office of Protected Resources concurred with the DC Water and NPS determination that the Potomac River Tunnel project is not likely to adversely affect the Atlantic or shortnose sturgeon or destroy or adversely modify critical habitat of the Atlantic sturgeon. Based on the outcome of the consultation with NMFS these issues have been dismissed from detailed analysis. Also, to comply with the Migratory Bird Treaty Act, DC Water would consult with each park to ensure vegetation removal and associated disturbance of potential migratory bird habitat occurs outside the time of year when these species are likely to occur in the area.

The proposed project could generate air emissions. Heavy equipment, generators, and other diesel-powered equipment would produce exhaust-related emissions during construction that have the potential to result in emissions above ambient air levels. To prevent odorous emissions from being discharged to the surface during the construction of the diversion chambers, temporary odor control would be implemented if needed at the construction areas. Any activities related to construction and demolition that are likely to create exhaust emissions and fugitive dust would be subject to DOEE Air Quality Division review and oversight. In accordance with the District's Air Pollution Control Act. Over the long term, below-grade, passive, ventilation controls would regulate air flow within the tunnel system and capture fugitive odors. Through the implementation of the above-described minimization and mitigation measures during construction and tunnel operation, the Potomac River Tunnel would have minimal short- and long-term impacts to air quality. Based on these considerations, this issue has been dismissed from detailed analysis.

Portions of the project area are in the 100-year floodplain. Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map panels 1100010014C (FEMA 2010a) and 1100010018C (FEMA 2010b) show that portions of the project area are in the regulated 100-year floodplain of the Potomac River. The proposed action could result in disturbances during construction and may also add permanent structures within the floodplain. However, above ground structures would be small in scale and disturbance would be minimal in relation to the overall area of the floodplain. Also, DC Water would design supporting tunnel infrastructure to be resilient to the effects of flooding, taking into consideration the potential effects of climate change. Based on these considerations, the proposed project would not result in a negative impact to human health, capital investment, or natural and beneficial floodplain values. Therefore, this issue has been dismissed from detailed analysis and a Floodplain Statement of Findings is not necessary (NPS Water Resources Division, Martin, pers. comm. 2018).

Lands held in trust by the Secretary of the Interior for the benefit of Indians could be impacted. No lands held in trust for the benefit of Indians are in the project area. Therefore, this issue has been dismissed from detailed analysis.

Minority or low-income populations could be disproportionately impacted. Communities in the vicinity of the project contain both minority and low-income populations; however, this issue has been dismissed from detailed analysis because equal consideration was given to all public input from persons regardless of age, race, income status, or other socioeconomic or demographic factors; the proposed action would not result in any identifiable adverse human health effects, but is expected to result in beneficial effects from water quality improvements; and the proposed action would not disproportionately affect any minority or low-income community.

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2.0 ALTERNATIVES

DC Water previously evaluated numerous general strategies for CSO control in the development of its Combined Sewer System Long Term Control Plan (DC Water 2002), which was modified in 2015. The alternatives evaluated herein represent continued refinement of the selected control strategies for the CSOs discharging to the Potomac River, and include Alternative A, the no-action alternative; and Alternative B, the proposed action, intended to comply with the Amended Federal Consent Decree.

Within the description of the proposed action (Alternative B), the project is broken into individual project components, which include the tunnel, tunnel mining site, CSO diversion facilities and associated near surface structures, a ventilation control facility, and an emergency overflow structure. Several project components presented under the proposed action include options for siting the facilities that represent the outcome of preliminary engineering design and analysis, as well as extensive collaboration between NPS, DC Water, local and federal government agencies, and community stakeholders. Component options are also presented that were previously considered but have been dismissed from detailed analysis because they would result in unacceptable impacts or costs or are not feasible due to constructability or other engineering constraints.

The Amended Federal Consent Decree requires and defines the process for DC Water to assess the practicability of utilizing GI to provide CSO control for CSOs 027, 028, and 029. Should GI be determined practicable by DC Water (subject to EPA approval), DC Water would construct GI facilities to control the impervious acreage required by the Amended Federal Consent Decree for one or more of these sewersheds in lieu of the corresponding portion(s) of the tunnel and associated infrastructure. Should GI be determined impracticable, DC Water would control these CSOs utilizing the tunnel system as originally envisioned. This chapter describes the full build-out scenario for both the tunnel and GI CSO control technologies. The final CSO control technologies would be selected in accordance with the processes defined in the Amended Federal Consent Decree.

2.1 ALTERNATIVE A: NO-ACTION

Alternative A, the no-action alternative, represents continued operation and maintenance of the existing combined sewer system that is tributary to the Potomac River CSO outfalls. Previously completed improvements to the combined sewer system, implemented by DC Water as part of its Nine Minimum Controls (NMC) and Phase 1 CSO Control Programs, have resulted in an estimated 38 percent reduction in CSOs to the Potomac River by volume from the 1996 baseline condition. However, the system continues to discharge untreated combined sewage during rain events on a regular basis. Under the no-action alternative, CSOs would continue to occur at current levels. CSO frequency and magnitude are highly dependent on weather conditions, occurring at higher levels in wetter years and lower levels in drier years. It is estimated that approximately 74 overflows occur to the Potomac River in a year of average rainfall, resulting in a total discharge of approximately 654 million gallons (DC Water 2015). The no-action alternative would also result in failure to meet DC Water's obligations under its Amended Federal Consent Decree and NPDES Permit, subjecting it to significant stipulated penalties and other regulatory enforcement actions.

Figure 2-1 shows schematically the configuration of the existing sewer system connected to the CSOs along the Potomac River. The system consists of an interconnected network of pipelines and pumping stations constructed by the federal government in various phases since the late 1800s. The last major addition to the system, consisting of the Upper Potomac Interceptor Relief Sewer, Potomac Pumping Station, and Potomac Force Mains, was constructed in the 1960s and 1970s. Each outfall is controlled by one or more existing CSO regulator structure that divert dry weather flows to the Rock Creek and / or Potomac Pumping Stations for conveyance to Blue Plains. During rain events, when the capacities of the downstream pipelines and pumping stations are exceeded, these structures allow flow to be released directly to the Potomac River, reducing the risk of surface flooding and basement backups.

2.2 ALTERNATIVE B: CONSTRUCT POTOMAC RIVER TUNNEL TO COMPLY WITH AMENDED CONSENT DECREE

Alternative B, the proposed action, would involve construction of the Potomac River Tunnel and supporting infrastructure to provide control for seven CSO outfalls along the Potomac River. The proposed controls are estimated to reduce CSOs to the Potomac River by 93 percent by volume and limit their frequency to an estimated four times in a year of average rainfall. Instead of being discharged directly to the river, the captured combined sewage would be stored and conveyed to Blue Plains for treatment. The proposed action would comply with DC Water's Amended Federal Consent Decree and NPDES Permit. The Amended Federal Consent Decree requires the tunnel to be operational by March 23, 2030.

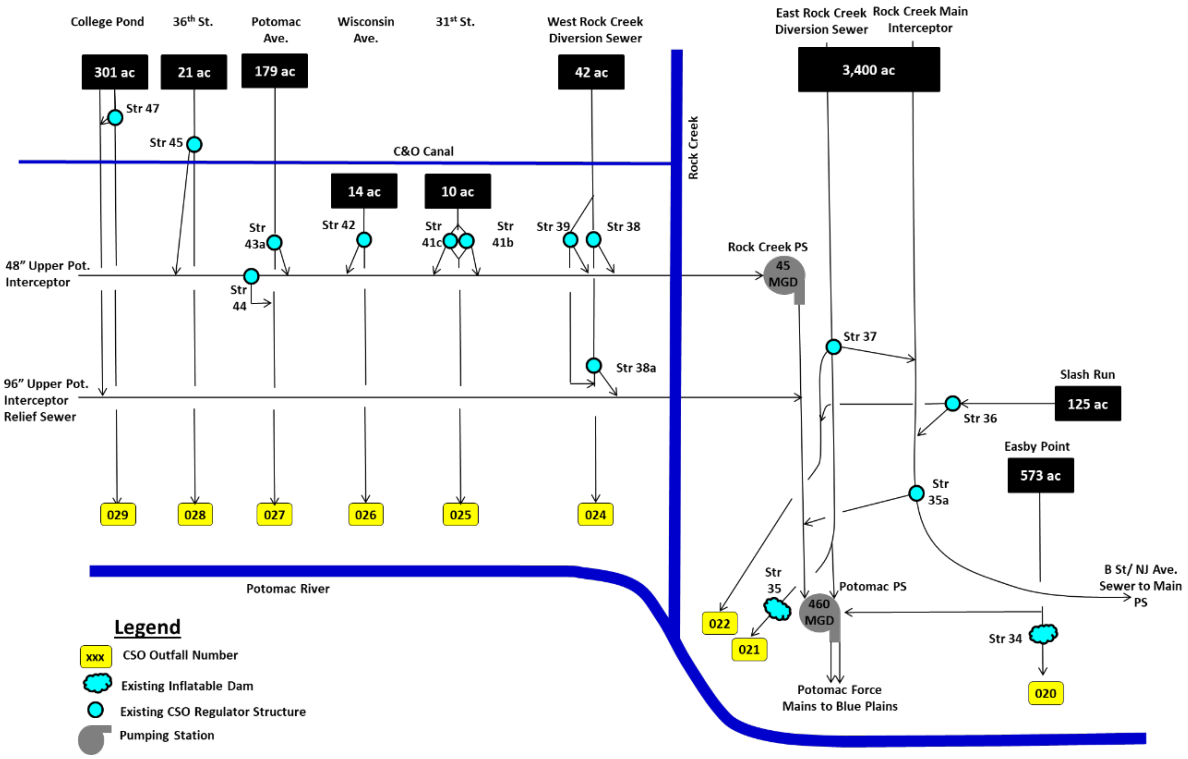

Figure 2-1: Existing Sewer System Configuration

The overall extent of the proposed action is shown on **Figure 1-1**, which includes the general locations for the tunnel alignment, near surface structures, and drop shafts, as well as the sewersheds for which GI is being evaluated for CSO control. Most of the near surface structures are designed to divert flow from the existing combined sewer system to the tunnel during rain events. These diversion facilities have been proposed downstream of the existing CSO regulator structures to avoid the need for constructing multiple structures for each outfall or significant reconstruction / reconfiguration of the existing sewer network. A typical diversion facility includes a diversion chamber, approach channel, drop shaft, and adit (**Figure 2-2**).

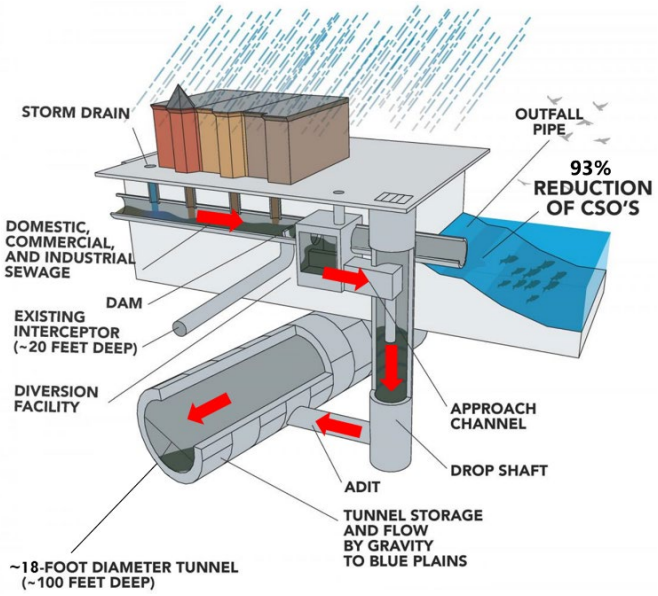

Figure 2-2: Graphic Illustration of Typical Diversion Facility

For clarity in presentation of the options considered for each proposed facility, the Potomac River Tunnel has been broken down into project components, listed in **Table 2-1**. Although one option must ultimately be selected for each component, DC Water has identified opportunities where project components can be combined to reduce the number of construction areas that are described under the individual components.

In the preparation of this EA, the proposed facilities have been developed to a conceptual level. Figures provided are intended to represent the general scope of proposed facilities and anticipated construction areas. Specific structure layouts and construction limits are subject to change due to further design refinement, collection of additional site data (such as geotechnical borings), and / or coordination with third parties during the negotiation of permits and easements.

Table 2-1: Components of the Potomac River Tunnel Project

Component Number	Component Description	Component Number	Component Description
1	Tunnel Corridor	8	CSO 024 Control and UPI Diversion Structure
2	Tunnel Mining Site	9	CSO 027 Control*
3	Emergency Overflow Structure	10	CSO 028 Control*
4	Ventilation Control Facility and UPIRS Diversion Structure	11	CSO 029 Control*
5	CSO 020 Control	12	Tunnel Connection to Existing Shaft at JBAB
6	CSO 021 Control	-	Green Infrastructure
7	CSO 022 Control		

*CSO control method pending GI practicability determination required by Amended Federal Consent Decree

2.2.1 Component 1 – Tunnel Corridor

A deep underground tunnel is proposed to provide the primary means of storage and conveyance of captured combined sewage. The proposed tunnel would be located approximately 75 to 125 feet below the ground surface and would be constructed in geologic stratigraphy consisting of alluvium, clays, silts, sands, decomposed bedrock, and bedrock. The tunnel would be constructed using a telescoping cylindrical steel tunnel boring machine (TBM) that simultaneously excavates and supports the ground with a permanent concrete tunnel lining. A rotating cutterhead at the front of the TBM would excavate the soil and rock as hydraulic cylinders jack the machine forward. Openings in the cutterhead would control the rate of material excavation that would be conveyed to the surface for disposal.

At its southeastern downstream end, the proposed tunnel would connect to the existing Blue Plains Tunnel within a drop shaft at JBAB, which has been designed to receive the tunnel with minimal surface impact. To the northwest, the tunnel would extend to the most upstream CSO to be captured pending the outcome of the GI practicability determination (CSO 024, 027, 028, or 029).

Due to the proposed use of a TBM to construct the tunnel, minimal surface disruption would be required between the various CSO diversion facilities. Along the tunnel alignment, surface activities are anticipated to be limited to installation of wells, ground monitoring arrays, seismographs, and other nonintrusive instrumentation to monitor the tunneling operations. Depending on subsurface conditions, short-term access may be required at certain points along the alignment to perform ground improvement such as jet grouting, dewatering, and ground freezing to facilitate mining operations or maintenance and / or repair of the TBM. The proposed corridor within which the Potomac River Tunnel would be constructed is shown on **Figure 1-2**.

2.2.2 Component 2 – Tunnel Mining Site

The tunnel mining site would be utilized to construct a mining shaft, lower and launch the TBM, remove excavated materials, and deliver concrete segments that would form the tunnel. The surrounding area would be used to store materials and equipment in support of tunneling operations. Multiple mining site locations were considered along the tunnel alignment. Potential mining sites were selected by identifying sites with adequate available open space, sufficient construction access and haul routes, and preferable geologic stratigraphy. Ground conditions vary significantly between the northern and southern portions of the tunnel alignment, so mining sites near the transition in ground conditions have been identified to allow for optimization of mining operations for the northern rock and southern soil tunneling drives. Two mining site options have been selected for detailed analysis – other options considered but dismissed are presented in *Section 2.3*.

2.2.2.1 Tunnel Mining Site Option 1 – West Potomac Park (North) (Preferred Option)

Tunnel Mining Site Option 1 would consist of approximately 6 acres within the area bounded by Independence Avenue SW, Ohio Drive SW, and West Basin Drive SW within National Mall and Memorial Parks. A conceptual layout of the mining site is shown in **Figure 2-3**. Access to the site would be from Independence Avenue SW and Ohio Drive SW. In addition to the mining shaft, a below-grade ventilation control vault would be constructed. Prior to initiating construction of the Potomac River Tunnel, DC Water, and the Potomac Electric Power Company (PEPCO) would extend high voltage electricity distribution lines to the mining site to deliver power for the TBM from an existing line to the east near 14th Street SW. The high voltage lines would be installed via trenching within the roadway of Independence Avenue SW or within East Basin Drive SW and Ohio Drive SW.

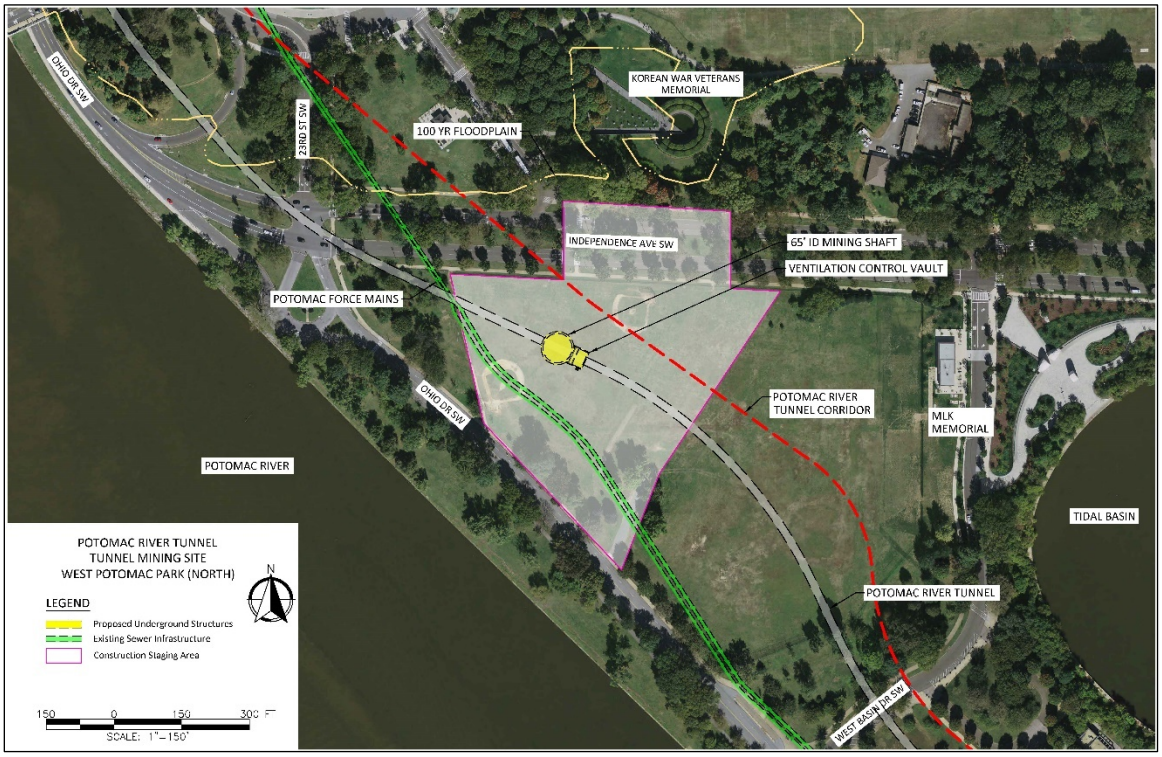

Figure 2-3: Tunnel Mining Site Option 1 – West Potomac Park (North)

Upon completion of construction, the site would be restored substantially to the existing conditions, with only manholes, hatches, and other structure access points visible at grade; however, because the elevation of the site is below the 100-year floodplain, tunnel ventilation grating, electrical panels serving the ventilation equipment, and access points to the ventilation control vault would be extended above-grade by approximately 5 feet to protect the tunnel system and ventilation equipment. The above-grade portion(s) of the ventilation vault would be approximately 900 square feet. Visible features would be integrated into the existing landscape and / or screened to the extent practicable, and the final site layout and restoration would be coordinated with the NPS and other stakeholders during the final design and permitting process.

2.2.2.2 Tunnel Mining Site Option 2 – West Potomac Park (South)

Tunnel Mining Site Option 2 would consist of approximately 6 acres within the area bounded by Ohio Drive SW, West Basin Drive SW, and the Franklin Delano Roosevelt Memorial within National Mall and Memorial Parks. A conceptual layout of the mining site is shown in **Figure 2-4**. Access to the site would be from Ohio Drive SW. In addition to the mining shaft, a below-grade ventilation control vault would be constructed. Similar to Option 1 described in *Section 2.2.2.1*, high voltage distribution lines would be installed prior to construction to deliver power to the TBM. Site restoration activities and visible at-and above-grade features would also be similar to Option 1.

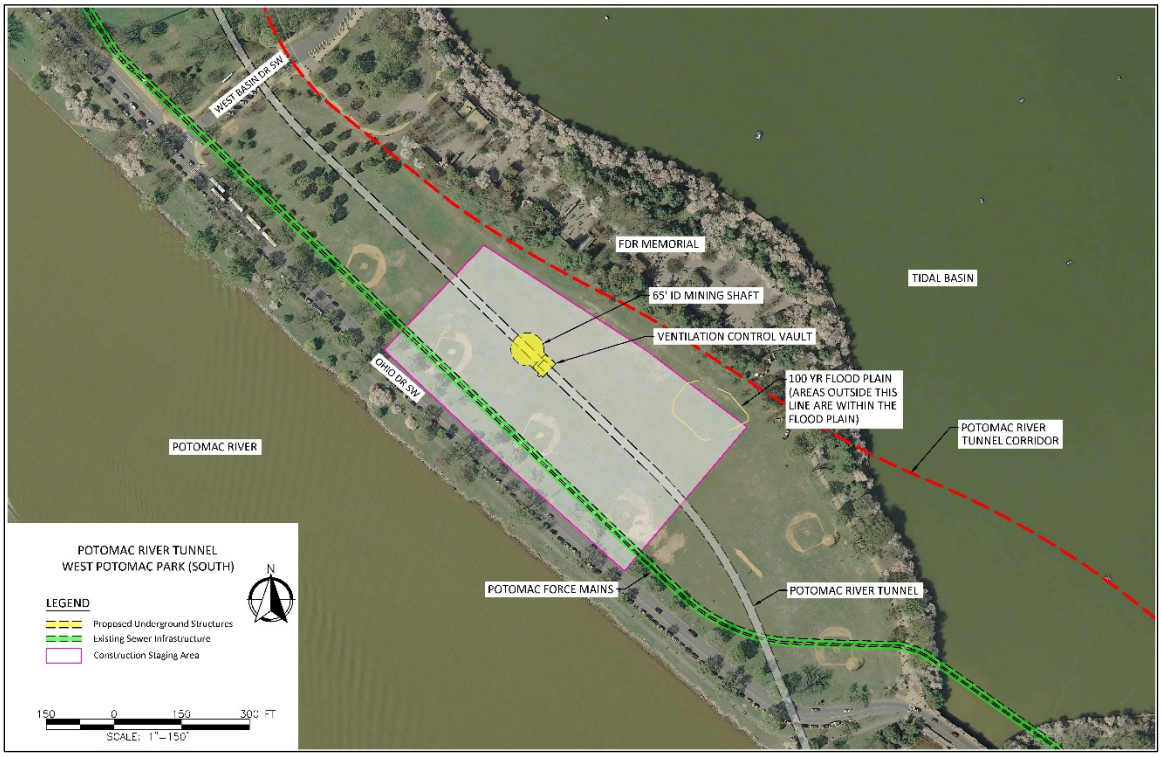

Figure 2-4: Tunnel Mining Site Option 2 – West Potomac Park (South)

2.2.3 Component 3 – Emergency Overflow Structure

An emergency overflow structure is necessary to protect the tunnel and upstream infrastructure during rain events that exceed the system's capacity or occur when the system is already full. The underground facility would be fitted with an approximately 200-foot horizontal weir to limit discharge velocities to the river, a baffle wall and bar screens to remove solids / floatables, bulkhead gates to isolate portions of the facility for maintenance, and tide gates to prevent backflow from the river to the tunnel system. Two options have been selected for detailed analysis, both of which allow co-location of construction of the emergency overflow structure with other proposed facilities to minimize the number of construction areas and reduce potential impacts. Other options that have been dismissed are presented in *Section 2.3*.

2.2.3.1 Emergency Overflow Structure Option 1 – West Potomac Park (North) (Preferred Option)

Emergency Overflow Structure Option 1 is located along Ohio Drive SW between Independence Avenue SW and West Basin Drive SW and would be located adjacent to the Tunnel Mining Site Option 1 described in *Section 2.2.2.1*. The total construction area, including the overflow structure and mining site, would consist of approximately 11 acres; however, it is anticipated that construction would be sequenced such that not all the area would be in use at any given time. Below-grade channels would be constructed to connect the mining shaft to the emergency overflow structure. Construction of this option would require relocation or temporary support in place of the existing Potomac Force Mains. During construction, temporary closures and / or relocation of Ohio Drive SW travel lanes and sidewalks would be required. A conceptual layout of the site is shown in **Figure 2-5**. Upon completion of construction, the outfall of the overflow structure would be visible from the river, but the upland portion of the site would be restored substantially to the existing conditions, with manholes, hatches, and other structure access points visible at grade to provide access to the operable portions of the facility for maintenance and repair. Also, riprap outfall protection would be installed on the river bottom to reduce the potential for erosion during tunnel overflow events. Visible features would be integrated into the existing landscape and / or screened to the extent practicable, and the final site layout and restoration would be coordinated with the NPS and other stakeholders during the final design and permitting process.

2.2.3.2 Emergency Overflow Structure Option 2 – West Potomac Park (South)

Emergency Overflow Structure Option 2 is located along Ohio Drive SW between West Basin Drive SW and the Inlet Bridge and would be located adjacent to Tunnel Mining Site Option 2 as described in *Section 2.2.2.2*. A conceptual layout of the site is shown in **Figure 2-6**. Except for the location and layout of the construction area, aspects of this option are similar to those described under Option 1 in *Section 2.2.3.1*.

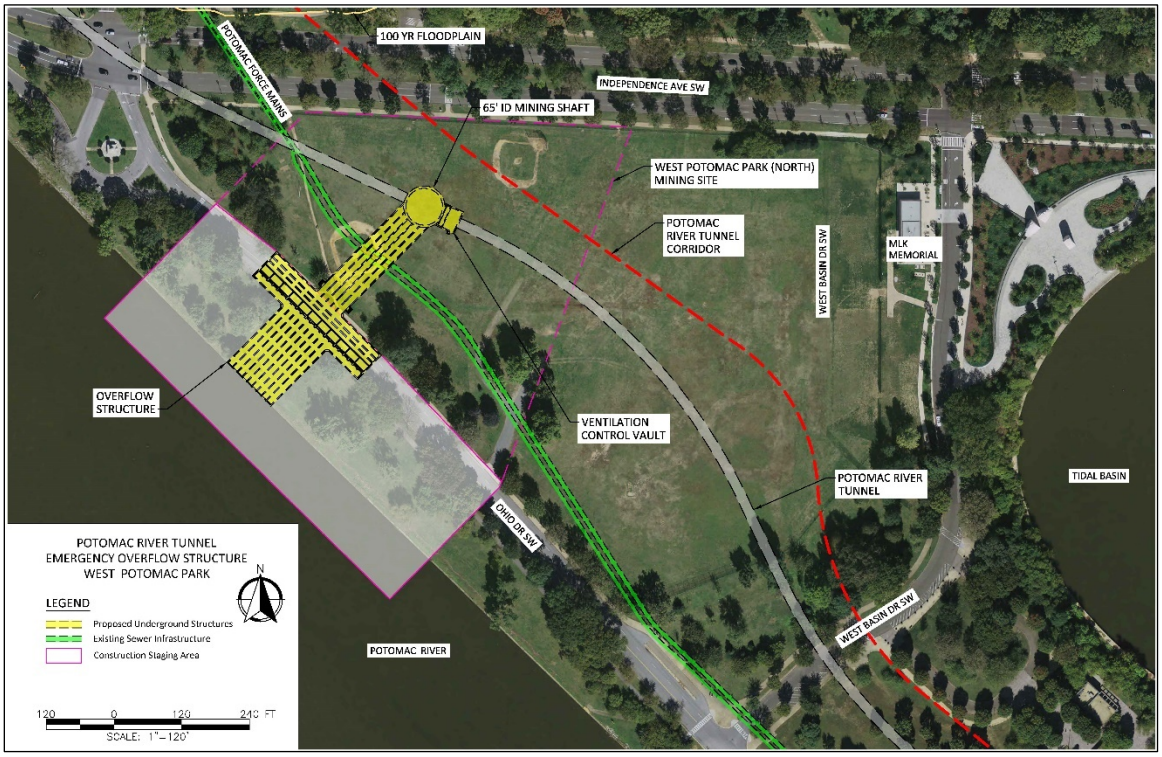

Figure 2-5: Emergency Overflow Structure Option 1 – West Potomac Park (North)

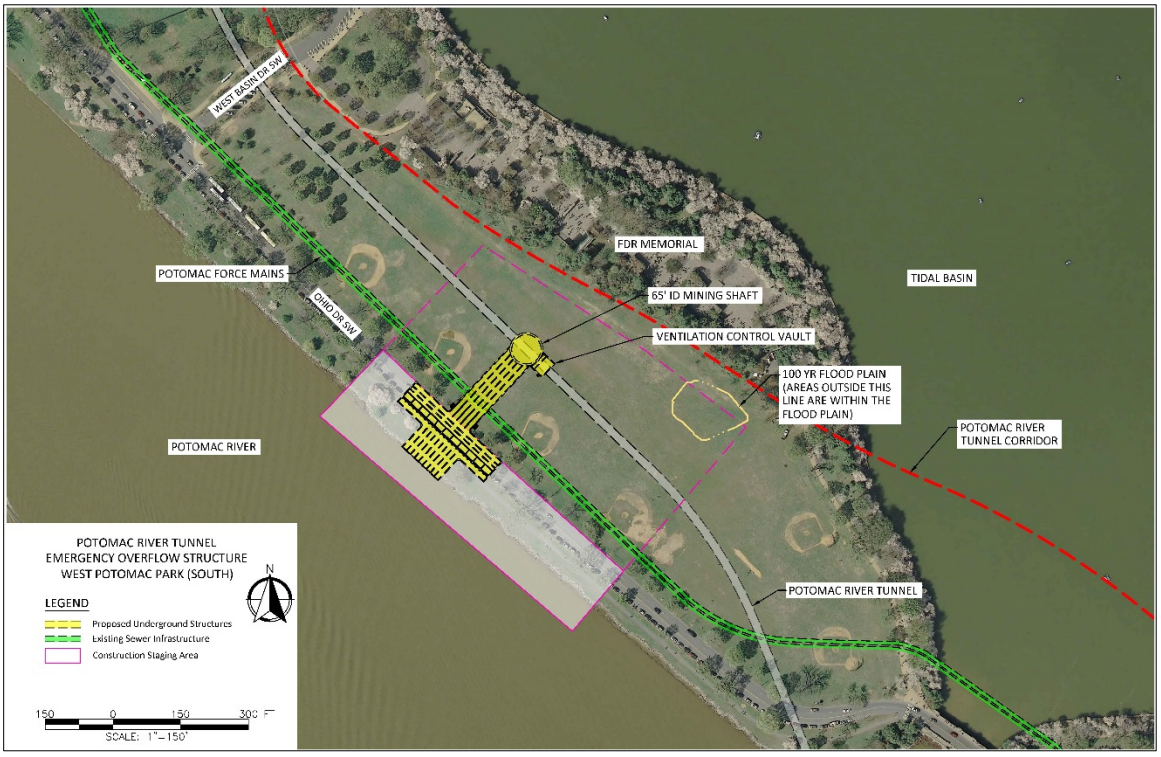

Figure 2-6: Emergency Overflow Structure Option 2 – West Potomac Park (South)

2.2.3.3 Emergency Overflow Structure Option 3 – CSO 022

Emergency Overflow Structure Option 3 is located at CSO 022 west of Rock Creek and Potomac Parkway NW, just south of Virginia Avenue NW, and consists of approximately three acres. Due to the limited space available at the site, temporary construction staging space would need to be created in the river utilizing barges or temporary fill adjacent to the existing seawall. The site combines construction of a below grade emergency overflow structure with a CSO 022

Control diversion structure, potentially consolidating construction of multiple facilities into one area. A conceptual layout of the construction site is shown in **Figure 2-7**. During construction, the segments of the Rock Creek Trail within the site would be detoured to maintain pedestrian and bicycle access. Upon completion of construction, the outfall of the overflow structure would be visible from the river, but the upland portion of the site would be restored substantially to the existing conditions, with only manholes, hatches, and other structure access points visible at grade to provide access to the operable portions of the facility for maintenance and repair. Also, riprap outfall protection would be installed on the river bottom to reduce the potential for erosion during tunnel overflow events. The final site layout and restoration would be coordinated with the NPS and other stakeholders during the final design and permitting process.

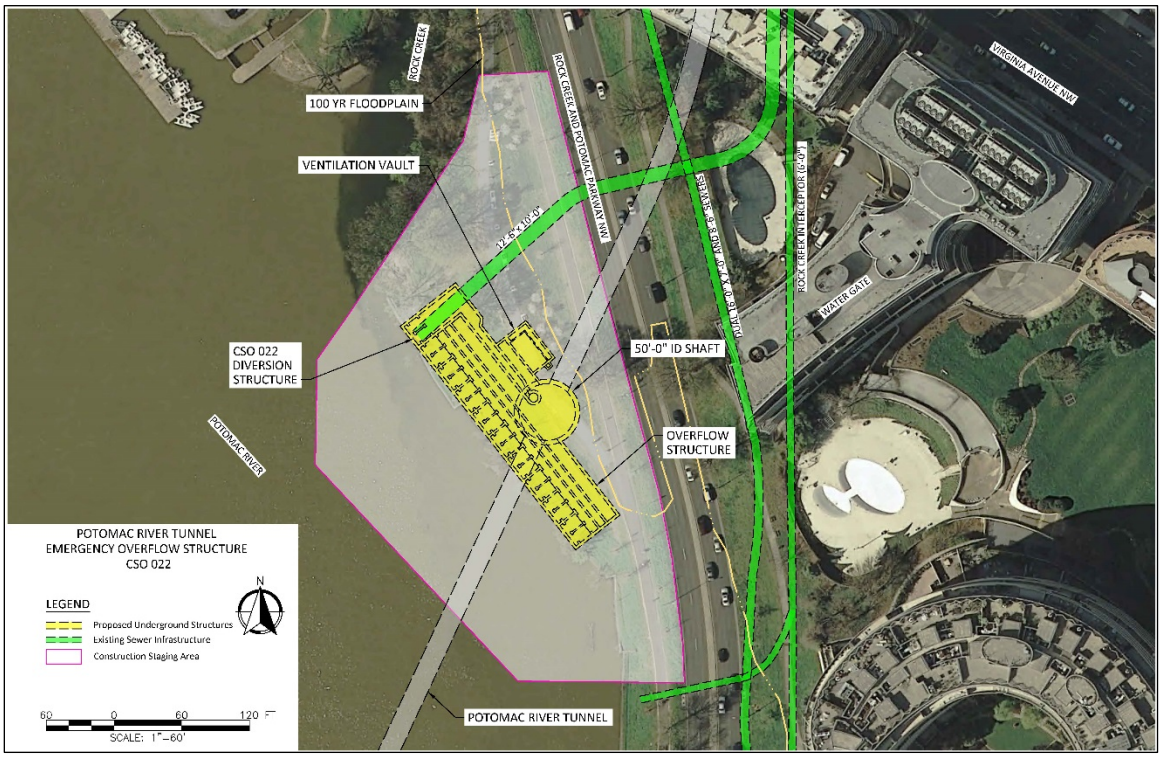

Figure 2-7: Emergency Overflow Structure Option 3 – CSO 022

2.2.4 Component 4 – Ventilation Control Facility and UPIRS Diversion Structure

A ventilation control facility is proposed to help regulate air flow throughout the tunnel system. The ventilation control facility would house an active fan-driven odor control system to maintain a negative air pressure within the tunnel and treat fugitive emissions during dry weather conditions and wet weather events. Pending final design, the facility may be constructed either as an above-grade one- to two-story building, consisting of approximately 6,000 square feet, or as a below-grade vault. If constructed as a below-grade vault, portions of the facility would need to be located above grade to provide for egress in compliance with applicable building codes, for access to control systems, and for flood protection for sensitive equipment. One location for the ventilation control facility is presented for detailed analysis. Another option, which has been dismissed, is presented in *Section 2.3*.

The proposed ventilation control facility site is located within the open area bounded by Rock Creek and Potomac Parkway NW, 27th Street NW, Virginia Avenue NW, and the ramp from eastbound Whitehurst Freeway to Interstate 66. In addition to the ventilation control facility, an underground diversion facility for the Upper Potomac Interceptor Relief Sewer (UPIRS) would be constructed. In conjunction with other proposed diversion structures along the tunnel alignment, this structure would allow the Potomac River Tunnel to be used as backup for the Potomac Pumping Station in the event of a power failure or other temporary shutdown. A conceptual layout of the site is shown in **Figure 2-8**. The location and configuration of the facilities, as well as site restoration, would be determined during final design and permitting in coordination with the property owners and owners of adjacent infrastructure.

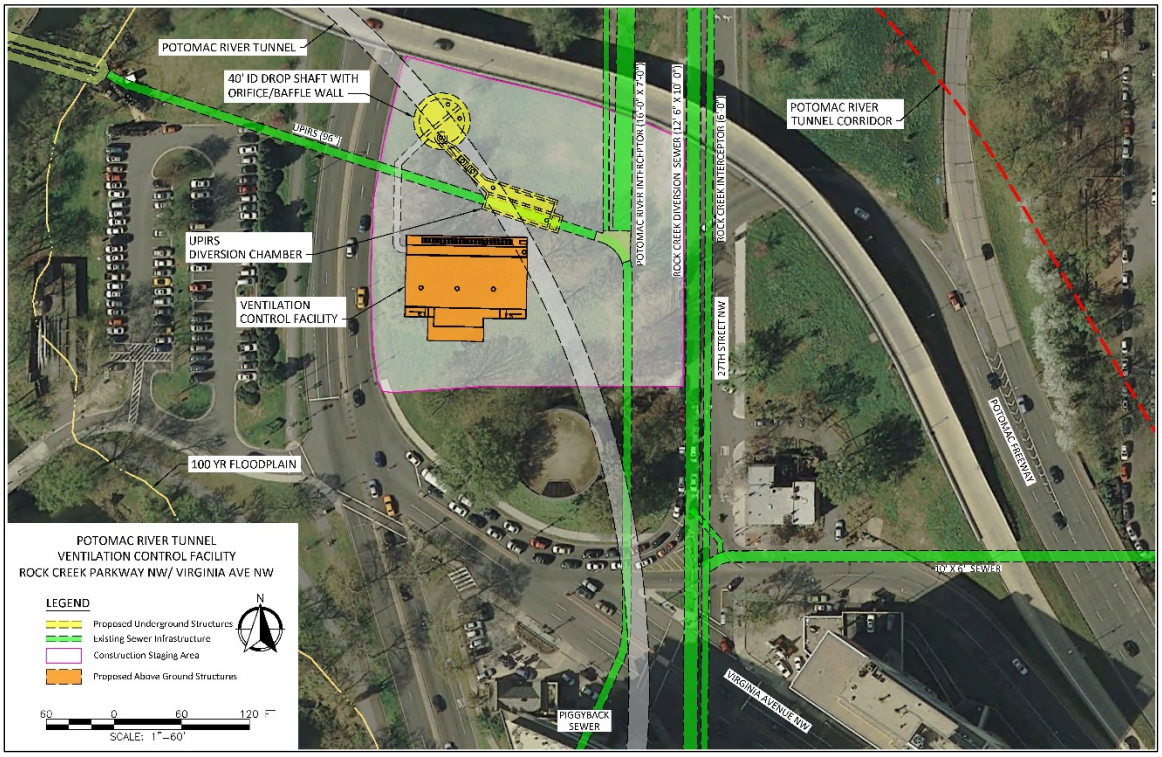

Figure 2-8: Ventilation Control Facility and UPIRS Diversion Structure Site

2.2.5 Component 5 – CSO 020 Control

CSO 020 discharges to the Potomac River adjacent to Rock Creek and Potomac Parkway NW, just northwest of the Lincoln Memorial. A facility is required to divert a minimum of 297 MGD of combined sewer flows from the existing outfall to the tunnel. Two options for the CSO 020 diversion facility are presented for detailed analysis.

2.2.5.1 CSO 020 Control Option 1 – 23rd Street NW / Constitution Avenue NW (Preferred Option)

CSO 020 Control Option 1 would be located within the open area southwest of the intersection of 23rd Street NW and Constitution Avenue NW and consists of approximately two acres (**Figure 2-9**). A diversion chamber, approach channel, and drop shaft would be constructed in the northwest portion of the site near the existing sewer. The diversion chamber would be retrofitted to the existing 11.25-foot x 11.25-foot outfall sewer to divert wet weather flow up to the design capacity to the tunnel for storage. An approach channel would be constructed to convey flow from the diversion chamber to the drop shaft. Pending detailed design, a below grade ventilation control vault may be constructed to mitigate fugitive emissions from the shaft. Should the ventilation control vault be constructed, above grade electrical cabinets would be necessary to serve the ventilation equipment. An underground adit would be constructed using trenchless methods connecting the tunnel to the diversion structure drop shaft. Upon completion of construction, the site would be restored substantially to the existing conditions, with only electrical cabinets (if needed), manholes, hatches, and other structure access points visible at grade; however, because a portion of the site is below the 100-year floodplain elevation, tunnel ventilation grating and access points to the ventilation control vault would be extended above-grade by approximately 3 to 5 feet or located in a higher elevation portion of the site to protect the tunnel system and ventilation equipment. The above-grade portion(s) of the ventilation vault would be approximately 300 square feet. The final site layout and restoration would be coordinated with the NPS and other stakeholders during the final design and permitting process.

2.2.5.2 CSO 020 Control Option 2 – Lincoln Memorial Volleyball Courts

CSO 020 Control Option 2 would be constructed at the volleyball courts between Rock Creek Parkway NW and Ohio Drive NW and consists of approximately two acres (**Figure 2-10**). A diversion chamber, approach channel, and drop shaft would be constructed in the southeastern portion of the site near the existing sewer. Except for the location and layout of the construction area, aspects of this option are similar to those described under Option 1 in *Section 2.2.5.1*.

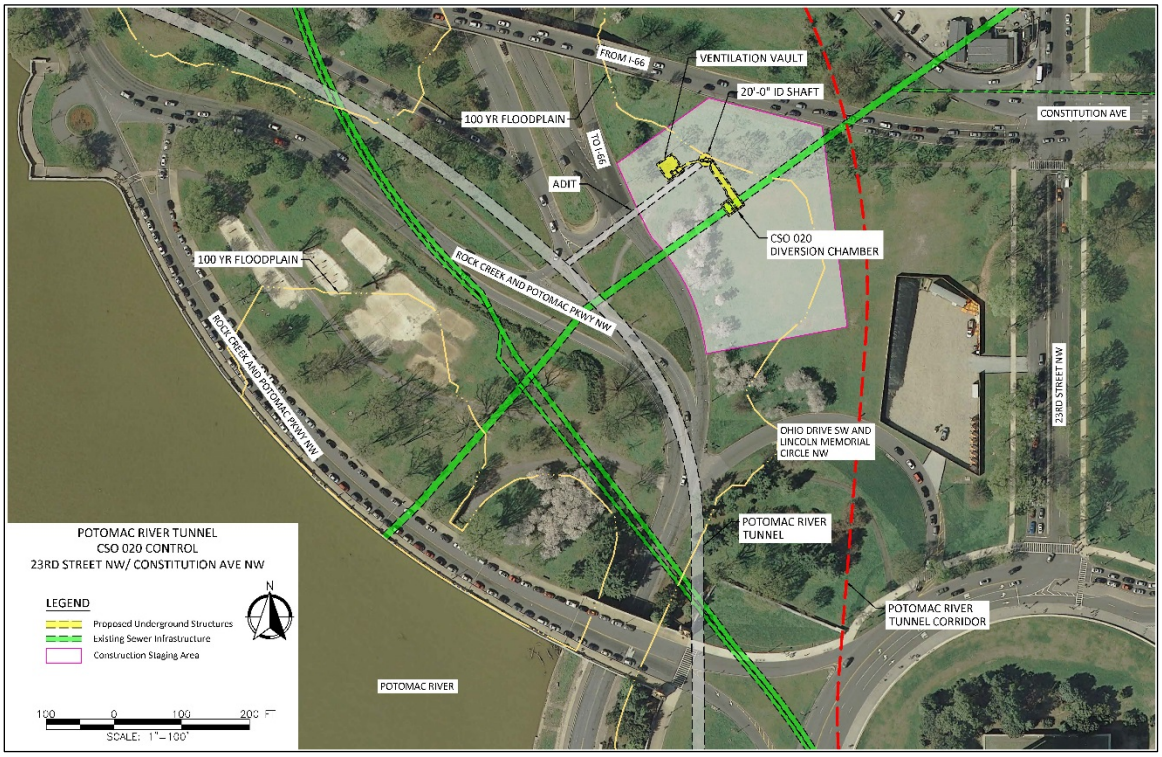

Figure 2-9: CSO 020 Control Option 1 – 23rd Street NW / Constitution Avenue NW

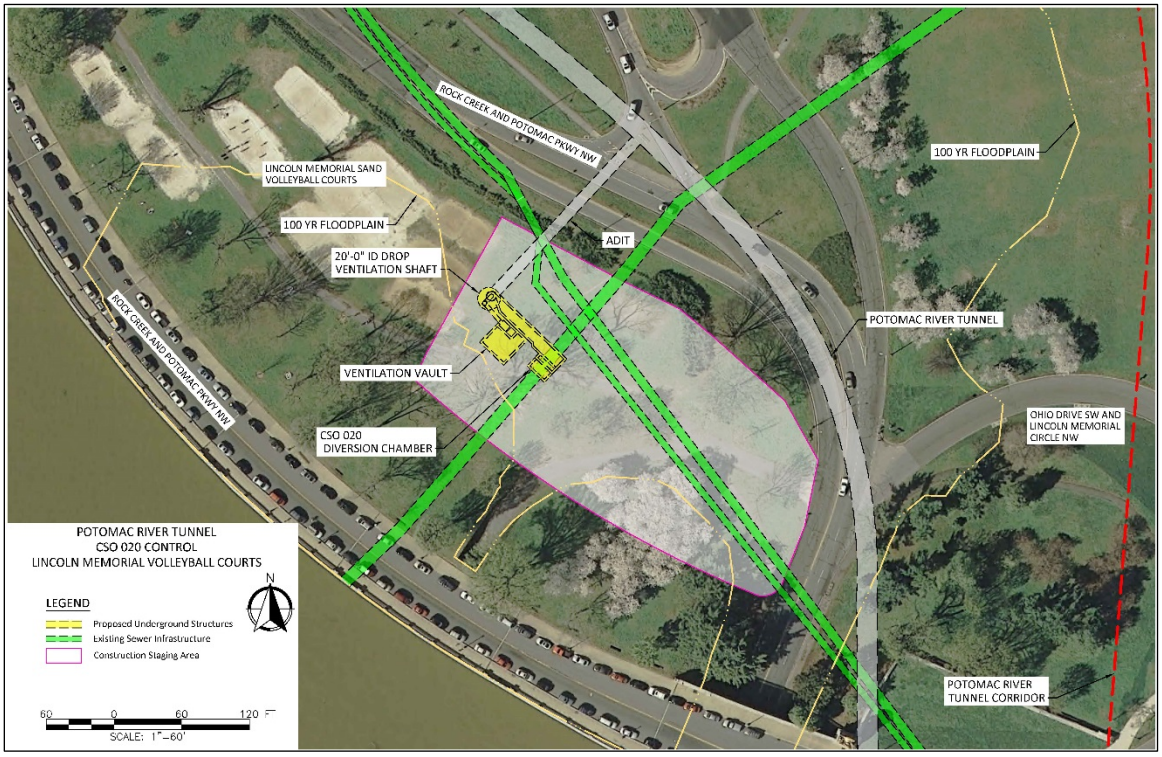

Figure 2-10: CSO 020 Control Option 2 – Lincoln Memorial Volleyball Courts

2.2.6 Component 6 – CSO 021 Control

The CSO 021 diversion structure, approach channel, drop shaft, and ventilation control vault are currently being constructed concurrently with the Kennedy Center Expansion Project as depicted on **Figure 2-11**. The CSO 21 diversion facilities have been integrated into the final site design of the expanded Kennedy Center facilities to minimize impacts. Work proposed at this site as part of the Potomac River Tunnel would include construction of an underground

adit to connect CSO 021 diversion structure drop shaft to the tunnel. The adit would be constructed from within the tunnel with all excavated materials removed via the tunnel mining shaft. Other work includes the removal of temporary fill within the diversion chamber and installation of equipment within the ventilation control vault. All work would be closely coordinated with the Kennedy Center to minimize impacts to its operations.

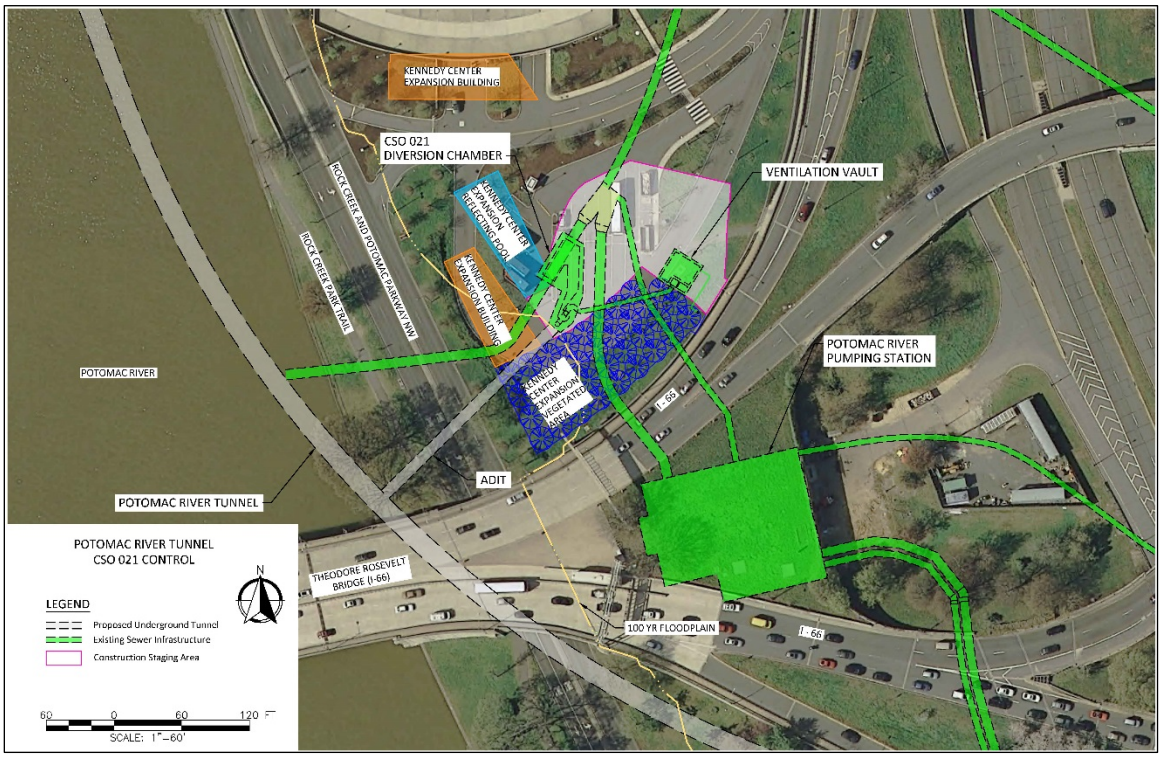

Figure 2-11: CSO 021 Control

2.2.7 Component 7 – CSO 022 Control

CSO 022 discharges to the Potomac River just downstream of the mouth of Rock Creek. A facility is required to divert a minimum of 333 MGD of combined sewer flows from the existing outfall to the tunnel. Two options for the CSO 022 Control diversion facilities are presented herein for detailed analysis.

2.2.7.1 CSO 022 Control Option 1 – Waterfront / Existing Outfall (Preferred Option)

CSO 022 Control Option 1 would be constructed adjacent to the existing outfall, just west of Rock Creek Parkway NW and south of Virginia Avenue NW and consists of approximately one and a half acres (**Figure 2-12**). A diversion chamber, approach channel, and drop shaft would be constructed near the existing sewer. The diversion chamber would be retrofitted to the existing 12.5-foot x 10-foot outfall sewer to divert wet weather flow up to the design capacity to the tunnel for storage. An approach channel would be constructed to convey flow from the diversion chamber to the drop shaft. Pending detailed design, a below grade ventilation control vault may be constructed to mitigate fugitive emissions from the shaft. Should the ventilation control vault be constructed, above grade electrical cabinets would be necessary to serve the ventilation equipment. An underground adit would be constructed using trenchless methods connecting the tunnel to the diversion structure drop shaft. During construction, the segments of the Rock Creek Trail within the site would be detoured if necessary to maintain pedestrian and bicycle access. Upon completion of construction, the site would be restored substantially to the existing conditions, with only electrical cabinets (if needed), manholes, hatches, and other structure access points visible at grade; however, because the site is below the 100-year floodplain elevation, tunnel ventilation grating and access points to the ventilation control vault would be extended above-grade by approximately 3 to 5 feet or located on a portion of the site outside of the floodplain to protect the tunnel system and ventilation equipment. The above-grade portion(s) of the ventilation vault would be approximately 300 square feet. The final site layout and restoration would be coordinated with the NPS and other stakeholders during the final design and permitting process.

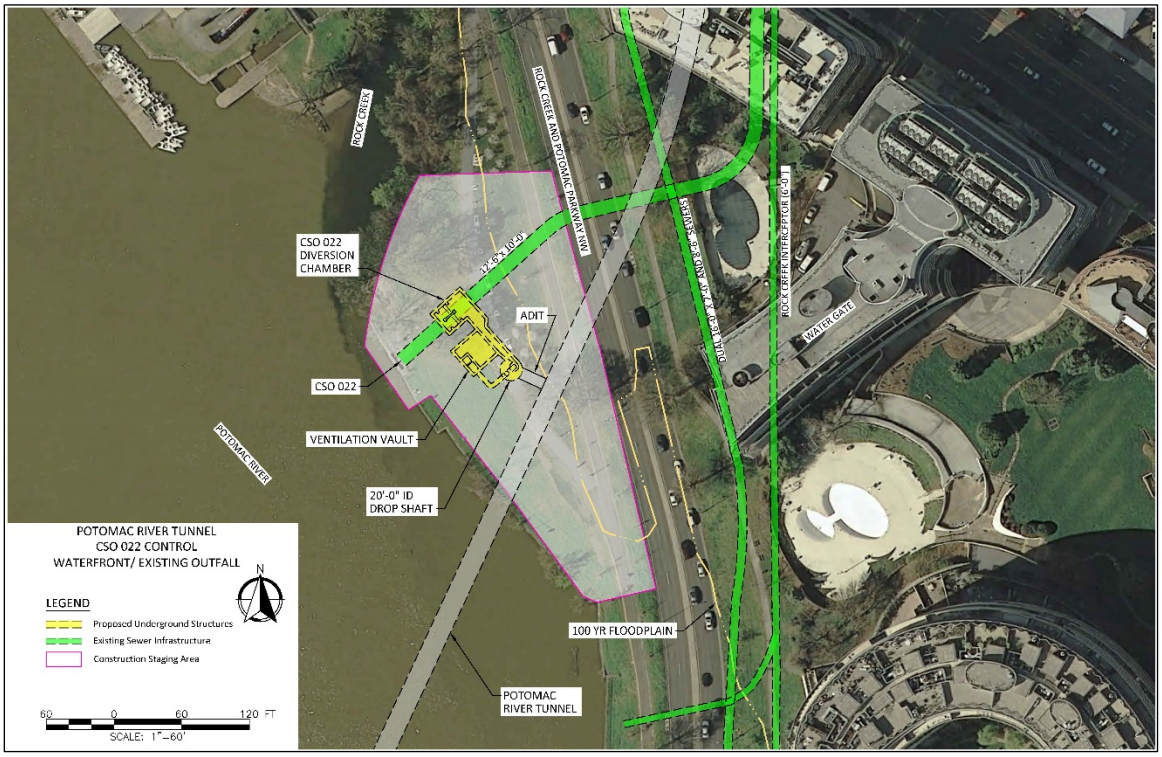

Figure 2-12: CSO 022 Control Option 1 – Waterfront / Existing Outfall

2.2.7.2 CSO 022 Control Option 2 – Virginia Avenue NW / 27th Street NW

CSO 022 Control Option 2 would be constructed at the intersection of Virginia Avenue NW and 27th Street NW (**Figure 2-13**). A diversion chamber, approach channel, and drop shaft would be constructed adjacent to and parallel to the existing sewer and 27th Street NW. During construction, lane and sidewalk closures would be required along Virginia Avenue NW and 27th Street NW. Maintenance of traffic controls, detours, and phasing of construction would be utilized to the extent practicable to maintain circulation of vehicular and pedestrian traffic. Upon completion of construction, the site would be restored substantially to the existing conditions, with only manholes, hatches, and other structure access points visible at grade. The final site layout and restoration would be coordinated with the District Department of Transportation (DDOT) and other stakeholders during the final design and permitting process. Selection of this option would allow for combination of construction of the CSO 022 Control with construction of the ventilation control facility and UPIRS diversion structure.

2.2.8 Component 8 – CSO 024 Control and UPI Diversion Structure

CSO 024 discharges to the Potomac River just upstream of the mouth of Rock Creek at the end of 30th Street NW. A facility is required to divert a minimum of 66 MGD of combined sewer flows from the existing outfall to the tunnel. One facility layout is presented for detailed analysis. Another option that was dismissed is presented in Section 2.3.

The CSO 024 Control would be constructed at the intersection of K Street NW and 30th Street NW (**Figure 2-14**). Two diversion chambers, an approach channel, and a drop shaft would be constructed within public space at the intersection. The diversion chamber would be retrofitted to the existing 9.5-foot x 7.5-foot outfall sewer to divert wet weather flow up to the design capacity to the tunnel for storage. A separate diversion structure would be constructed on the Upper Potomac Interceptor (UPI), allowing the tunnel to be utilized as backup for the Rock Creek Pumping Station in the event of a power failure or other temporary shutdown. An approach channel would be constructed to convey flow from the diversion chambers to the drop shaft. Pending detailed design, a below grade ventilation control vault may be constructed to mitigate fugitive emissions from the shaft. Should the ventilation control vault be constructed, above grade electrical cabinets would be necessary to serve the ventilation equipment. An underground adit would be constructed using trenchless methods connecting the drop shaft to the tunnel. During construction, vehicular and pedestrian traffic would be detoured around the construction area. Construction would be phased to minimize traffic impacts to the extent feasible. Upon completion of construction, the site would be restored substantially to the existing conditions, with only electrical cabinets (if needed), manholes, hatches, and other structure access points visible at grade; however, because the site is below the 100-year floodplain elevation, tunnel ventilation grating and access points

to the ventilation control vault would be extended above-grade by approximately 3 to 5 feet to protect the tunnel system and ventilation equipment. The above-grade portion(s) of the ventilation vault would be approximately 300 square feet. The final site layout and restoration would be coordinated with DDOT (including coordination of designs with the proposed Union Station to Georgetown Streetcar) and other stakeholders during the final design and permitting process.

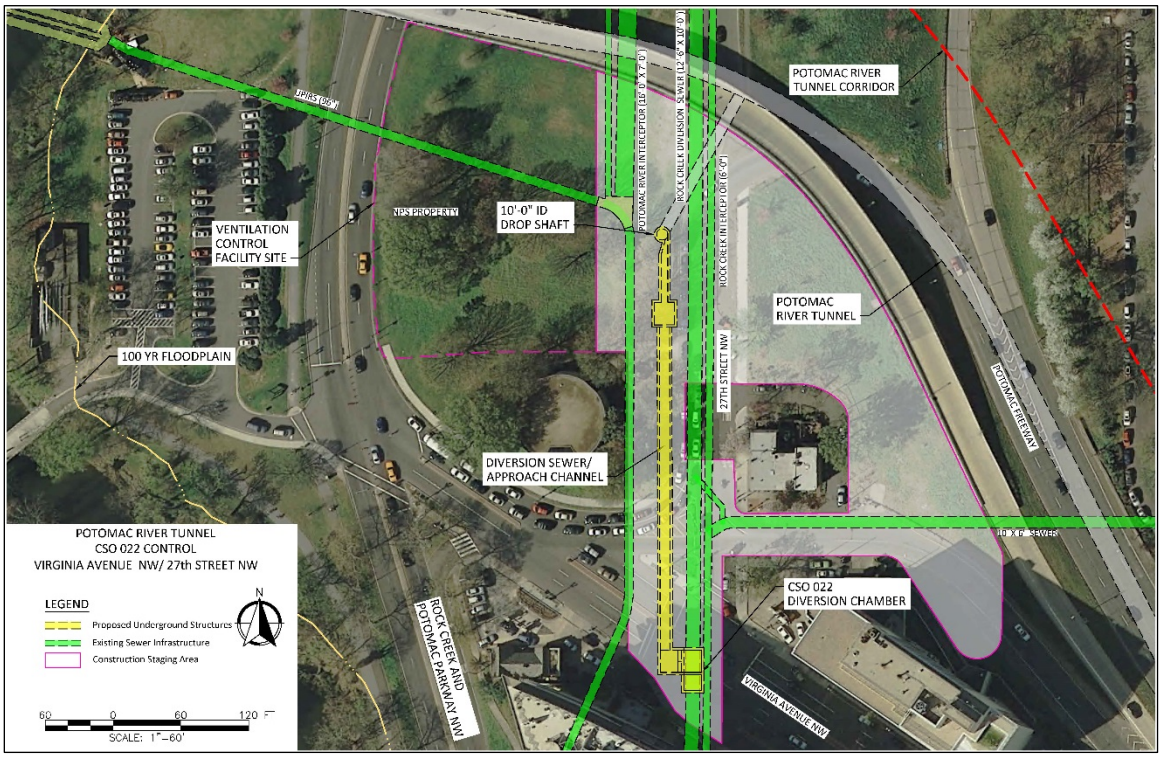

Figure 2-13: CSO 022 Control Option 2 – Virginia Avenue NW / 27th Street NW

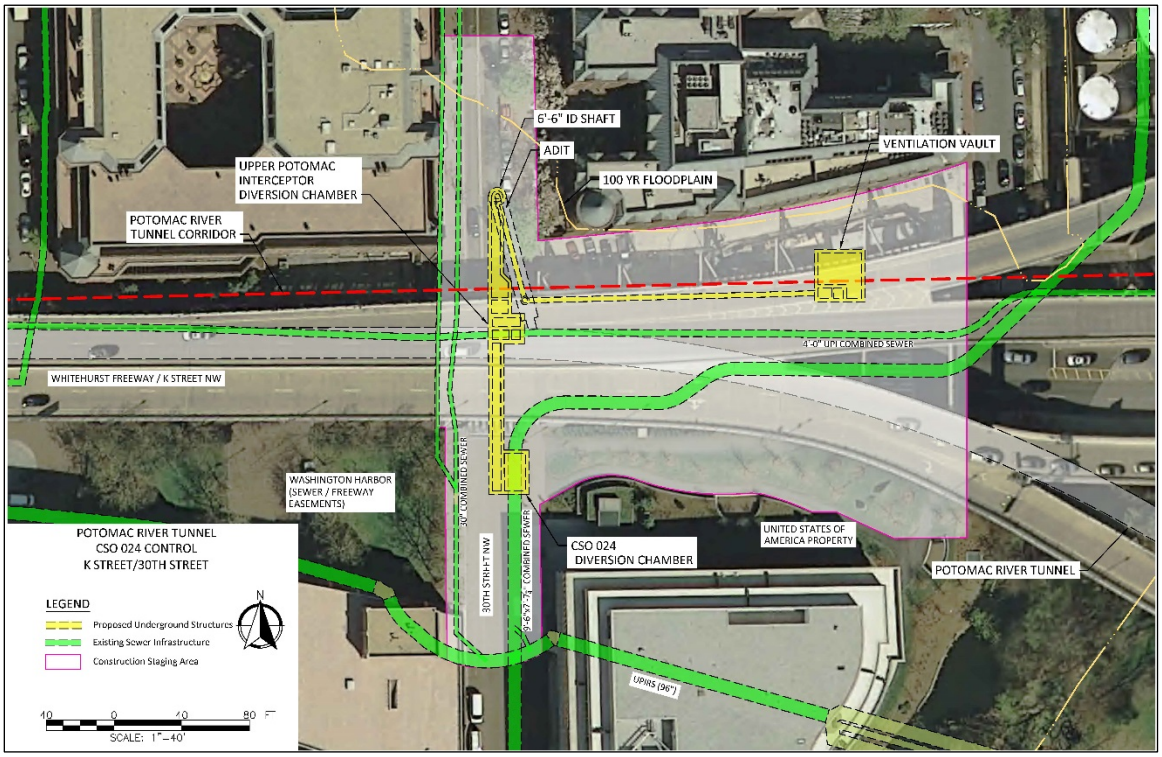

Figure 2-14: CSO 024 Control and UPI Diversion Structure

2.2.9 Component 9 – CSO 027 Control

CSO 027 discharges to the Potomac River at Georgetown Waterfront Park south of K Street NW between 33rd Street NW and Potomac Street NW. A facility is required to divert a minimum of 92 MGD of combined sewer flows from the existing outfall to the tunnel. Two site options for the CSO 027 diversion facilities are presented for detailed analysis, with two conceptual layouts provided for each option depending on the location selected for an emergency surge relief pipe required to protect the low-lying area between CSO 024 and 028 from flooding due to transient flows within the tunnel system during extreme filling events. The emergency surge relief pipe may also be constructed as part of the CSO 028 Control. Another site option that was considered but dismissed is presented in Section 2.3.

2.2.9.1 CSO 027 Control Option 1 – K Street NW / Georgetown Waterfront Park (Preferred Option, without Emergency Surge Relief Pipe)

CSO 027 Control Option 1 would be located at the intersection of K Street NW and Potomac Street NW (Figure 2-15). This reduces the amount of construction within Georgetown Waterfront Park by locating structures within K Street NW (beneath Whitehurst Freeway). A diversion chamber, approach channel, and drop shaft would be constructed within public space at the intersection. Temporary lane and sidewalk closures would be required within K Street NW and Potomac Street NW; maintenance of traffic controls would be provided to maintain vehicular and pedestrian circulation to the extent practicable. The diversion chamber would be retrofitted to the existing 8-foot x 7-foot outfall sewer to divert wet weather flow up to the design capacity to the tunnel for storage. An approach channel would be constructed to convey flow from the diversion chamber to the drop shaft. A below grade ventilation control vault would be constructed to allow air to expel from the tunnel, with equipment provided to mitigate fugitive emissions. Because the site is below the 100-year floodplain elevation, tunnel ventilation grating and access points to the ventilation control vault would be extended above-grade by approximately 3 to 5 feet to protect the tunnel system and ventilation equipment. Due to the need to extend these structures above grade, they could not be placed within the street or sidewalks and would need to be constructed within the adjacent park space. The above-grade portion(s) of the ventilation vault would be approximately 150 square feet. Upon completion of construction, the site would be restored substantially to existing conditions, with only electrical cabinets, manholes, hatches, and other structure access points visible at- and above-grade. The final site layout and restoration would be coordinated with DDOT, NPS, and other stakeholders during the final design and permitting process.

Should CSO 027 be selected as the location for the emergency surge relief pipe, it would require connection to the river, and thus would require construction through Georgetown Waterfront Park to connect to the Potomac River. The above-grade portion(s) of the ventilation vault would increase to approximately 800 square feet. CSO 027 Control Option 1 including the emergency surge relief pipe is shown in Figure 2-16.

2.2.9.2 CSO 027 Control Option 2 – Georgetown Waterfront Park

CSO 027 Control Option 2 would be located within Georgetown Waterfront Park (**Figure 2-17** without emergency surge relief pipe, **Figure 2-18** with emergency surge relief pipe). A diversion chamber, approach channel, and drop shaft would be constructed within the park. Except for the location and layout of the construction area, aspects of this option are similar to those described under Option 1 in *Section 2.2.9.1*. However, this option substantially reduces construction within K Street NW.

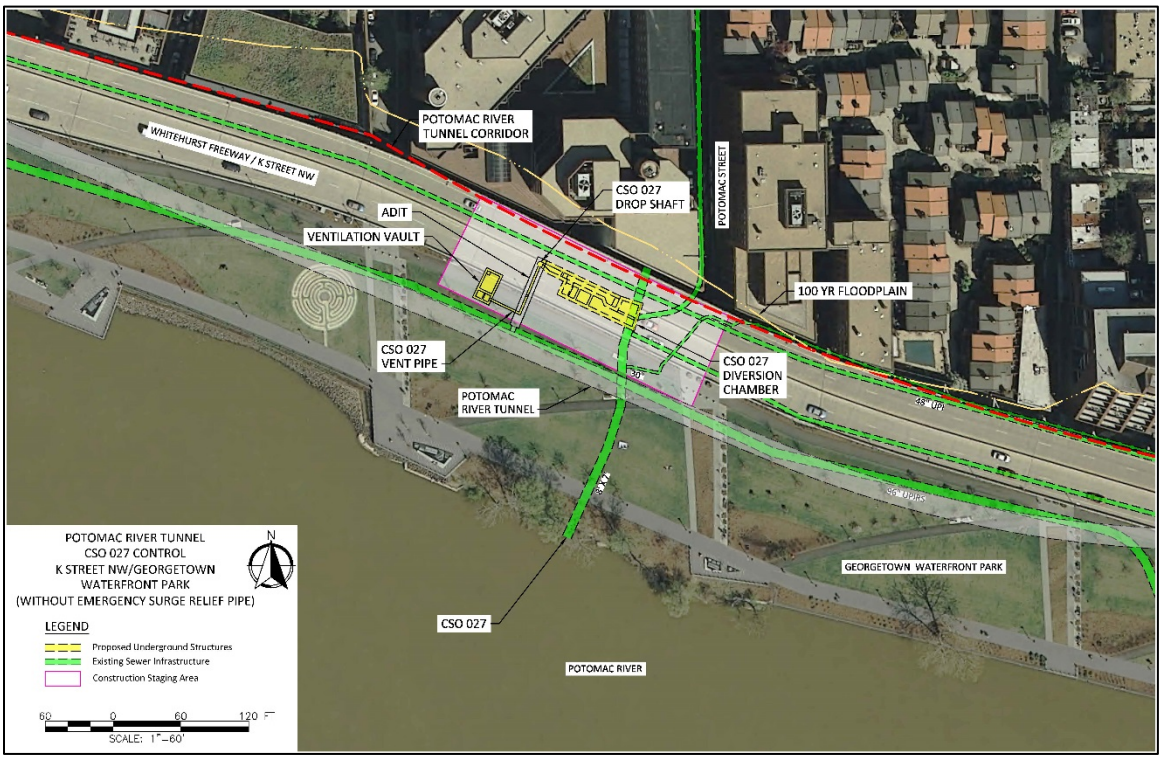

Figure 2-15: CSO 027 Control Option 1 – K Street NW / Georgetown Waterfront Park (without Emergency Surge Relief Pipe)

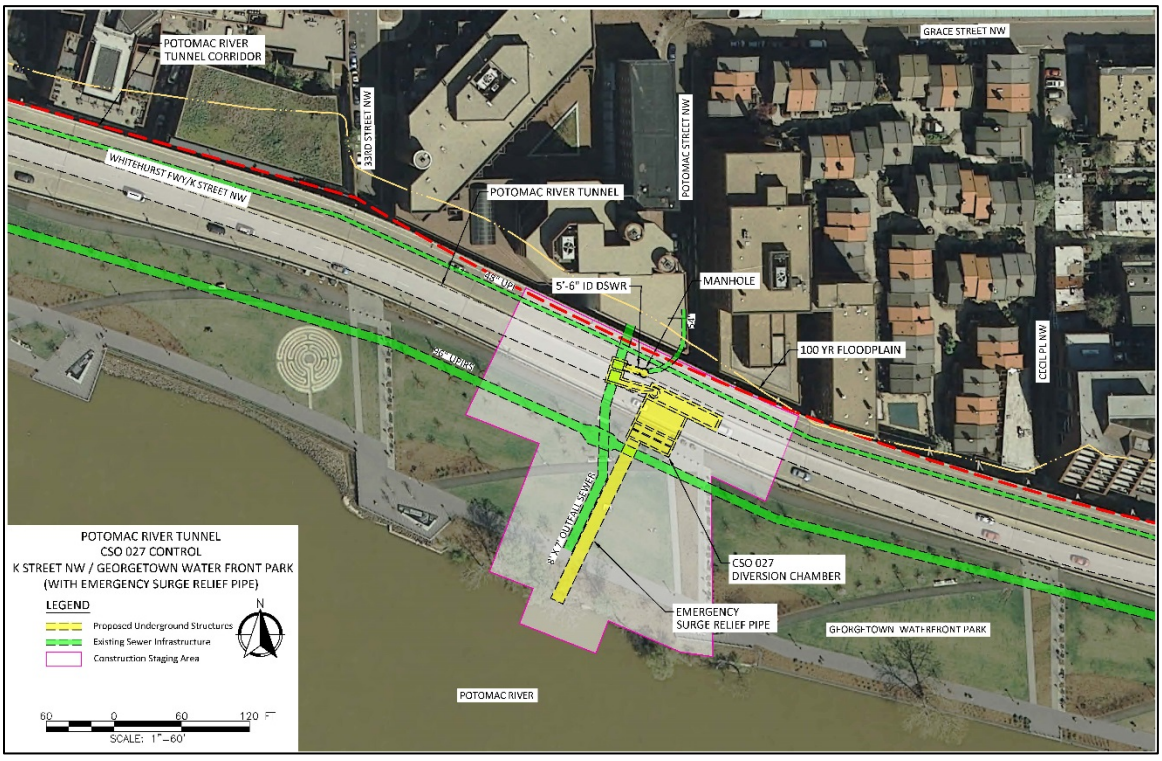

Figure 2-16: CSO 027 Control Option 1 – K Street NW / Georgetown Waterfront Park (with Emergency Surge Relief Pipe)

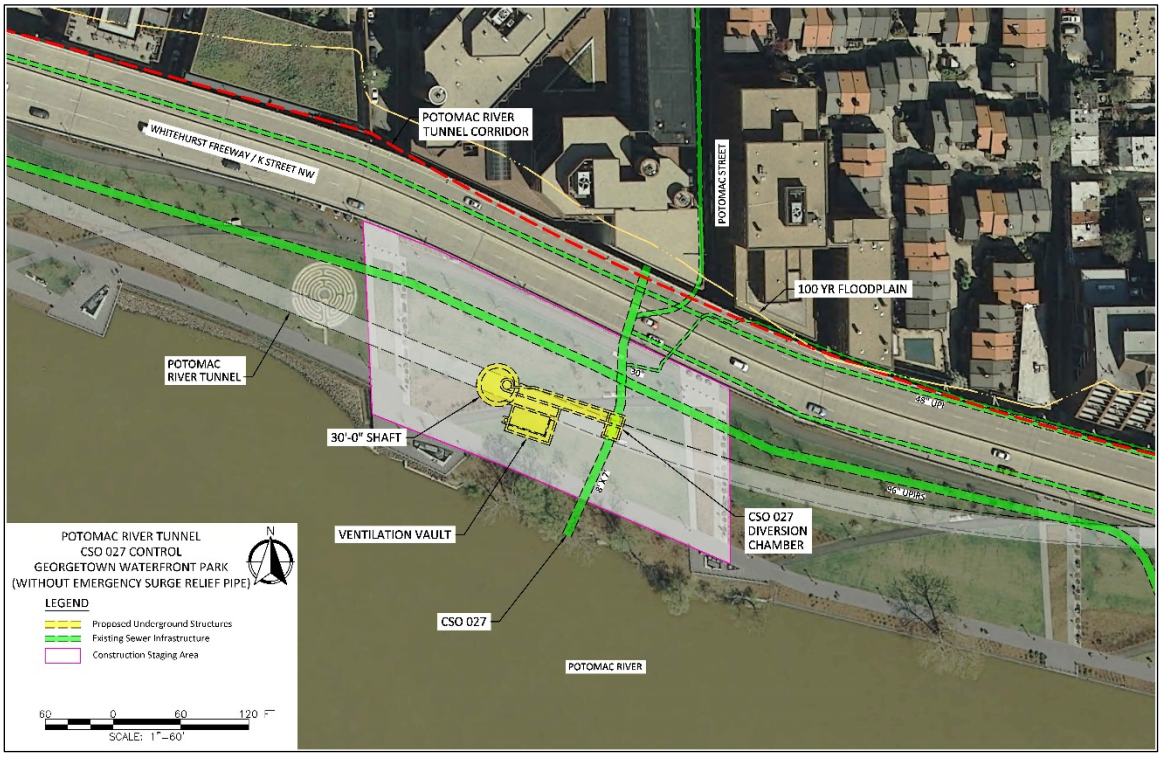

Figure 2-17: CSO 027 Control Option 2 – Georgetown Waterfront Park (without Emergency Surge Relief Pipe)

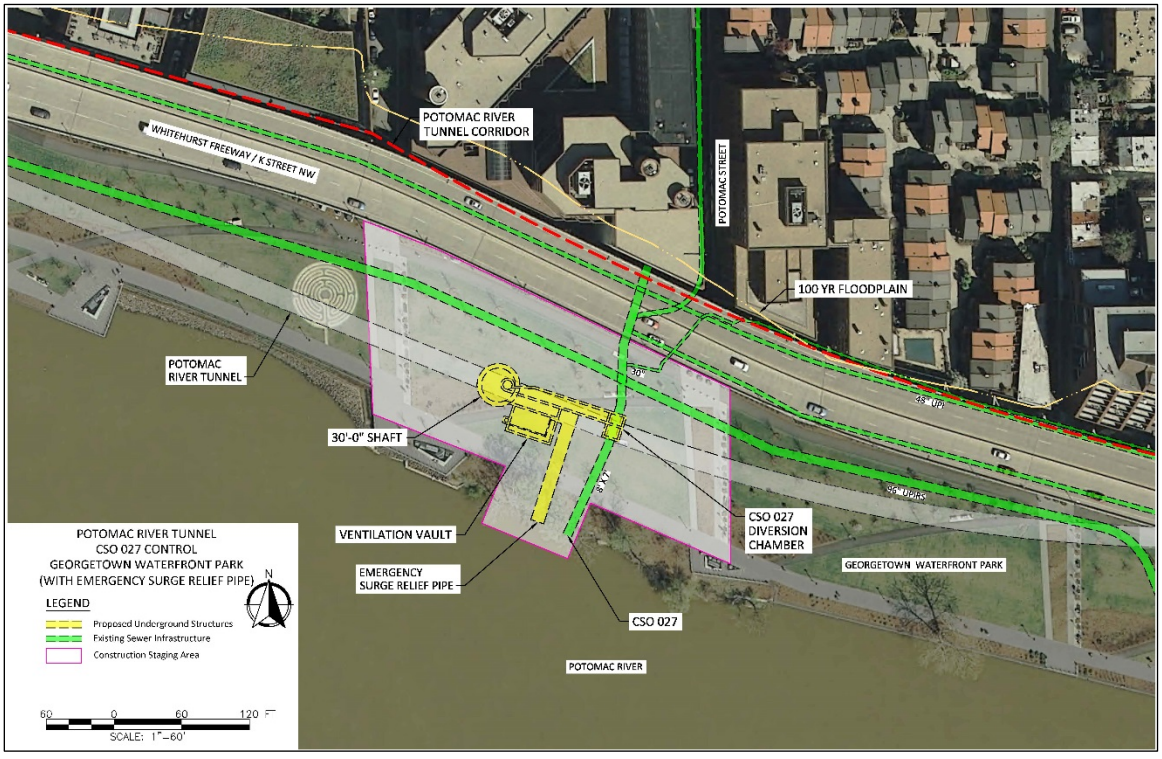

Figure 2-18: CSO 027 Control Option 2 – Georgetown Waterfront Park (with Emergency Surge Relief Pipe)

2.2.10 Component 10 – CSO 028 Control (Preferred with Emergency Surge Relief Pipe)

CSO 028 discharges to the Potomac River just west of the Potomac (Alexandria) Aqueduct remains. A facility is required to divert a minimum of 9 MGD of combined sewer flows from the existing outfall to the tunnel. One site is presented for detailed analysis, with two conceptual layouts provided depending on the location selected for an emergency surge relief pipe required to protect the low-lying area between CSO 024 and CSO 028 from flooding due

to transient flows within the tunnel system during extreme filling events. The emergency surge relief pipe may also be constructed as part of the CSO 027 Control. Another site option that was considered but dismissed is presented in *Section 2.3*. The CSO 028 Control would be constructed along the Capital Crescent Trail adjacent to the C&O Canal embankment just west of the Potomac (Alexandria) Aqueduct remains (**Figure 2-19** without emergency surge relief pipe, **Figure 2-20** with emergency surge relief pipe.). The diversion chamber would be retrofitted to the existing 4-foot x 4-foot outfall sewer to divert wet weather flow up to the design capacity to the tunnel for storage. An approach channel would be constructed to convey flow from the diversion chamber to the drop shaft. Because the site is below the 100-year floodplain elevation, access to the drop shaft and the tunnel ventilation grating would be extended above the elevation of the trail by approximately 8 feet to protect the tunnel system from flooding and contain transient flows within the shaft during extreme tunnel filling events. The elevated portion of the drop shaft would be approximately 700 square feet if the site is selected for the emergency surge relief pipe, and approximately 300 square feet if the emergency surge relief pile is constructed at CSO 027 instead. In either case, it would be incorporated into the existing embankment to minimize visual impacts, and exposed portions would be finished with materials coordinated between DC Water, NPS, and other stakeholders. During construction, a temporary detour would be constructed to maintain pedestrian, bicycle, and vehicular access along the Capital Crescent Trail. Upon completion of construction, the site would be restored substantially to the existing conditions, with only the upper drop shaft, manholes, hatches, and other structure access points visible at- and above-grade. The final site layout and restoration would be coordinated with the NPS and other stakeholders during the final design and permitting process.

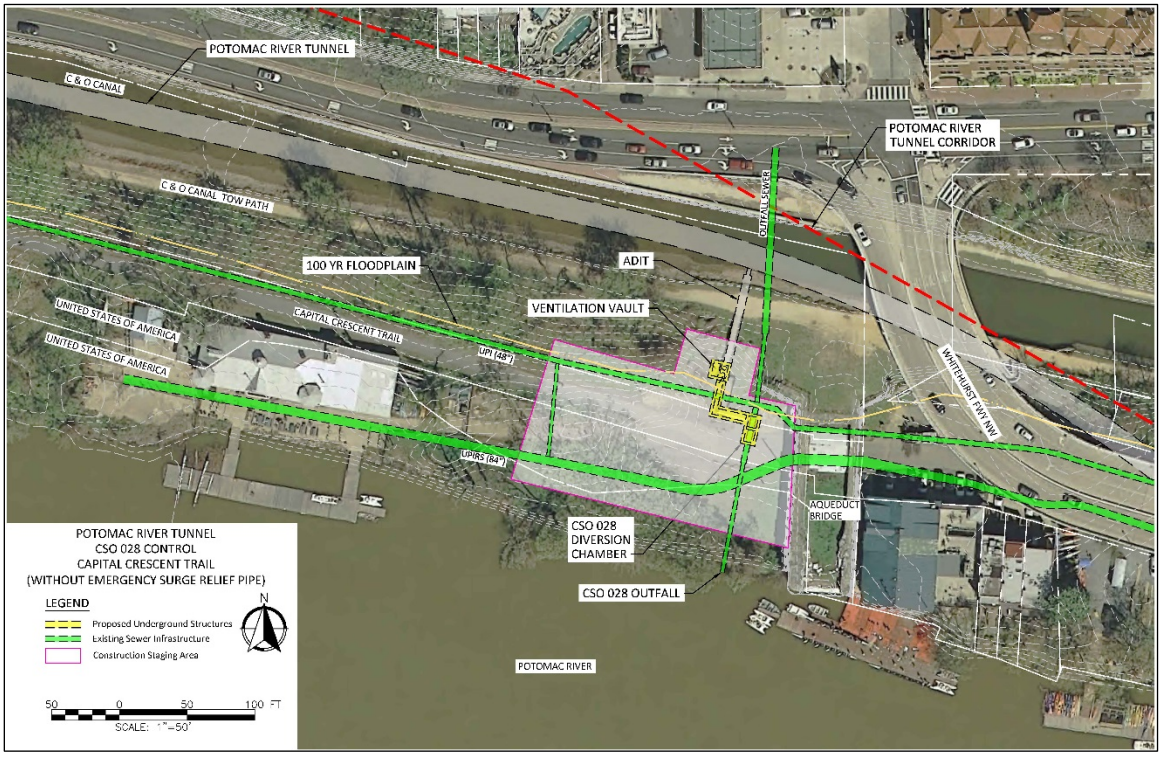

Figure 2-19: CSO 028 Control (without Emergency Surge Relief Pipe)

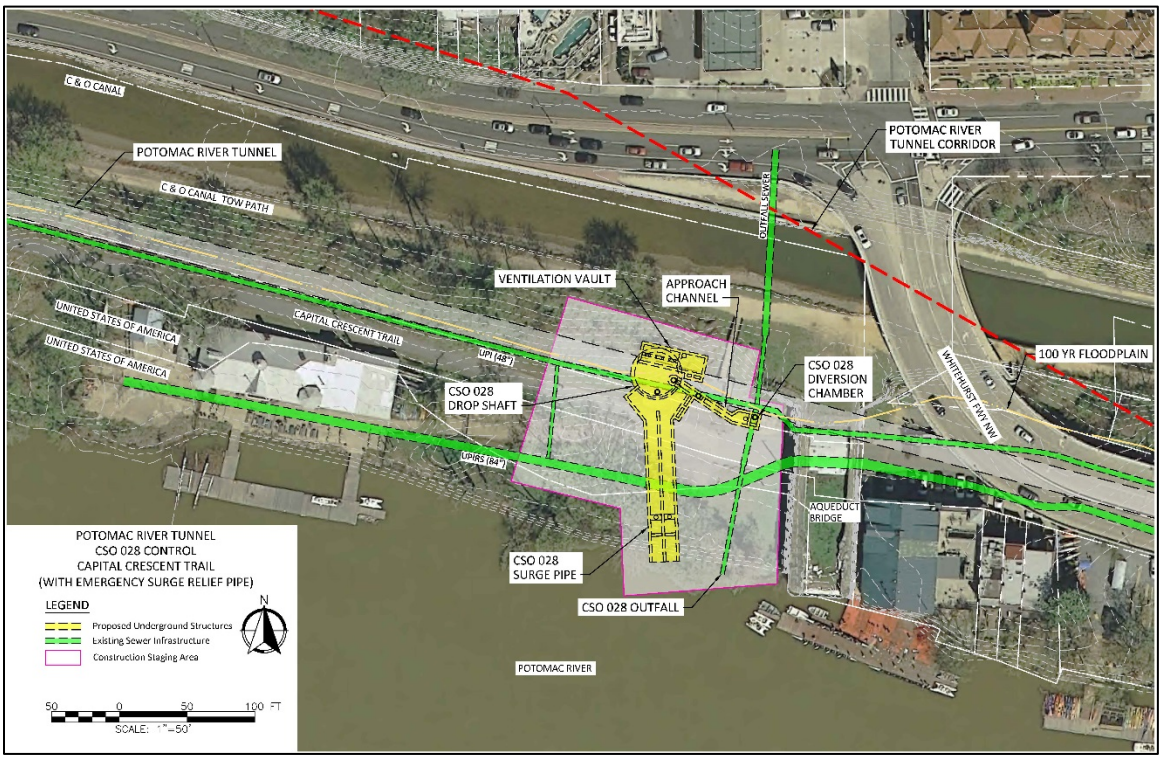

Figure 2-20: CSO 028 Control (with Emergency Surge Relief Pipe)

2.2.11 Component 11 – CSO 029 Control

CSO 029 discharges to the Potomac River along the Capital Crescent Trail south of Georgetown University approximately 1,500 feet west of the Potomac (Alexandria) Aqueduct remains. A facility is required to divert a minimum of 133 MGD of combined sewer flows from the existing outfall to the tunnel. Two facility layout options are presented for detailed analysis. Another option that was considered but dismissed is presented in Section 2.3.

2.2.11.1 CSO 029 Control Option 1 – Canal Road NW / Georgetown University Southwest Entrance

CSO 029 Control Option 1 would be constructed along Canal Road NW at the southwest entrance to Georgetown University (**Figure 2-21**). A diversion chamber, approach channel, and drop shaft would be constructed near the existing sewer. The diversion chamber would be retrofitted to the existing 7-foot diameter outfall sewer to divert wet weather flow up to the design capacity to the tunnel for storage. An approach channel would be constructed to convey flow from the diversion chamber to the drop shaft. A below grade ventilation control vault would be constructed to ventilate air from the tunnel during filling events, with equipment provided to mitigate fugitive emissions. Above grade electrical cabinets would be necessary to serve the ventilation equipment. Pending final design, retaining wall(s) may be required to provide additional level working space for construction of the diversion structure and / or shaft or the relocation of roadways. These walls may be temporary or permanent. The configuration and materials of the wall(s) would be coordinated with Georgetown University, DDOT and other stakeholders as appropriate. During construction, lane and sidewalk closures would be required along Canal Road NW and the southwest access to Georgetown University. Construction of the diversion structure would be phased to maintain access to vehicles entering and exiting Georgetown University. Maintenance of traffic controls, detours, and phasing of construction would be utilized to maintain circulation of vehicular and pedestrian traffic to the extent practicable. Upon completion of construction, the site would be restored substantially to the existing conditions, with only electrical cabinets, manholes, ventilation grating, hatches, and other structure access points visible at grade. The final site layout and restoration would be coordinated with DDOT, Georgetown University, and other stakeholders during the final design and permitting process.

2.2.11.2 CSO 029 Control Option 2 – South of Georgetown University (Preferred Option)

CSO 029 Control Option 2 would be constructed between Canal Road NW and the southwest entrance to Georgetown University (**Figure 2-22**). A diversion chamber, approach channel, and drop shaft would be constructed near the existing sewer. Except for the location and layout of the construction area, aspects of this option are similar to those

described under Option 1 in *Section 2.2.11.1*. The southwest access to Georgetown University would remain open for through traffic, though temporary closures of portions of the entrance may be necessary during construction.

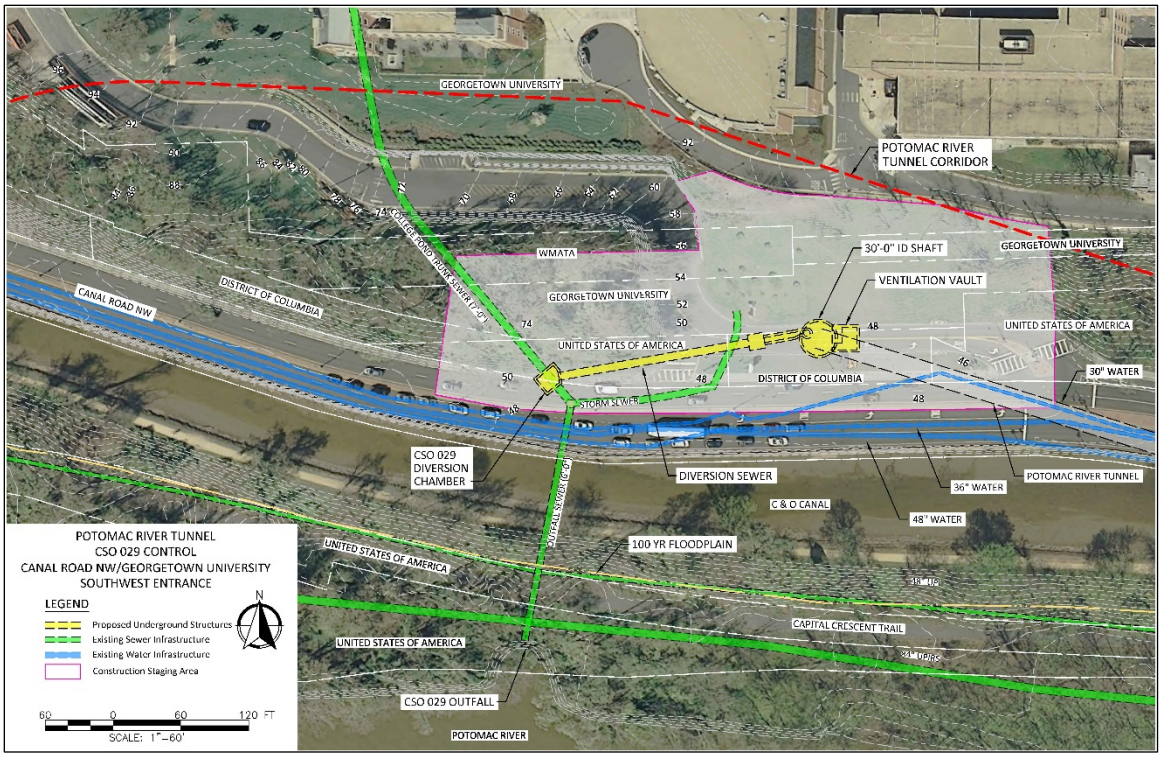

Figure 2-21: CSO 029 Control Option 1 – Canal Road NW / Georgetown University Southwest Entrance

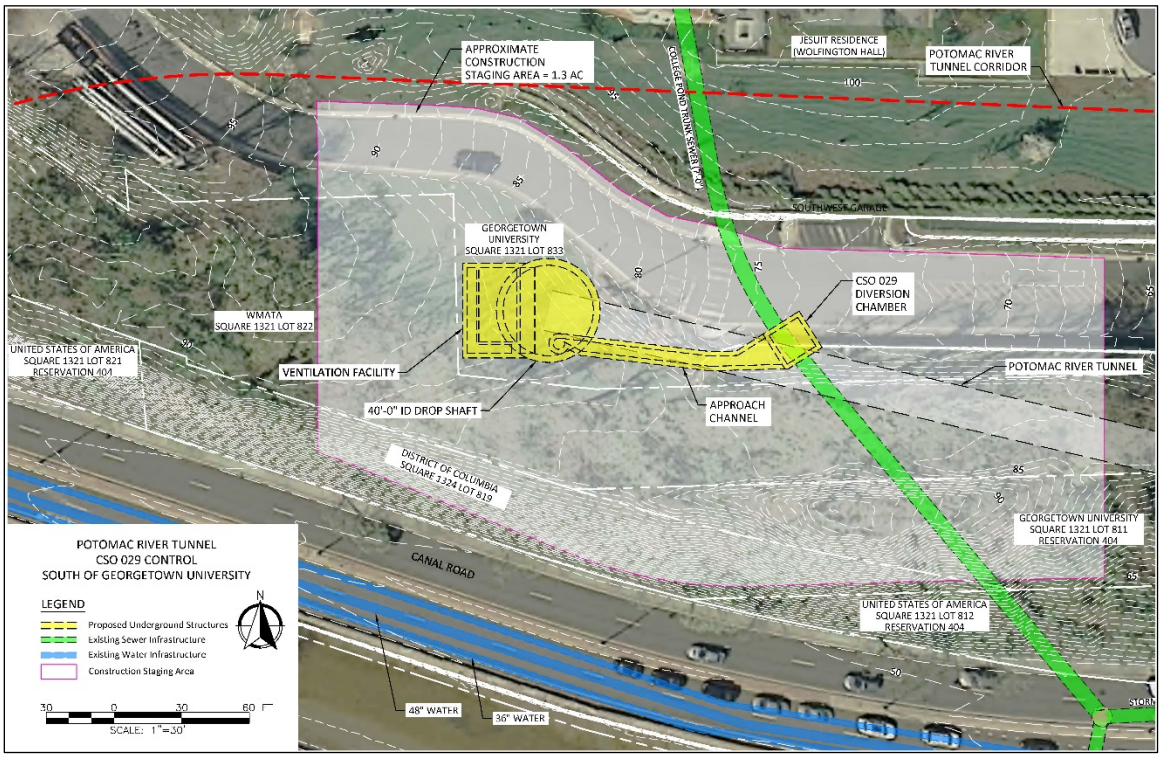

Figure 2-22: CSO 029 Control Option 2 – South of Georgetown University

2.2.12 Component 12 – Tunnel Connection to Existing Shaft at JBAB

At its downstream end, the Potomac River Tunnel will be connected to the existing Blue Plains Tunnel, which would convey the flow to Blue Plains. The connection would be made via the existing drop shaft at JBAB, which has been designed to accommodate this connection (**Figure 2-23**). All work at this site would occur within the tunnel and existing drop shaft, except for potential ground improvement at the Potomac River Tunnel's interface with the drop shaft. The site would be restored substantially to existing conditions. All work at this site would be coordinated closely with JBAB.

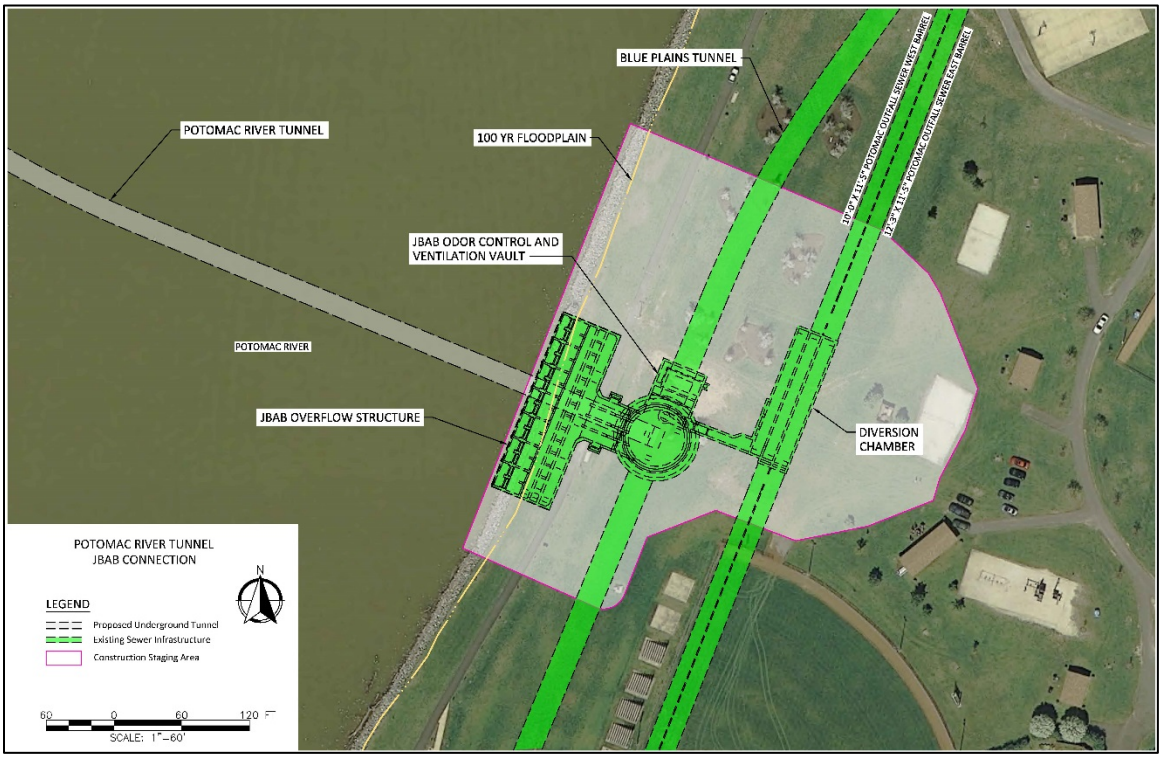

Figure 2-23: Tunnel Connection to Existing Shaft at JBAB

2.2.13 Construction Haul Routes

Proposed haul routes have been identified for construction traffic that primarily coincide with DDOT's current Truck and Bus Route System Map dated May 7, 2010 and are described in the following sections. Final selection of haul routes would be coordinated with DDOT and NPS and would take traffic, road conditions, and bridge capacities into consideration. Proposed haul routes are described for each of the construction areas and are presented on figures provided in **Appendix A**.

2.2.14 Potential GI Practicability Determination Outcomes within the Proposed Action

DC Water's Consent Decree was amended in 2016 to include the use of GI strategies to control CSOs with the intention of replacing portions of the proposed storage / conveyance tunnels and diversion facilities for the smaller, more upstream CSOs discharging to the Potomac River. Bioretention, downspout disconnection, and permeable pavement are examples of some of the types of low impact development facilities that would be constructed within the CSOs 027, 028, and 029 sewersheds (GI sewersheds, **Figure 1-2**). These facilities allow stormwater to flow through the surface layer of the facility to an underground storage layer, often composed of gravel. The facilities then temporarily store the runoff, slowing down the flow into the existing sewer system. Depending on soil conditions, the flow may infiltrate into the ground rather than flowing into the sewer system. **Figure 2-24** illustrates some examples of the GI practices that could be constructed within the Potomac River sewersheds.

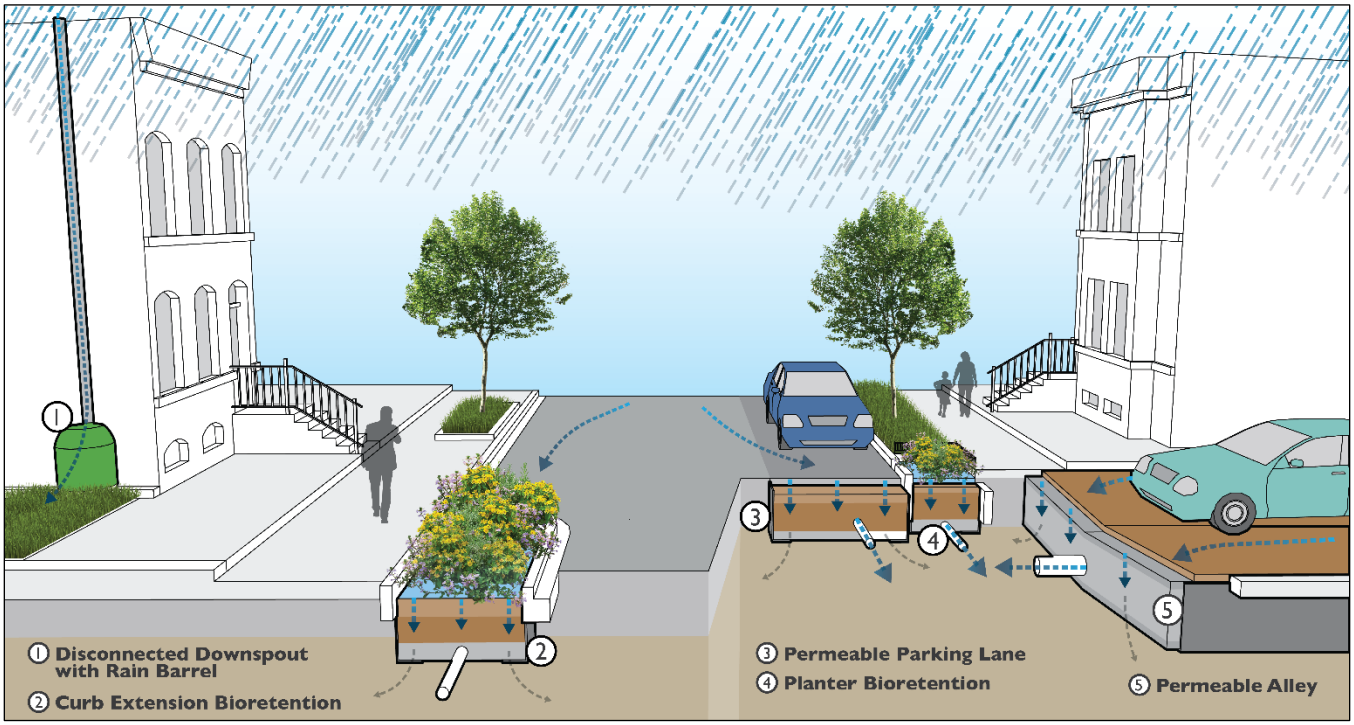

Figure 2-24: Graphic Illustration of Several Green Infrastructure Practices

To comply with the Consent Decree requirement to evaluate the practicability of GI, DC Water has initiated Green Infrastructure Project 1. This project will implement a portion of the required GI within the Potomac River GI sewersheds. DC Water will monitor and assess the outcome of Project 1 to determine the practicability of implementing the remainder of the required GI in these sewersheds. Green Infrastructure Project 1 is scheduled to be completed in 2019, with post-construction monitoring to conclude by 2020. Based on the outcome of the GI practicability determination, the western (upstream) terminus of the Potomac River Tunnel may vary. Four potential outcomes of the GI practicability determination are possible, which are summarized in **Table 2-2**. For each outcome, the Potomac River Tunnel would terminate at the most upstream CSO to be controlled by the tunnel.

Table 2-2: Possible Green / Gray Infrastructure Outcomes for the Proposed Action Alternative

Outcome	CSOs 020 - 024	CSO 027	CSO 028	CSO 029
A	Gray Infrastructure	Green Infrastructure	Green Infrastructure	Green Infrastructure
B	Gray Infrastructure	Gray Infrastructure	Green Infrastructure	Green Infrastructure
C	Gray Infrastructure	Gray Infrastructure	Gray Infrastructure	Green Infrastructure
D	Gray Infrastructure	Gray Infrastructure	Gray Infrastructure	Gray Infrastructure

Detailed facility siting and design have not been performed for the level of GI implementation required by the Amended Federal Consent Decree should GI be determined practicable. **Table 2-3** identifies the impervious acres of drainage area to be managed by GI after completion of GI Project 1. The type, configuration, and layout of GI facilities will be site specific and will be dependent on the results of the practicability assessment performed for GI Project 1.

Table 2-3: Impervious Area to be Controlled by GI per Amended Federal Consent Decree

Parameter Description	CSO 027	CSO 028	CSO 029
Total Sewershed Area	164 acres	21 acres	330 acres
Impervious Area to be Controlled by GI [(1)]	31 acres	4 acres	25 acres

[(1)] Area indicates remainder of impervious acres to be managed after completion of GI Project 1

2.2.15 NPS Preferred Alternative

Alternative B, which consists of the proposed action intended to comply with the Amended Federal Consent Decree, is the preferred alternative. The preferred option, where applicable, is listed for each project component in **Table 2-4**.

Table 2-4: Component Options Comprising the Preferred Alternative

Component Number	Component Description	Preferred Option
1	Tunnel Corridor	As described in *Section 2.2.1* and depicted on **Figure 1-2**
2	Tunnel Mining Site	Option 1 - West Potomac Park (North) As described in *Section 2.2.2.1* and depicted on **Figure 2-3**
3	Emergency Overflow Structure	Option 1 - West Potomac Park (North) As described in *Section 2.2.3.1* and depicted on **Figure 2-5**
4	Ventilation Control Facility and UPIRS Diversion Structure	As described in *Section 2.2.4* and depicted on **Figure 2-8**
5	CSO 020 Control	Option 1 - 23rd Street NW / Constitution Avenue NW As described in *Section 2.2.5.1* and depicted on **Figure 2-9**
6	CSO 021 Control	As described in *Section 2.2.6* and depicted on **Figure 2-11**
7	CSO 022 Control	Option 1 - Waterfront / Existing Outfall As described in *Section 2.2.7.1* and depicted on **Figure 2-12**
8	CSO 024 Control and UPI Diversion Structure	As described in *Section 2.2.8* and depicted on **Figure 2-14**
9	CSO 027 Control	Option 1 - K St NW / Georgetown Waterfront Park (without Emergency Surge Relief Pipe) As described in *Section 2.2.9.1* and depicted on **Figure 2-15** if GI is determined impracticable
10	CSO 028 Control	CSO 028 Control (with Emergency Surge Relief Pipe) As described in *Section 2.2.10* and depicted on **Figure 2-20** if GI is determined impracticable
11	CSO 029 Control	As described in *Section 2.2.11.2* and depicted on **Figure 2-22** if GI is determined impracticable
12	Tunnel Connection to Existing Shaft at JBAB	As described in *Section 2.2.12* and depicted on **Figure 2-23**
-	Green Infrastructure	Pending GI practicability determination

2.2.16 Mitigation Measures of the Proposed Action

Mitigation measures would be implemented under the proposed action, whenever feasible, for the protection of natural and cultural resources, quality of the local communities, and visitor experience in the parks. The exact mitigation measures would depend upon the final design and plan approvals by relevant agencies. The following mitigation measures are proposed to reduce project impacts:

2.2.16.1 Water Quality

- Erosion and sediment controls would be employed in areas of ground disturbance that would be reviewed and approved by DOEE.
- Silt fencing, silt bags, cofferdams, hay bales, diversion channels and berms, temporary stormwater basins, temporary inlet protection, stabilized construction entrances, and vegetation stabilization may be used to contain erodible materials within the construction areas.
- Sediment-laden water would be pumped into existing combined sewers for treatment at Blue Plains. Waters containing one or more constituents at or above current DC Water discharge standards would be disposed of by alternative methods, such as offsite disposal or onsite wastewater treatment. DC Water would outline treatment procedures prior to any onsite treatment in a Water Treatment Plan approved by DOEE.
- Groundwater and / or surface water monitoring would be conducted to ensure that erosion and sediment controls are effective during construction.
- Installation of cofferdams would occur behind full-depth turbidity curtains to contain disturbed river bottom sediments during work within the Potomac River.
- A post-construction surface water monitoring program would be conducted in accordance with DC Water's NPDES permit.
- Coordination between DC Water, NPS, USACE, and DOEE would be undertaken to determine potential mitigation for permanent waterway impacts in accordance with Sections 401 and 404 of the Clean Water Act.

2.2.16.2 Riverine Wetlands

- NPS and DC Water would conduct invasive species management within riverine and floodplain areas of Rock Creek Park. See the Wetland Statement of Findings provided as **Appendix C** for more details.

2.2.16.3 Visitor / Community Use and Experience

- Temporarily relocated park functions and facilities would be reestablished after construction.

- NPS would assist event coordinators through the special use permit review process to identify alternative locations for events or modify an event's structure during construction.
- Trees removed would be replaced in kind or with native species at a ratio coordinated with the NPS.
- Temporary detours would be established for trails, parks, and sidewalks during construction.
- Barriers would be placed around constructions sites to limit the visibility of activities and equipment.
- In-river construction areas would be clearly defined, and access would be restricted to ensure the safety of visitors engaged in water-based activities.
- Design of at- or above-grade structures would be developed in coordination with the NPS and DC SHPO to minimize visual impacts of the facilities.
- Temporary ADA-compliant pedestrian access routes would be provided for residences, businesses, and other facilities adjacent to construction areas.
- Noise reduction measures would be implemented at construction areas and may include temporary noise barriers, the use of quiet equipment models, maintaining mufflers, lubrication of equipment, limiting idling, minimizing the use of back-up alarms, and frequent noise monitoring.
- Maintenance of traffic would be implemented during construction to minimize congestion.

2.2.16.4 Historic Structures and Districts

- Preconstruction surveys would be conducted, as needed, and other construction means and methods would be identified to minimize the effects of vibration on historic structures.
- Monitoring and structural protection would be implemented during construction, as needed.
- Trees of the same or similar species would be planted to replace trees removed during construction.
- DC Water, in consultation with NPS, DC SHPO, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for each construction site.
- DC Water, NPS, and DC SHPO would develop an agreement document that would define the continued consultation and monitoring processes for the project and stipulate mitigation of any adverse effects to historic properties.

2.2.16.5 Archeological Resources

- Identified archeological resources would be evaluated for listing in the National Register and appropriate avoidance, minimization, and mitigation approaches would be developed in consultation with NPS and DC SHPO.
- DC Water, NPS, and DC SHPO would develop an agreement document that would define the continued consultation and monitoring processes for the project and stipulate mitigation of any adverse effects to archeological resources.

2.2.16.6 Cultural Landscapes

- DC Water, in consultation with NPS, DC SHPO, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for each site and minimize the visual intrusion to other nearby cultural landscapes.
- Park functions and facilities would be reestablished post-construction and removed trees would be replaced by the same or similar species.

2.3 COMPONENT OPTIONS CONSIDERED BUT DISMISSED

The following component options were considered during project planning and conceptual design of the Potomac River Tunnel. These options were dismissed due to unacceptable impacts or cost, or engineering design or constructability limitations.

2.3.1 Dismissed Tunnel Mining Site Options

Three additional sites were considered for mining the proposed Potomac River Tunnel. The additional sites, including their primary reasons for dismissal, are summarized in **Table 2-5**, and illustrated in subsequent figures.

Table 2-5: Dismissed Tunnel Mining Site Options

Site	Figure	Primary Reason(s) for Dismissal
North of Lincoln Memorial (CSO 020)	**Appendix B, Figure 1**	• Less desirable geotechnical conditions • Potential site of National Desert Storm War Memorial
NPS NCR Headquarters	**Appendix B, Figure 2**	• Undesirable geotechnical conditions • Insufficient space for mining operations • Impacts to NPS NCR and US Park Police Headquarters
East Potomac Golf Course	**Appendix B, Figure 3**	• Undesirable geotechnical conditions • Impacts to golf course operations

2.3.2 Dismissed Emergency Overflow Structure Option

DC Water considered one additional site for the emergency overflow structure, the East of Key Bridge site, as shown on **Figure 4** in **Appendix B**. This potential site was considered during the planning process but dismissed from further consideration primarily because the location of the structure would be upstream of the high use river areas and is the location of a future boathouse facility planned to be constructed as part of the Georgetown Nonmotorized Boathouse Zone. This option would also require significantly long diversion sewers to connect to adjacent CSOs, reducing the feasibility of consolidating multiple facilities into one construction site.

2.3.3 Dismissed Ventilation Control Facility Option

DC Water considered one additional site for the ventilation control facility, the East of Key Bridge site, as shown on **Figure 5** in **Appendix B**. This potential site was considered during the planning process but dismissed from further consideration because the location of the structure is the location of a future boathouse facility planned to be constructed as part of the Georgetown Nonmotorized Boathouse Zone. This option would also require significantly long diversion sewers to connect to adjacent CSOs, reducing the feasibility of consolidating multiple facilities into one construction site.

2.3.4 Dismissed CSO 024 Control Option

DC Water considered one additional site for the CSO 024 Control facilities, which is shown on **Figure 6** in **Appendix B**. The additional CSO 024 Control site is located along the Potomac River waterfront, just south of the House of Sweden. This option was dismissed for the following reasons:

- Located in a high use park area;
- Requires a significantly longer adit to connect to the tunnel;
- Unable to connect to the UPI to provided redundancy for Rock Creek Pumping Station; and
- Existing roadways do not provide access for operation and maintenance.

2.3.5 Dismissed CSO 027 Control Option

DC Water considered one additional site for the CSO 027 Control, which is shown on **Figure 7** in **Appendix B**. The additional CSO 027 Control site considered is located along Potomac Street NW, just north of its intersection with K Street NW. This option was dismissed due to insufficient space within the public right-of-way between buildings for construction of the necessary facilities, exacerbated by a high congestion of existing utilities. Construction would require closure of Potomac Street NW, a one-way street that is not fully interconnected with the surrounding street grid due to the C&O Canal, restricting access to certain properties due to lack of available detour routes.

2.3.6 Dismissed CSO 028 Control Option

DC Water considered one additional site for the CSO 028 Control, which is shown on **Figure 8** in **Appendix B**. The additional CSO 028 Control site considered is located along the C&O Canal Towpath, between the C&O Canal and the Potomac (Alexandria) Aqueduct remains. This option was dismissed due to the potential impacts to the C&O Canal prism, including the towpath and canal embankment, which would be required to construct an access to the elevated area for construction, operation, and maintenance.

2.3.7 Dismissed CSO 029 Control Option

DC Water considered one additional site for the CSO 029 Control, which is shown on **Figure 9** in **Appendix B**. The additional CSO 029 control site considered is located along the Capital Crescent Trail adjacent to the existing outfall, south of Georgetown University. This option was dismissed due to lack of access, creating the potential for impacts to the trail and surrounding forest during construction, operation, and maintenance. Additionally, the site is below the 100-year floodplain, which would require elevated facilities to protect the tunnel from flooding.

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3.0 AFFECTED ENVIRONMENT

This chapter describes the resources that could be affected from implementation of the proposed action. The topics presented in this chapter are those related to the key issues described in *Chapter 1: Purpose and Need*. The descriptions of the existing resources and conditions provided in this chapter serve as an account of the baseline conditions for comparison against the potential impacts of the alternatives.

3.1 WATER QUALITY

The EPA, under Section 303(d) of the Clean Water Act, requires states (including the District and Tribal governments) to prepare a list of waterbodies or waterbody segments that do not meet EPA-mandated water quality standards. The Section 303(d) listing requirement applies to waters impaired by point and / or nonpoint sources of pollution discharge. States are assigned the responsibility for reviewing, developing, and revising water quality standards, subject to EPA approval and certification, with the goal to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (40 CFR 131.2). Regulations pertaining to the water quality standards for the District were published in 2010 under DCMR Title 21, Chapter 11. Included in the regulations are designated use categories and use criteria for surface waters of the District. These include Use Category A: Primary Contact Recreation (i.e. swimming and direct contact); Use Category B: Secondary Contact Recreation (i.e. boating and indirect contact); Use Category C: Protection and propagation of fish, shellfish, and wildlife; Use Category D: Protection of human health related to consumption of fish and shellfish; and Use Category E: Navigation. Of the designated uses, all but Use Category A are current uses of the Potomac River within the study area. Use criteria for Use Category A requires surface waters to be free of discharges of untreated sewage, litter and unmarked submerged or partially submerged man-made structures that would constitute a hazard to users.

The Potomac River is included on the Section 303(d) list of impaired waters and is divided into three segments for assessment purposes. According to monitoring and analysis conducted to support the development of the Section 303(d) list for the District, existing water quality of the Middle Potomac River Segment 2, in which the study area is located, exceeded standards for *E. coli*, pH, turbidity, and polychlorinated biphenyls (PCBs). It was therefore determined that even though designated uses of the waterbody segment include Use Category B, C, D, and E, actual water quality data suggest only Use Category E is supported.

For listed waters, the District is required to develop TMDLs that specify the maximum amount of a pollutant that a water body can receive while still meeting federal and District water quality standards. Five TMDLs have been approved for the Potomac River within District waters, including *E. coli*, total PCBs, nitrogen and phosphorus, total suspended solids, and pH. The sources of *E. coli* that have detrimental effects on District waters are CSOs, urban stormwater runoff / storm sewers, municipal point sources, and pollutants from upstream jurisdictions (DOEE 2016).

There are 47 active CSO outfalls in the District, of which 10 are located along the Potomac River. During the development of the LTCP in 2002, DC Water's CSO Model for Average Year predicted that, in a normal rainfall year, there will be 74 CSOs to the Potomac River, releasing a predicted volume of 953 million gallons of untreated discharges (DC Water 2002). Since 2002, improvements to the combined sewer system implemented by DC Water as part of its NMC and Phase 1 CSO Control Programs have reduced CSOs to the Potomac River to an estimated 654 million gallons, an estimated 38 percent reduction by volume (DC Water 2015). CSOs contribute to water quality degradation because they contain pollutants such as *E. coli*, suspended solids, oil and grease, organics, and metals. CSO discharges also contribute to low dissolved oxygen levels that can have detrimental effects on the ability of a waterbody to support aquatic life, and constituents of CSOs can accumulate in the tissues of fish and shellfish. Additionally, contact with CSO-polluted waters or consumption of polluted fish and shellfish can cause human health concerns. At a minimum, CSO discharges reduce the aesthetic appearance of surface waters and can result in unpleasant odors.

Sediment is another pollutant of concern that contributes to reduced water clarity and increased turbidity levels that exceed water quality standards within the Middle Potomac River Segment 2 (DOEE 2016). CSOs may contain sediment that enters the combined sewer system through natural processes, such as land and streambank erosion, and human use and disturbance, including construction activities. To limit sediment transport to District waters, an approved erosion and sediment control plan is required for all projects with 50 square feet or more of land disturbance (DCMR Title 21, Chapter 5).

3.2 RIVERINE WETLANDS

In addition to the federal regulations protecting waters of the United States described in the *Water Quality* section, NPS Director's Order 77-1: *Wetland Protection* provides protection for water resources, including wetlands. The NPS has

adopted the Federal Geographic Data Committee (FGDC) Wetland Classification Standard, which identifies wetlands as marine, estuarine, riverine, lacustrine, and palustrine systems (FGDC 2013). The Potomac River along the eastern shoreline of West Potomac Park is classified as riverine wetlands, which are defined as the areas within a waterway of a depth of 2.5 meters (8.2 feet) or less at low water, or at the limits of emergent or woody vegetation extending beyond this depth (FGDC 2013). To identify riverine wetlands, NOAA nautical charts were used to determine approximate water depths within the Potomac River. Riverine wetlands within the study area generally include soft bottom habitat consisting of fine grain sediments, sand, and mud. This habitat typically supports clams, worms, crustaceans, and other benthic invertebrates. According to the National Wetland Inventory (NWI) maintained by the US Fish and Wildlife Service, over 1,000 acres of unconsolidated soft bottom habitat exists in the Potomac River between the Francis Scott Key Bridge and the confluence of the Potomac and Anacostia Rivers (US Fish and Wildlife Service 2018).

Director's Order 77-1: *Wetland Protection* and Procedural Manual 77-1 require a Wetland Statement of Findings be prepared for projects or actions with unavoidable impacts to wetlands that are greater than 0.1 acres (NPS 2016a). The Statement of Findings documents compliance with the NPS wetland protection procedures and describes the NPS proposal to compensate for conversion, degradation, or loss of wetland area and / or function and is coordinated with the NPS Water Resources Division for review and approval. A Wetland Statement of Findings has been prepared for this project and is provided as **Appendix C**. **Figure 1** in the Wetland Statement of Findings provides the extent of riverine wetlands within the Potomac River; however, Emergency Overflow Structure Option 1 at West Potomac Park is the focus of the evaluation in the Statement of Findings because it is the only location where riverine wetland impacts would occur. Other areas where construction activities would possibly occur within the Potomac River, including Emergency Overflow Structure Option 3 at CSO 022, and the emergency surge relief pipe at CSO 027 or CSO 028, are considered deepwater habitat according to the FGDC Wetland Classification Standard (2013) and are therefore not subject to the requirements of Procedural Manual 77-1.

3.3 VISITOR / COMMUNITY USE AND EXPERIENCE

The District within the Potomac River Tunnel study area affords many opportunities to tourists and residents alike. Opportunities for recreation and interpretation are provided within National Mall and Memorial Parks, Rock Creek Park, and C&O Canal NHP. Additional opportunities for visitors outside NPS administration include the Kennedy Center, historic Georgetown, and boating and other water-based activities within the Potomac River.

National Mall and Memorial Parks encompasses over 1,000 acres and receives over 22 million visitors annually (NPS 2010). Numerous monuments and memorials, are within the parks administration, including several that are proximal to the study area such as the Lincoln Memorial (7,915,934 annual visitors in 2016), the Franklin Delano Roosevelt Memorial (4,360,502 annual visitors in 2016), the Korean War Veterans Memorial (4,084,298 annual visitors in 2016), and the Martin Luther King, Jr. Memorial (3,638,208 annual visitors in 2016) (NPS 2016b).

West Potomac Park consists primarily of landscaped lawns and recreational fields, as well as the Tidal Basin. There are approximately 500 to 700 events held at West Potomac Park per year. Some of the most popular events held at West Potomac Park annually include the 4th of July Celebration, which attracts over 500,000 visitors and includes concerts and a firework display (NPS 2010); the Cherry Blossom Festival, which occurs over four weekends in early spring and attracts over 1.5 million visitors to the District annually (National Cherry Blossom Festival 2017); and the Rolling Thunder First Amendment Demonstration Run, which attracts over 1 million riders and spectators, making it the world's largest single-day motorcycle event (Rolling Thunder Washington, D.C. Inc. 2018). West Potomac Park includes multiple athletic fields, as well as sand volleyball courts northwest of the Lincoln Memorial. Parking is provided primarily along Ohio Drive SW and West Basin Drive SW. Numerous landscape trees, including American elms and flowering cherry trees, are planted alongside Ohio Drive SW and Independence Avenue SW.

Open to the public since 1971, the Kennedy Center is located within the study area along Rock Creek and Potomac Parkway overlooking the Potomac River. The Kennedy Center is home to nine performance spaces and three great halls hosting approximately 3,000 events each year. The Kennedy Center is currently constructing an expansion that includes additional performance spaces (The Kennedy Center 2017).

Within the study area, Rock Creek Park includes green areas along the Rock Creek and Potomac Parkway, and the Rock Creek Park Trail travels alongside the Parkway, affording views of the Potomac River, and continues past the Kennedy Center, the National Mall, and West Potomac Park, providing access to various points of interest within the District for daily commuters and for recreation. The Rock Creek Park Trail additionally provides connectivity to the C&O Canal towpath near Milepost 0 in Georgetown.

Georgetown Waterfront Park is a 10-acre park along the Potomac River between 31st Street NW and 34th Street NW. Georgetown Waterfront Park offers walking and bike paths, a high-arching fountain, an interactive labyrinth, a steel and cable pergola, steps leading to the edge of the Potomac River, and several overlooks (Friends of Georgetown Waterfront Park 2017). Visitors are provided views of the Potomac River, Theodore Roosevelt Island, and Virginia.

C&O Canal NHP parallels the Potomac River for 184.5 miles from Georgetown in Washington, DC to Cumberland, Maryland. Within the study area, the canal and towpath parallel Canal Road NW to Whitehurst Freeway, continuing east to their terminus at Milepost 0 at Rock Creek. The towpath provides opportunities for hikers and bikers and connects to the Rock Creek Park Trail providing a route used both recreationally and by commuters.

The Capital Crescent Trail is also located in the study area within the C&O Canal NHP. The trail is used both recreationally and for commuters and provides connections to both the C&O Canal towpath and the Rock Creek Park Trail by a connection through Georgetown Waterfront Park and along K Street NW. Within the study area, the trail follows a south-southeast direction between the C&O Canal towpath and the Potomac River waterfront terminating at the Georgetown trailhead at Water Street NW / K Street NW.

The Potomac River offers many opportunities within the District for visitors and residents to enjoy boating and other water-based activities. Within the study area, Thompson Boat Center provides boating lessons, storage, and rentals (Potomac River Guide 2017). Just upstream, the Washington Canoe Club, Potomac Boat Club, and Key Bridge Boathouse also provide facilities for nonmotorized water-based activities. The stretch of the Potomac River around these boating facilities is a popular area for visitors to enjoy the water; over 137,000 users engage in paddling, canoeing, kayaking, regattas, and competitive boating activities each year (NPS 2013).

The western portion of the study area is located within Georgetown, a National Historic Landmark located north of the Potomac River and west of Rock Creek. Historic homes and cobblestone streets contribute to Georgetown's cultural significance, and retail, dining, and entertainment options make the neighborhood a popular destination for tourists. Georgetown Waterfront Park is located along the Potomac River, in addition to other significant historic features such as the C&O Canal and towpath. Georgetown is also home to Georgetown University, the oldest Catholic and Jesuit university in the United States (Georgetown BID 2017).

3.3.1 Noise

The study area is an urban setting that experiences higher than typical background noise generated by vehicle traffic, construction, emergency vehicles and buses, and other noise generating activities. Sensitive receptors such as residences, businesses, and churches occur throughout the project area. The general provisions of noise control regulation in DC "promote public health, safety, welfare, and the peace and quiet of the inhabitants of the District," and "facilitate the enjoyment of the natural attractions of the District" (20 DCMR 2700.1).

Ambient acoustical site surveys were conducted in September and October 2017, to document background noise levels in the vicinity of nine proposed construction areas for the proposed project (DC Water 2018). The daytime monitoring period for this noise study is defined as weekday day (Monday, Tuesday, Wednesday or Thursday) between the hours of 10:00 am and 2:00 pm. The nighttime monitoring period for this noise study is defined as weekday night (Monday, Tuesday, Wednesday or Thursday) between the hours of 10:00 pm and 2:00 am. Varying sound levels were measured in terms on an equivalent decibel level (L_{eq}) using the A-weighted decibel scale (dBA). Background noise levels ranged from 61 – 70 dBA during the daytime monitoring, and from 52 – 65 dBA during the nighttime monitoring periods (DC Water 2018).

Section 20-2802 of the DCMR limits weekday daytime (7:00 am to 7:00 pm) construction activities to not exceed an hourly L_{eq} of 80 dBA at a residential property. For most other activities, with exceptions, Section 20-2701 of the DCMR provides the maximum permissible noise levels in residential, special purpose, and waterfront areas to be 60 dBA daytime (7:00 am to 10:00 pm) and 55 dBA nighttime (10:00 pm to 7:00 am). Based on the background noise data collection, daytime ambient noise levels at all the monitoring locations, and nighttime levels at all but two of the monitoring locations, exceeded maximum permissible noise levels as prescribed in Section 20-2701 (DC Water 2018).

3.3.2 Traffic

A traffic analysis was conducted in December 2017 to document levels of service (LOS) for various intersections throughout the study area (JMT 2018). LOS analysis is used to assess the overall operating conditions of intersections and characterize the intersections based on travel times, vehicle densities, and delays (**Table 3-1**).

The LOS was predicted for the year 2025, assuming a background growth rate and additional traffic from approved development in the study area, to identify the baseline condition during the period of construction. The LOS analysis was performed for 13 intersections within the study area and conceptual maintenance of traffic plans for each project component and option were taken into account, as appropriate, to also analyze the LOS during active construction.

In the 2025 baseline condition, most intersections within the study area are predicted to fall within the LOS A, B, and C designations. The following intersections are predicted operate at LOS D or lower:

- Ohio Drive SW at 23rd Street / Independence Avenue SW would operate at LOS E in both the AM and PM
- 27th Street NW at I Street NW would operate at LOS D in the AM
- K Street NW at 29th Street NW would operate at LOS F in the PM
- K Street NW at 30th Street NW would operate at LOS F in the PM
- K Street NW at Thomas Jefferson Street NW would operate at LOS F in the PM
- Canal Road NW at the Entrance to Georgetown University would operate as LOS D in the AM and LOS F in the PM (JMT 2018)

Table 3-1: Level of Service (LOS) Designations

Level of Service	Definition
LOS A	This is a condition of free flow, accompanied by low volumes and high speeds. Traffic density will be low, with uninterrupted flow speeds controlled by driver desires, speed limits, and physical roadway conditions. There is little or no restriction in maneuverability due to the presence of other vehicles, and drivers can maintain their desired speeds with little or no delay.
LOS B	This occurs in the zone of stable flow, with operating speeds beginning to be restricted somewhat by traffic conditions. Drivers still have reasonable freedom to select their speed and lane of operation. Reductions in speed are not unreasonable, with a low probability of traffic flow being restricted. The lower limit (lowest speed, highest volume) of this level of service has been used in the design of rural roadways.
LOS C	This is still in the zone of stable flow, but speeds and maneuverability are more closely controlled by the higher volumes. Most of the drivers are restricted in their freedom to select their own speed, change lanes, or pass. A relatively satisfactory operating speed is still obtained, with service volumes suitable for urban design practice.
LOS D	This level of service approaches unstable flow, with tolerable operating speeds being maintained, through considerably affected by changes in operating conditions. Fluctuations in volume and temporary restrictions to flow may cause substantial drops in operating speeds. Drivers have little freedom to maneuver, and comfort and convenience are low. These conditions can be tolerated, however, for short periods of time.
LOS E	This cannot be described by speed alone, but represents operations at lower operating speeds, typically, but not always, in the neighborhood of 30 miles per hour, with volumes at or near capacity of the highway. Flow is unstable, and there may be stoppages of momentary duration. This level of service is associated with operation of a facility at capacity flows
LOS F	This describes a forced-flow operation at low speeds, where volumes are below capacity; in the extreme, both speed and volume can drop to zero. There conditions usually result from queues of vehicles backing up for a restriction downstream. The section under study will be serving as a storage area during parts or all of the peak hour. Speeds are reduced substantially and stoppages may occur for short or long periods of time because of the downstream congestion.

3.4 HISTORIC STRUCTURES AND DISTRICTS

To identify potentially impacted historic properties for the NEPA analysis, the NPS and DC Water used the Area of Potential Effect (APE) for the Potomac River Tunnel project that has been developed in accordance with Section 106 of the National Historic Preservation Act as part of a separate but parallel regulatory process. The APE is defined as "the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The APE is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking" (36 CFR 800.16[d]).

The APE for the Potomac River Tunnel project is provided as **Figure 3-1**. The APE considers all the potential direct and indirect effects that the project could have on historic properties. The APE includes the maximum project area within which the tunnel and all supporting infrastructure could potentially be constructed, areas where potential visual effects might occur, and the entire CSOs 027, 028, and 029 sewersheds where GI may be implemented pending the outcome of the practicability determination required by DC Water's Amended Federal Consent Decree. A detailed map of the APE for the sewersheds where GI may be implemented is provided as **Figure 3-2**.

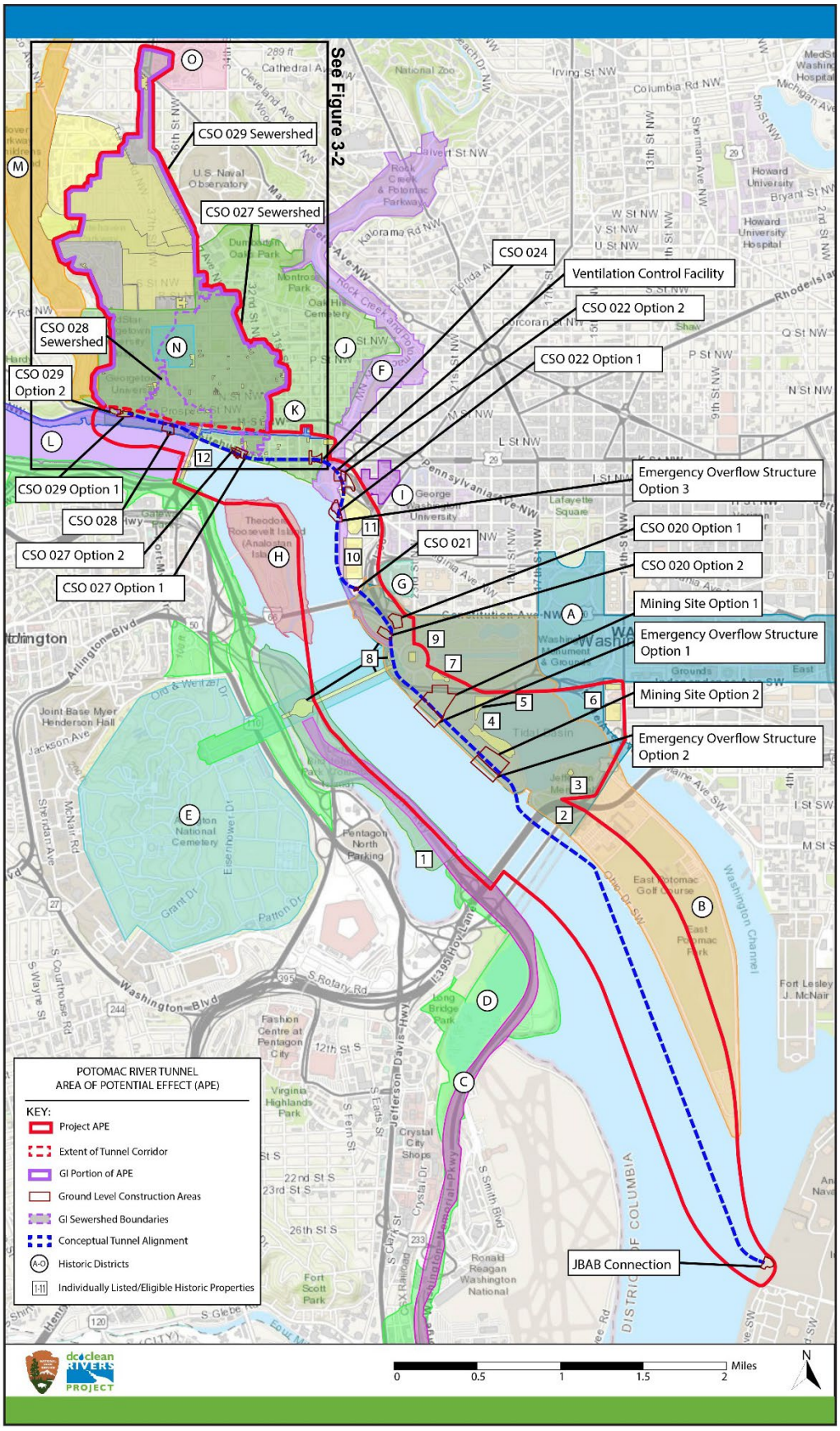

Figure 3-1: Historic Properties Potentially Affected by the Potomac River Tunnel Project

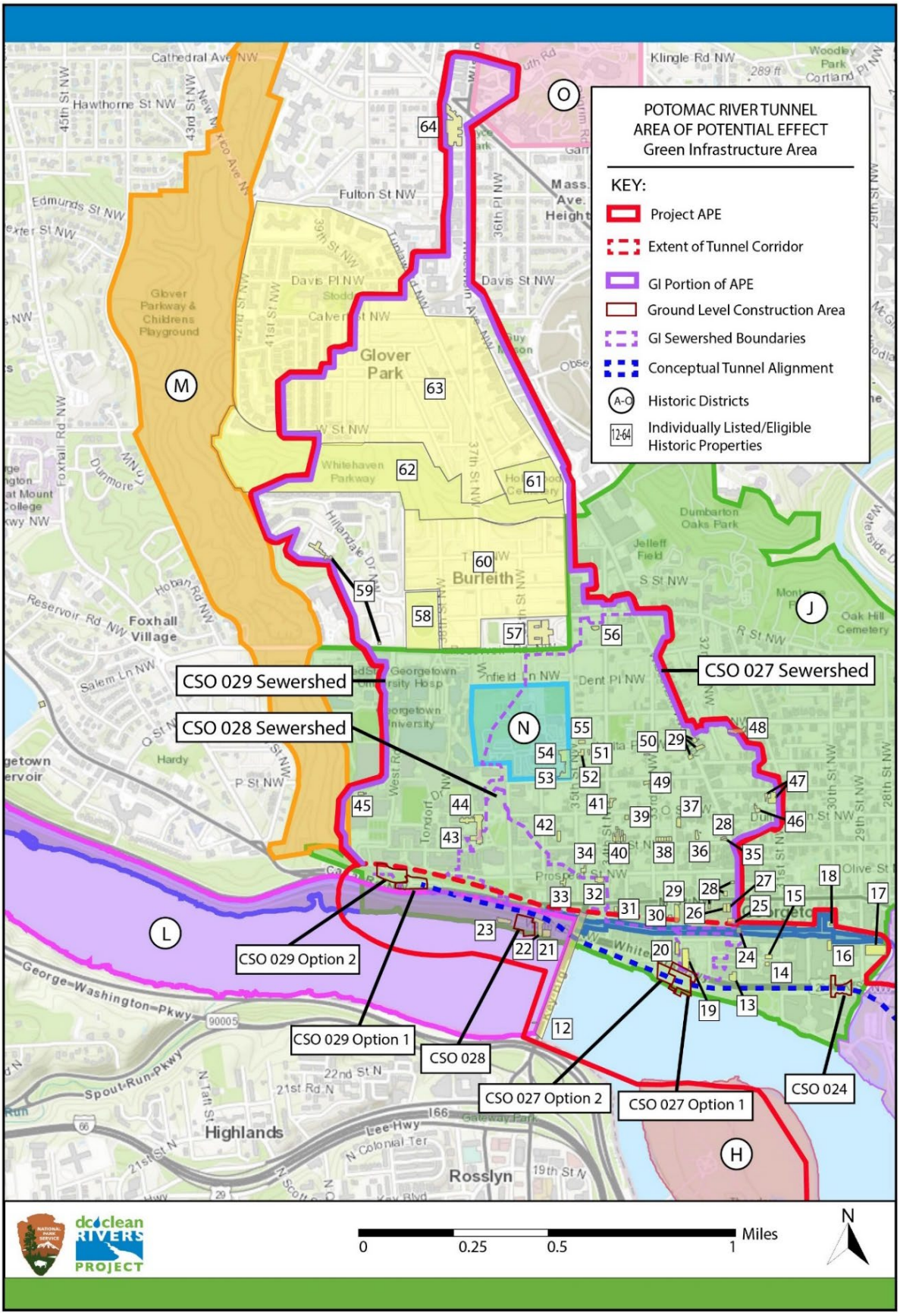

Figure 3-2: Potentially Affected Historic Properties within the GI Area

Historic structures and districts potentially affected by the project are provided in **Appendix D**. This includes all historic districts, individually listed resources, and resources that have been determined eligible for listing in the National Register or the DC Inventory. Each resource is designated in the table to correspond with **Figure 3-1**. Included are all the resources that could potentially be adversely affected, directly or indirectly, temporarily or permanently, from implementation of the Potomac River Tunnel and supporting infrastructure. Most of the at- and above-grade infrastructure would be constructed within the boundaries of National Register-listed historic properties.

Potentially affected historic structures and districts within the GI area are also provided in **Appendix D**. Each resource is designated in the table to correspond with **Figure 3-2**. Included are all the historic districts, individually listed resources, and resources that have been determined eligible for listing in the National Register or DC Inventory that could potentially be adversely affected, directly or indirectly, temporarily or permanently, from the implementation of GI. Since detailed siting of GI facilities has not yet been completed, for conservatism, all known resources within the CSO 027, 028, and 029 sewersheds are listed.

3.5 ARCHEOLOGICAL RESOURCES

Archeological resources assessment for the Potomac River Tunnel project has followed the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* and the DC Preservation League's *Guidelines for Archaeological Investigations in the District of Columbia*. To date, DC Water has completed a Phase IA archeological assessment of the construction areas presented in *Chapter 2*, and a Phase IB archeological resource survey for selected construction areas determined to have high archeological potential. DC Water is preparing a draft technical report of the results of the Phase IA assessment and Phase IB survey that will be submitted to NPS and SHPO for review and comment.

This section identifies the construction areas where archeological resources have been identified, or areas of archeological potential. A summary table of the results of the Phase IA assessment and Phase IB survey for the project, along with recommendations for further investigations, can be found in **Appendix D**. Additional investigations will be necessary at several of the proposed construction areas to determine if archeological resources are present and to evaluate the significance of resources.

At the location of CSO 022 Control Option 1 and Emergency Overflow Structure Option 3, geoarcheological testing in 2017 encountered deposits of building materials in borings that likely represent demolition debris from two Washington Gas Light Company structures depicted on late nineteenth- to early twentieth-century maps (Kreisa et al. 2018). National Register-evaluation investigations have been recommended for the construction area.

Archeological site 51NW120, the Lime Kiln site, is present at the proposed location of the Ventilation Control Facility and UPIRS Diversion Structure (Glumac et al. 1993). The site, which has not been evaluated for listing in the National Register, consists of remains of a lime kiln that was found to continue to 13 feet below surface. Historic maps dating to the nineteenth century also indicate that the remains of residences and commercial buildings could be present in other portions of the construction area (Kreisa et al. 2018). National Register-evaluation investigations have been recommended for site 51NW120, and site survey investigations have been recommended for the remaining area.

Archeological assessment for CSO 022 Control Option 2 determined that the portion of the construction area east of 27th Street NW continues to retain a potential for the remains associated with mid-nineteenth century residential and commercial structures that have not been impacted to the same degree as the area to the west of 27th Street NW. Site survey investigations are recommended east of 27th Street NW if ground disturbance would occur within this portion of the construction area to determine if resources potentially eligible for listing in the National Register are present.

Archeological assessment of the CSO 024 Control and UPI diversion structure area determined there to be a low potential for the presence of intact resources within the roadway given the presence of existing large diameter sewer lines (Kreisa et al. 2018). Therefore, no additional investigations are recommended in the areas confined to the public right-of-way. However, multiple structures are depicted on historic maps in the landscaped area directly south of K Street NW as early as 1861. Archeological assessment indicates this portion of the construction area has not been impacted by the installation of substantial utilities and therefore has a potential for intact archeological resources. Site survey investigations are recommended south of K Street NW and east of 30th Street NW if ground disturbance would occur within this portion of the construction area to determine if resources potentially eligible for listing in the National Register are present.

Archeological site 51NW075, which encompasses the entirety of Georgetown Waterfront Park, is located within CSO 027 Control Options 1 and 2. This site, currently unevaluated for listing in the National Register, was initially

investigated in 1985 and contained numerous early nineteenth-century building foundations and brick floors as well as late eighteenth-century cobblestone pavements beneath 1.5–5 feet of fill (Artemel et al. 1985). A pre-contact Native American component was also encountered. Nineteenth- and early twentieth-century maps depict commercial / industrial structures associated with the waterfront and the railroad terminus, including wharves and docks that may now be submerged within the Potomac River (Kreisa et al. 2018). Thus, National Register-evaluation investigations have been recommended for site 51NW075. In addition, historical map review indicates that during the nineteenth and twentieth centuries, docks or wharves were present along the shoreline in this area (Kreisa et al. 2018). The remains of these docks and wharves may extend into the Potomac River. Archeological investigation is required to determine the presence and potential significance of such resources if the emergency surge relief pipe is constructed at CSO 027 under either option.

Historical map review of the CSO 028 Control area indicates that a series of structures was present in the area between the Francis Scott Key Bridge to the east, and the Washington Canoe Club to the west, in the second half of the nineteenth century into the twentieth century. Phase IB geoarcheological testing conducted in 2017 encountered the remains of one or more structures depicted on nineteenth-century historic maps at approximately three feet below the surface (Kreisa et al. 2018). Additional investigations have been recommended to determine if resources potentially eligible for listing in the National Register are present. In addition, the remains of historic structures, including boat club buildings and associated docks, could be present near the shoreline in this area. If the emergency surge relief pipe is constructed at CSO 028, additional archeological investigations are required to determine the presence and potential significance of such resources.

A previous archeological survey conducted for the Georgetown University southwest entrance identified archeological site 51NW112 in the north portion of CSO 029 Control Option 1. This archeological site has not been evaluated for listing in the National Register. To the southwest geoarcheological testing conducted in 2017 encountered a deposit at 15 feet below the current surface that is consistent with the remains of a structure depicted on mid-nineteenth century maps (Kreisa et al. 2018). Additional investigations have been recommended to determine if resources potentially eligible for listing in the National Register are present.

Historical maps of the CSO 029 Control Option 2 area only depict an early twentieth century streetcar line within the site, although proximity to the Potomac River indicates a potential for prehistoric Native American archeological resources (Kreisa et al. 2018). Archeological assessment indicates the construction area has not been impacted by the installation of substantial utilities and therefore has a potential for intact archeological resources. Site survey investigations are recommended to determine if resources potentially eligible for listing in the National Register are present.

An archeological assessment has not been conducted specific to GI implementation within the CSO 027, 028, and 029 sewersheds; however, limited investigations within these sewersheds have been conducted by others for a variety of unrelated undertakings that have resulted in the identification of a number of archeological resources. Resources previously identified in Georgetown include pre-contact Native American sites and Historic period sites dating from the 1700s to the early 1900s. Native American sites range from fishing camps along the Potomac River, villages and camps along the river and Rock Creek, and lithic quarries, among others. Historic period sites include domestic and commercial structural remains and associated artifact deposits, as well as industrial sites, such as mills, dating from the late eighteenth through the nineteenth centuries. Overall, the likelihood of unidentified archeological resources depends on the location and whether the site has been previously disturbed for road, utility, or other construction.

3.6 CULTURAL LANDSCAPES

The term “Cultural Landscape” encompasses the “notion that humans necessarily occupy a significant place in the landscape… [it] is simply that which is the result of human beings’ centuries-long response to the natural qualities of the land” (Zachary 1996). The NPS defines a cultural landscape as a geographic area, including both cultural and natural resources, associated with a historic event, activity, or persons exhibiting other cultural or aesthetic values. There are four general types of cultural landscapes, defined below by the Cultural Landscape Foundation:

1) *Historic Sites*: those cultural landscapes that are “significant for their association with a historic event, activity, or person;”
2) *Designed Landscapes*: those that were “consciously designed or laid out by a landscape architect, master gardener, architect, or horticulturist to design principles, or by an amateur gardener working in a recognized style or tradition;”

3) *Vernacular Landscapes*: those that have "evolved through use by the people whose activities or occupancy shaped those landscapes. Through social or cultural attitudes of an individual, family, or community, the landscapes reflect the physical, biological, and cultural character of those everyday lives;" and

4) *Ethnographic Landscapes*: those that contain a "variety of natural and cultural resources that the associated people define as heritage resources." (CLF 2016)

Cultural landscapes that have been previously identified and inventoried by the NPS within the APE, include the Lincoln Memorial Grounds, Thomas Jefferson Memorial, Memorial Avenue Corridor, East Potomac Golf Course, Potomac Waterfront Section of Rock Creek and Potomac Parkway, Lady Bird Johnson Park, and Theodore Roosevelt Island. Brief descriptions of their general boundaries, background, and significance are provided in **Appendix D**.

In addition, there are several cultural landscapes that have not been inventoried by the NPS but have been identified by other entities such as the Cultural Landscape Foundation. Although these resources have not yet been fully documented as cultural landscapes, they are included for the purposes of the impact analysis in this EA. Additional cultural landscapes within the APE include George Washington Memorial Parkway, Mount Vernon Memorial Parkway, the Franklin Delano Roosevelt Memorial, the Plan of the City of Washington (original 1791 plan for the District bound by the Potomac River and the Anacostia River), the Watergate Complex, East and West Potomac Parks, the Kennedy Center, Francis Scott Key Memorial Park, C&O Canal NHP, the McMillan Plan (developed in 1902 to guide improvements throughout Washington, DC), and the Potomac River Landscape. Brief descriptions of their general boundaries, background, and significance are provided in **Appendix D**.

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4.0 ENVIRONMENTAL CONSEQUENCES

This chapter of the EA describes the potential environmental impacts associated with each alternative. The resource topics presented correspond to the issues described in *Chapter 1: Purpose and Need*.

4.1 METHODOLOGY FOR ANALYZING IMPACTS

In accordance with CEQ regulations, the environmental consequences analysis includes the direct, indirect, and cumulative impacts (40 CFR 1502.16). The intensity of the impacts is assessed in the context of the park's purpose and significance and any resource-specific context that may be applicable (40 CFR 1508.27). The methods used to assess impacts vary depending on the resource being considered, but generally are based on a review of pertinent literature and park studies, information provided by on-site experts and other agencies, professional judgment, and park staff knowledge and insight.

This EA also considers cumulative impacts, namely "the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). Cumulative impacts have been addressed in this EA by resource and are considered for the no-action alternative and the proposed action. Some of these actions are in the early planning stages; therefore, the evaluation of the cumulative impact is based on a general description of the projects. Projects considered in the cumulative impact analysis are briefly described in **Table 4-1**.

Table 4-1: Cumulative Impacts Projects

Project	Description	Status
DC Clean Rivers Project – Anacostia River Tunnel System	In March 2018, DC Water achieved an important milestone when it completed the first major phase of the Anacostia River Tunnel System in advance of the Consent Decree deadline. The newly operational system consists of over 7 miles of 23-feet diameter tunnel, reaching from Blue Plains to RFK Stadium, and includes connections to all of the CSOs along the Anacostia River. Captured flows are delivered to Blue Plains, where newly constructed pumping and treatment facilities process the water before discharging it to the Potomac River. As of October 1, 2018, in just over six months of operation, the system has captured and treated over three billion gallons of CSOs that would have otherwise been discharged untreated into the Anacostia River. **Affected Resources**: Water Quality; Riverine Wetlands; Visitor / Community Use and Experience; Historic Structures and Districts; Archeological Resources; Cultural Landscapes	Past
Nine Minimum Controls (NMC) and Phase 1 CSO Control Programs	DC Water has implemented various CSO control measures as part of the NMC and Phase 1 CSO Control Programs, including rehabilitation of the Potomac Pumping Station; maximization of storage within the collection system using inflatable dams; major maintenance projects such as the cleaning of large interceptor sewers; regular inspections of critical facilities such as outfalls, regulators, pump stations, and tide gates; and public notifications regarding CSOs, including the posting of signs at CSO outfalls, operation of CSO event indicator lights along District waterways, and publishing of CSO information on the DC Water website. The NMC and Phase 1 CSO Control Programs have resulted in an estimated 38 percent reduction in CSOs to the Potomac River by volume. **Affected Resources**: Water Quality; Riverine Wetlands; Cultural Landscapes	Past
Georgetown Waterfront Park	Constructed in two phases from 2006 to 2011, Georgetown Waterfront Park provides visitors river views and recreational and educational opportunities at the edge of historic Georgetown (Friends of Georgetown Waterfront Park 2017). **Affected Resources**: Visitor / Community Use and Experience; Cultural Landscapes	Past
Martin Luther King, Jr. Memorial	The Martin Luther King, Jr. Memorial was officially dedicated in 2011 to commemorate and celebrate Dr. King's invaluable contributions to the civil rights movement. The memorial features a large stone carving of Dr. King on a 3-acre site along the tidal basin (NPS 2017a). **Affected Resources:** Visitor / Community Use and Experience; Historic Structures and Districts; Cultural Landscapes	Past
Kennedy Center Expansion	The Kennedy Center is currently constructing an approximately 70,000 square feet facility expansion that includes new performance and event spaces, three new rehearsal / multi-purpose areas, and an eatery. The expansion project also includes construction of a new pedestrian / bike connection to Rock Creek Trail. The expansion is expected to be completed in 2018 (The Kennedy Center 2018). **Affected Resources:** Visitor / Community Use and Experience; Historic Structures and Districts; Cultural Landscapes	Past

Project	Description	Status
The Francis Scott Key Bridge Rehabilitation	DDOT initiated the rehabilitation of portions of the Key Bridge in 2016 to repair the concrete superstructure, encapsulate the bridge's footings, enhance bicycle and pedestrian safety, install new street lights and poles, add anti-graffiti measures, and resurface a small portion of the roadway. Construction is scheduled to conclude in 2018 (DDOT 2018b). **Affected Resources:** Visitor / Community Use and Experience; Cultural Landscapes	Past
Theodore Roosevelt Bridge Rehabilitation	The rehabilitation of Theodore Roosevelt Memorial Bridge from Constitution Avenue to the Virginia state line includes repairs to the bridge superstructure and substructure and other bridge damage and improved pedestrian and bicycle access. DDOT performed minor rehabilitation work on the Bridge in 2013; additional rehabilitation is currently scheduled for 2021. **Affected Resources:** Water Quality; Riverine Wetlands; Visitor / Community Use and Experience; Cultural Landscapes	Future
Vietnam Veterans Memorial Visitor Center	The Vietnam Veterans Memorial Fund is planning to construct a below-grade visitor center to enhance the understanding of the Vietnam Veterans Memorial and the Vietnam War. The visitor center will be located on a 5.2-acre site adjacent to the existing Vietnam Veterans Memorial (NPS 2012). **Affected Resources:** Visitor / Community Use and Experience; Historic Structures and Districts; Cultural Landscapes	Future
National Desert Storm and Desert Shield Memorial	The National Desert Storm War Memorial Association is proposing to construct a memorial to honor members of the Armed Forces who served in Operation Desert Storm and Operation Desert Shield. Potential sites for the memorial include northwest of the Lincoln Memorial near the terminus of Constitution Avenue, and across the Potomac River in Virginia, southeast of Memorial Circle. Designs for the memorial are currently under development (NPS 2017b). **Affected Resources:** Visitor / Community Use and Experience; Historic Structures and Districts; Cultural Landscapes	Future
Georgetown Nonmotorized Boathouse Zone Development Plan	NPS identified an area near the Key Bridge to develop better public access to the Potomac River for nonmotorized recreation. The plan includes new boating facilities, an expanded kayak rental facility, and a streetscape reconfiguration that will improve connections to area trails and parks (NPS 2016c). **Affected Resources:** Visitor / Community Use and Experience; Historic Structures and Districts; Cultural Landscapes	Future
Arlington Memorial Bridge Rehabilitation	NPS and Federal Highway Administration are planning to rehabilitate the Arlington Memorial Bridge. The Bridge is over 80 years old and has never undergone a major rehabilitation. Deteriorating structural conditions have resulted in lane closures, emergency repairs, and weight restrictions on the Bridge. Temporary repairs have begun on the Bridge while the rehabilitation is designed, and construction phasing is planned (NPS 2017c). **Affected Resources:** Water Quality; Riverine Wetlands; Visitor / Community Use and Experience; Historic Structures and Districts; Cultural Landscapes	Future
Long Bridge Project	DDOT is proposing to rehabilitate / replace the Long Bridge over the Potomac River. The project consists of potential improvements to the Long Bridge and related railroad infrastructure within a 1.8-mile study area between the Rosslyn Interlocking near Long Bridge Park in Arlington, Virginia and the L'Enfant Interlocking near 10th Street SW in Washington, DC. The project would provide additional railroad capacity and improve the reliability of railroad service through the Long Bridge Corridor (DDOT 2017). **Affected Resources:** Water Quality; Riverine Wetlands; Visitor / Community Use and Experience; Archeological Resources; Cultural Landscapes	Future
C&O Canal NHP Georgetown Canal Plan	NPS, in partnership with Georgetown Heritage, DC Office of Planning, and the Georgetown Business Improvement District is planning to revitalize the one-mile section of the C&O Canal in Georgetown from the 0-Mile Marker (Rock Creek and Potomac River confluence) to the Potomac (Alexandria) Aqueduct. Concept designs are currently being developed and include infrastructure repair, improved accessibility, additional recreational and educational opportunities, and safety and amenity upgrades (NPS 2017d). **Affected Resources:** Visitor / Community Use and Experience; Historic Structures and Districts; Archeological Resources; Cultural Landscapes	Future
Union Station to Georgetown Streetcar Transportation Improvements	DDOT is proposing to extend the existing streetcar line from Union Station to Georgetown to improve east-west connectivity and transportation system mobility. Transportation improvements, including streetcar, vehicular, transit, bicycle, and pedestrian, are being evaluated in an EA to determine the best multi-modal enhancements on the corridor. The project would include construction of a propulsion facility and streetcar vehicle storage facility along the extended line (DDOT 2018a). **Affected Resources:** Visitor / Community Use and Experience; Historic Structures and Districts; Archeological Resources	Future

4.2 WATER QUALITY

4.2.1 About the Analysis

Water quality impacts were evaluated taking into consideration temporary construction-related disturbances; common practices to prevent soils, sediment-laden water, and pollutant constituents from being transported from construction areas into nearby waterbodies; as well as professional judgement. Long-term impacts to water quality were analyzed using estimated CSO reduction as determined during completion of the LTCP.

4.2.2 Impacts of Alternative A – No-Action

There would be no new impacts to water quality under the no-action alternative because CSOs to the Potomac River would continue to occur at their current frequency and magnitude. DC Water estimates approximately 654 million gallons of untreated discharges would continue to occur in a year of average rainfall. The Potomac River would remain on the EPA's Section 303(d) list of impaired waters, and DC Water would fail to satisfy its court mandated obligations of the Amended Federal Consent Decree. Additionally, District water quality standards would not be achieved, and designated uses may not be attained.

4.2.2.1 Cumulative Impacts

There would be no new impacts to water quality under the no-action alternative; therefore, there would be no cumulative impacts. However, CSOs to the Potomac River would continue to occur at their current frequency and magnitude.

4.2.2.2 Conclusion

There would be no new impacts to water quality under the no-action alternative. However, approximately 654 million gallons of untreated CSOs would continue to discharge into the Potomac River per average year of rainfall and DC Water would be in violation of its Amended Federal Consent Decree, NPDES Permit, and District water quality standards. There would be no cumulative impacts because there would be no new impacts under the no-action alternative.

4.2.3 Impacts of Alternative B – Proposed Action

It is estimated that over the long term, implementation of the Potomac River Tunnel and supporting infrastructure would reduce CSOs to the Potomac River by 93 percent by volume and limit their frequency to an estimated four times in a year of average rainfall. Reducing CSO discharges would significantly decrease pollutant loads of bacteria, suspended solids, oil and grease, organics, metals, and other pollutants associated with sanitary waste, resulting in substantial long-term benefits to water quality in the Potomac River and the Chesapeake Bay. The proposed action would also be expected to improve the quality of the Potomac River as habitat for aquatic life, support healthier fish and benthic populations, and reduce human health concerns. As determined by DOEE and the EPA, the project would reduce CSOs to a level which would not cause or contribute to the exceedance of water quality standards, subject to post construction monitoring. Additionally, as determined by various regulatory agencies, the project would bring CSOs into compliance with TMDLs for the Potomac River. Mitigation required as identified during the Section 404 permitting process would compensate for permanent waterway impacts from construction of the emergency overflow structure and emergency surge relief pipe at CSO 027.

Construction of supporting tunnel infrastructure, as well as tunnel mining operations, would require ground disturbance, temporary stockpiling of loose soil, and dewatering practices to recover sediment-laden water from underground work areas. To prevent construction-related water quality degradation, strict erosion and sediment controls would be employed where ground disturbing activities occur. Methods to retain erodible materials within the limits of construction may include silt fencing, silt bags, cofferdams, hay bales, diversion channels and berms, temporary stormwater basins, temporary inlet protection, stabilized construction entrances, and vegetation stabilization to protect District waterbodies from sedimentation. Sediment-laden water would be pumped to existing combined sewers during low flow periods in the system and directed to Blue Plains for treatment.

All erosion and sediment control practices would be reviewed and approved by DOEE prior to implementation. All necessary permits and authorizations would be obtained, including, but not limited to, DC Water Temporary Discharge Authorization, Section 401 of the Clean Water Act water quality certification, Section 404 of the Clean Water Act authorization for the discharge of dredged or fill material into waters of the United States, and NPDES permit coverage for stormwater discharges under the EPA Construction General Permit. Groundwater and / or surface water monitoring would be conducted during construction to ensure effectiveness of erosion and sediment control devices, and samples

would be collected from sediment-laden waters discharged to the combined sewer system to determine pollutant constituents of recovered groundwater if stipulated in the Temporary Discharge Authorization. If waters containing one or more constituents at or above current DC Water discharge standards (21 DCMR 1501) are encountered, an alternative disposal method would be implemented. Alternatives could include offsite disposal or onsite wastewater treatment. Prior to any onsite wastewater treatment, DC Water would outline treatment procedures in a Water Treatment Plan approved by DOEE. After the project is implemented, DC Water would conduct a post-construction surface water monitoring program to collect data to determine the extent of water quality improvements in accordance with its NPDES permit issued by EPA.

Under Alternative B, the proposed emergency overflow structure, which includes site options at West Potomac Park or CSO 022, as well as the construction of an emergency surge relief pipe as part of either the CSO 027 or CSO 028 Control, would require work within the limits of the Potomac River. To construct the emergency overflow structure, a cofferdam would be installed to dewater and protect the construction area. Similar techniques would be used to construct the emergency surge relief pipe, but at a smaller scale. It is anticipated that cofferdam installation would disturb river bottom sediments, temporarily affecting water quality as sediments become suspended within the water column. To minimize these temporary effects, cofferdam installation would occur behind full-depth turbidity curtains to prevent sediment migration downstream by containing disturbed river bottom sediments within the construction area. Turbidity curtains would be actively monitored to ensure proper function and would be removed after the cofferdams are installed.

As part of the construction of the emergency overflow structure and emergency surge relief pipe, riprap outfall protection would be installed on the river bottom at the structure headwall for velocity dissipation and to reduce the potential for scour during tunnel overflow events. Construction of an emergency overflow structure, as well as the emergency surge relief pipe at either the CSO 027 or CSO 028 Control, would require authorization under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act from the US Army Corps of Engineers (USACE), water quality certification from DOEE, and may also require mitigation to compensate for permanent waterway impacts that would be determined through future coordination among DC Water, NPS, USACE, and DOEE.

Based on the implementation of erosion and sediment controls and approved dewatering methods, short-term adverse impacts to water quality are anticipated to be minimal under Alternative B. In the event GI is determined practicable and is implemented within the CSO 027, 028, and 029 sewersheds, construction activities would result in minimal short-term adverse impacts to water quality due to the small scale of the projects and because erosion and sediment controls the same or similar to those described previously would be used to retain sediments on site.

4.2.3.1 Cumulative Impacts

Several proposed projects and actions in the study area have the potential to impact water quality. The Theodore Roosevelt Bridge Rehabilitation, the Arlington Memorial Bridge Rehabilitation, and the Long Bridge Project require temporary construction work within the Potomac River or other District waterbodies that may temporarily degrade water quality. These and other projects within the District would also require ground disturbance during construction that may result in the transport of sediments to district waterbodies. Strict erosion and sediment controls would be employed during construction of all these projects, resulting in minimal adverse cumulative impacts in the short- and long-term. Improvements to the combined sewer system implemented by DC Water as part of the DC Clean Rivers Project and other projects have reduced CSOs to the Anacostia River by approximately 80 percent, with future projects anticipated to achieve a reduction rate of 98 percent. The NMC and Phase 1 CSO Control Programs have reduced CSOs to the Potomac River by an estimated 38 percent. These projects have resulted in substantial short- and long-term benefits to water quality. Through the implementation of erosion and sediment controls, construction activities under Alternative B would contribute a small adverse increment to the mostly beneficial short-term impacts of other projects and actions that would result in an overall beneficial cumulative impact. As CSOs to the Potomac River would be reduced by 93 percent by volume, Alternative B would contribute a substantial beneficial increment to the long-term impacts of other projects and actions, resulting in long-term beneficial cumulative impacts.

4.2.3.2 Conclusion

Alternative B would result in substantial long-term benefits from the estimated 93 percent by volume reduction in CSOs to the Potomac River in an average year of rainfall. Short-term adverse impacts to water quality would be minimized because erosion and sediment controls and approved dewatering methods would be implemented during construction. Mitigation required as identified during the Section 404 permitting process would compensate for permanent waterway impacts from construction of the emergency overflow structure and emergency surge relief pipe at

either the CSO 027 or CSO 028 Control. Alternative B would contribute adverse and beneficial increments to short- and long-term beneficial cumulative impacts.

4.3 RIVERINE WETLANDS

4.3.1 About the Analysis

To analyze impacts to wetlands, a wetland investigation was conducted for the project in September 2017 during which only riverine wetlands were identified within the study area. According to NPS Procedural Manual 77-1: *Wetland Protection*, any area that is classified as a wetland according to the Federal Geographic Data Committee (FGDC) Wetlands Classification Standard (FGDC-STD-004-2013) is subject to Director's Order 77-1 and associated wetland protection procedures. The FGDC Wetlands Classification Standard defines riverine wetlands as a depth of 2.5 meters at low water, or the limits of emergent or woody vegetation extending beyond this depth. NOAA nautical charts were used to determine approximate water depths where construction-related disturbance could occur to delineate riverine wetlands within the Potomac River. Geographic Information Systems (GIS) were then used to calculate potential impacts. NWI mapping was used to determine the extent of similar habitat areas in the vicinity to provide context for the intensity of the impact.

4.3.2 Impacts of Alternative A – No-Action

There would be no loss of existing wetlands under the no-action alternative. Also, there would be no new impacts that would further degrade wetlands because untreated CSO discharges to the Potomac River would continue to occur at their current frequency and magnitude.

4.3.2.1 Cumulative Impacts

There would be no loss of wetlands and no new impacts under the no-action alternative; therefore, there would be no cumulative impacts.

4.3.2.2 Conclusion

There would be no loss of wetlands and no new impacts to water quality under the no-action alternative because CSOs would continue to discharge into the Potomac River at their current frequency and magnitude. There would be no cumulative impacts because there would be no impacts under the no-action alternative.

4.3.3 Impacts of Alternative B – Proposed Action

Implementation of the Potomac River Tunnel and supporting infrastructure is estimated to reduce CSOs to the Potomac River by 93 percent by volume and limit their frequency to an estimated four times in a year of average rainfall. By reducing the harmful pollutants associated with CSOs, the suitability of riverine wetlands for aquatic species habitat would be improved over the long term.

Based on the definition of riverine wetlands (FGDC 2013), only Emergency Overflow Structure Options 1 or 2 at West Potomac Park are proposed in such an area. Activities including cofferdam installation, excavation and grading, and outfall construction would result in approximately 27,375 square feet (0.63 acres) under Emergency Overflow Structure Option 1, or 28,150 square feet (0.65 acres) under Emergency Overflow Structure Option 2, of disturbance to riverine wetlands of the Potomac River. As part of the overflow structure construction, riprap outfall stabilization would be permanently installed on the river bottom at the structure headwall for velocity dissipation and scour protection that would result in approximately 22,000 square feet (0.51 acres) of permanent impacts to riverine wetlands under Emergency Overflow Structure Option 1 (see **Figure 2** in **Appendix C**), or 24,600 square feet (0.56 acres) of permanent impacts under Emergency Overflow Structure Option 2 (see **Figure 4** in **Appendix C**). The riprap would alter the roughness of the riverbed and remove a small amount of soft bottom habitat. As over 1,000 acres of unconsolidated soft bottom habitat exists in the Potomac River between the Francis Scott Key Bridge and the confluence of the Potomac and Anacostia Rivers (USFWS 2018), the amount of lost habitat (0.51 acres) is very small compared to the total amount of soft bottom habitat within the Potomac River. Furthermore, the riprap outfall stabilization would not be expected to greatly alter the functions of the impacted wetlands.

Construction of Emergency Overflow Structure Option 3 at CSO 022 would result in approximately 37,050 square feet (0.85 acres) of temporary impacts and 22,550 square feet (0.52 acres) of permanent impacts to the Potomac River (**see Figure 3** in **Appendix C**). Under this option, limited space at the site would necessitate additional construction staging areas be created using barges or temporary fill adjacent to the existing seawall. The temporary staging areas would result in greater overall impacts to the Potomac River than the West Potomac Park emergency overflow structure options. Also, construction of an emergency surge relief pipe as part of the CSO 027 Control options, or at CSO 028,

would result in approximately 10,895 square feet (0.25 acres) of temporary impacts and 1,620 square feet (0.04 acres) of permanent impacts to the Potomac River, at either location. However, if Emergency Overflow Structure Option 3 at CSO 022 is selected for implementation, the proposed action would not result in impacts to riverine wetlands, as the location of this option, as well as the location of the emergency surge relief pipe at either CSO 027 or CSO 028, are within areas classified as deepwater habitat and are not protected under NPS Director's Order 77-1: *Wetland Protection*.

Site-specific investigations would be conducted, as needed, for potential GI locations in the CSO 027, 028, and 029 sewersheds to identify and delineate any wetlands that may occur in the area. As the projects would primarily occur within urban street rights-of-way and alleyways, no wetland impacts are anticipated.

In accordance with Procedural Manual 77-1, NPS requires mitigation to compensate for conversion, degradation, or loss of wetland area and / or function (NPS 2016a). Through the Section 401 and Section 404 of the Clean Water Act permitting processes, the USACE and / or DOEE may also stipulate mitigation requirements. To mitigate riverine wetland impacts from construction of the emergency overflow structure, the NPS and DC Water have committed to conducting invasive species management within riverine and floodplain areas of Rock Creek Park. A Wetland Statement of Findings has been prepared for the project that is provided as **Appendix C**. The Statement of Findings provides additional details regarding mitigation that will occur to compensate for wetland impacts due to the project. Based on the small amount of riverine wetlands that would be lost and the mitigation that would be implemented to compensate for impacts, short- and long-term adverse impacts to riverine wetlands would be negligible under Alternative B. Over the long term, the reduction of untreated discharges to the Potomac River would benefit riverine wetlands by improving water quality and the suitability of riverine wetlands habitat for aquatic species.

4.3.3.1 Cumulative Impacts

Rehabilitation of the Arlington Memorial Bridge is the only project identified that will have impacts to riverine wetlands. To compensate for these impacts, SAV beds will be established within the Potomac River. Therefore, adverse impacts to riverine wetlands from the Arlington Memorial Bridge rehabilitation would be minimal as impacts would be mitigated. Several proposed projects, including the Theodore Roosevelt Bridge Rehabilitation, the Long Bridge Project, and the Arlington Memorial Bridge Rehabilitation, require construction within the Potomac River that may result in temporary water quality impacts and an associated reduction in the suitability of riverine wetlands habitat. Conversely, improvements to the combined sewer system implemented by DC Water as part of the DC Clean Rivers Project and other projects have reduced CSOs to the Anacostia River by approximately 80 percent, with future projects anticipated to achieve a reduction rate of 98 percent. The NMC and Phase 1 CSO Control Programs have reduced CSOs to the Potomac River by an estimated 38 percent. These projects have resulted in short- and long-term benefits to riverine wetlands and associated riverine wetlands habitat. Under Alternative B, temporary impacts to riverine wetlands from construction of Emergency Overflow Structure Options 1 or 2 in West Potomac Park would be minimal, and permanent long-term impacts would be mitigated, therefore contributing a small adverse increment to short-term cumulative impacts that are beneficial. Over the long term, implementation of Alternative B would substantially reduce CSO discharges to the Potomac River, which would improve water quality and the suitability of riverine wetlands habitat for aquatic species. Alternative B would add a beneficial increment to the beneficial long-term impacts of other projects, resulting in a long-term beneficial cumulative impact. If Emergency Overflow Structure Option 3 at CSO 022 is selected for implementation there would be no adverse impacts to riverine wetlands and therefore no cumulative impacts under Alternative B.

4.3.3.2 Conclusion

If selected for implementation, Emergency Overflow Structure Options 1 or 2 would result in temporary impacts to riverine wetlands during construction from the installation of cofferdams, excavating and grading, and outfall construction, as well as permanent impacts from the installation of riprap outfall stabilization. Short- and long-term adverse impacts would be minimal because of the small amount of riverine wetlands that would be lost and through implementation of acceptable mitigation coordinated among DC Water, NPS, USACE, and DOEE. Reducing CSOs to the Potomac River would result in long-term benefits to riverine wetlands by improving water quality and the suitability of riverine wetlands habitat for aquatic species. Alternative B would add small adverse and beneficial increments to the beneficial impacts of other projects and actions resulting in beneficial short- and long-term cumulative impacts to riverine wetlands. If Emergency Overflow Structure Option 3 at CSO 022 is selected for implementation there would be no adverse riverine wetland impacts and no cumulative impacts.

4.4 VISITOR / COMMUNITY USE AND EXPERIENCE

4.4.1 About the Analysis

To analyze the impacts of each alternative on park visitors and communities surrounding the parks, important features, amenities, special events, and activities were identified, and scenic views and quality were qualitatively evaluated. Disruptions to the park setting, water-based recreational activities, and to Georgetown, including residents, businesses, etc., were considered, and construction-related noise and traffic have been addressed for sites on parkland and surrounding areas. The analysis of potential impacts was performed using data provided by technical experts, professional judgment, information provided by park staff, public comments, and experience with similar past projects.

4.4.2 Impacts of Alternative A – No-Action Alternative

There would be no new impacts to visitor / community use and experience under the no-action alternative. However, untreated CSOs would continue to discharge into the Potomac River at their current frequency and magnitude during certain rain events. The experience of water-based recreational activities would be diminished from the presence of sewage during and for varying periods of time after CSO events. Primary recreational contact standards for safe swimming in the Potomac River would likely remain unattainable during and immediately after CSO discharges. Odors from CSOs would continue to detract from the visitor experience within the parks at the CSO outfalls, particularly during and after storm events. CSOs would also continue to discourage some visitors from experiencing water-based recreational activities, such as boating or kayaking, in turn affecting businesses that cater to these activities.

4.4.2.1 Cumulative Impacts

There would be no new impacts to visitor / community use and experience under the no-action alternative; therefore, there would be no cumulative impacts.

4.4.2.2 Conclusion

There would be no new impacts to visitor / community use and experience under the no-action alternative because CSOs would continue to discharge to the Potomac River at their current frequency and magnitude. However, untreated CSOs would continue to diminish the experience for visitors of surrounding recreational areas and water-based activities and businesses and discourage water-based recreational uses. There would be no cumulative impacts because there would be no impacts under the no-action alternative.

4.4.3 Impacts of Alternative B – Proposed Action

Construction of the Potomac River Tunnel and associated infrastructure is planned to begin in 2023 and is required by the Amended Consent Decree to be completed and operational by March 23, 2030. Tunnel mining operations at West Potomac Park are expected to occur for approximately 5 years. Other facilities, including the CSO Controls, ventilation control facility, and emergency overflow structure, would take approximately 18-24 months to construct. The approximate limits of the construction areas are presented on **Figure 2-3** through **Figure 2-23** in *Chapter 2*. These boundaries represent the anticipated total area needed for construction at each site, including ground disturbance to install the structures, in addition to area for vehicle, equipment, and material staging. The limits of construction presented on the figures also represent the area that would be off limits to the public while the work is being completed. It should be noted however that DC Water would phase construction at many of the sites so that smaller portions of the overall construction areas would be active at any given time. DC Water would coordinate with NPS, DDOT, and other stakeholders to determine an approach to construction phasing that would allow for the structures to be constructed efficiently while attempting to reduce impacts to traffic or resources of concern as well as avoiding conflicts with other potential projects within the vicinity.

Construction within West Potomac Park would be disruptive towards events and recreational activities. To establish Tunnel Mining Site Option 1 at West Potomac Park (North), two existing softball fields, as well as a portion of the larger open recreational area would be displaced. Similarly, construction would require the temporary removal of three athletic fields and open recreation space at Tunnel Mining Site Option 2 at West Potomac Park (South). Under either option, park facilities would be eliminated for use by visitors, organized athletic organizations, or for special events such as the 4th of July Celebration and the National Cherry Blossom Festival for approximately six years. Similarly, four volleyball courts would be temporarily displaced during construction of CSO 020 Control Option 2. DC Water and NPS would explore opportunities to temporarily relocate athletic fields to underutilized areas of West Potomac Park or implement other mitigation measures to minimize impacts to organized athletic events during construction. Also, through the special use permit review process, NPS would assist coordinators of events to identify alternative locations for event activities or to modify how the event is structured taking construction into consideration.

Emergency Overflow Structure Options 1 or 2 would temporarily reduce the available area for parking along Ohio Drive SW for approximately 18-24 months. However, Ohio Drive SW would be temporarily relocated to maintain vehicle access through or around the construction area. DC Water would construct the temporary road at a sufficient width to operate like the existing Ohio Drive SW to minimize impacts to visitors.

Following construction, features and amenities of West Potomac Park, including Ohio Drive SW, athletic fields, open spaces, and parking would be reestablished. Special events would be able to revert to pre-construction event locations and organization. The configuration of the athletic fields may change to some degree depending on the final layout of at- and above-grade infrastructure associated with the mining shaft, emergency overflow structure, and ventilation control equipment. These structures would be located and designed to minimize the visual intrusion and impacts to use of the surrounding park space. Under CSO 020 Control Option 2, DC Water would reestablish the volleyball courts once construction has concluded.

One of the largest draws for visitors to the National Mall are the many monuments and memorials. The Tunnel Mining Site Option 1 at West Potomac Park (North) and Emergency Overflow Structure Option 1 are near the John Ericsson Memorial and the Martin Luther King, Jr. Memorial. Other memorials including the Korean War Veteran's Memorial and Lincoln Memorial are directly across Independence Avenue SW from the site. Construction activities could disturb the setting, feeling, and contemplative experience for visitors at these memorials for approximately six years. Tunnel Mining Site Option 2 at West Potomac Park (South) and Emergency Overflow Structure Option 2 are near the Franklin Delano Roosevelt Memorial and would result in similar impacts to visitors and their experience during construction. The experience at these memorials would return to pre-construction conditions once the project has been fully implemented.

Flowering cherry trees throughout the National Mall are enjoyed by tourists and visitors, particularly within East and West Potomac Parks along the Tidal Basin and Hains Point during the National Cherry Blossom Festival. Some of these cherry trees, as well as other landscape trees, including American elms along Ohio Drive SW, would be removed to accommodate construction activities along the Potomac River. Emergency Overflow Structure Options 1 or 2 would require the removal of approximately 20 flowering cherry trees, and six flowering cherry trees, respectively. CSO 020 Control Options 1 or 2 would each require removal of approximately 10 flowering cherry trees. None of the Japanese cherry trees around the Tidal Basin or Hains Point would be impacted. As there are nearly 4,000 cherry trees in the District, the removal of approximately 30 flowering cherry trees (in the event Emergency Overflow Structure Option 1 and CSO 020 Control Options 1 or 2 are selected for implementation) would have a small impact on the visitor experience. Active construction within West Potomac Park would also detract from the experience for visitors during the Festival. Additionally, a temporary intersection proposed for the bypass of Ohio Drive SW (discussed below under Traffic) would require the removal of several American elms along Independence Avenue SW. As design progresses, DC Water would attempt to reduce tree impacts. Additionally, each tree removed would be replaced in kind or with native species at a ratio coordinated with the NPS to minimize long-term impacts to visitors.

Construction of supporting tunnel infrastructure would require temporary closures of segments of trails, paths, and sidewalks for approximately 18-24 months. Temporary detours of Rock Creek Park Trail would be necessary during construction associated with each emergency overflow structure option, CSO 020 Control Option 2, and CSO 022 Control Option 1. Similarly, construction of both CSO 027 Control options and the CSO 028 Control would require construction phasing or temporary detours of the Capital Crescent Trail. Various other unnamed paths and sidewalks throughout the project area would also need to be temporarily detoured during construction. DC Water would coordinate with DDOT regarding the scheduling of potential detours as well as sequencing with future DDOT projects in the vicinity. DC Water would ensure that safe pedestrian and bicycle access and connectivity is maintained around all construction areas. Once construction is completed, trails, paths, and sidewalks would be reestablished on their original alignments, or as coordinated between DC Water and the property owner(s). Placement of permanent above-grade infrastructure would be designed outside of the alignment of paths and sidewalks, resulting in no long-term impacts to pedestrian and bicycle circulation.

There would be no impacts to park visitors as DC Water commissions the CSO 021 Control, which is currently under construction with the Kennedy Center Expansion Project. All proposed work would be closely coordinated with the Kennedy Center to minimize impacts to its operations. Except for traffic and parking-related impacts, which are discussed later in this section, there would be no impacts to park visitors at the location of the proposed ventilation control facility and UPIRS diversion structure, CSO 022 Control Option 2, the CSO 024 Control and UPI diversion structure, or CSO 029 Control Options 1 or 2, as the areas in which these facilities would be constructed provide minimal opportunities for visitors or residents. The proposed CSO 024 Control and UPI diversion structure would be

constructed in a way that maintains access to residential and commercial areas, including retail, entertainment, and other destinations within historic Georgetown. This includes providing temporary detours of the paths along the southside of K Street NW, which would be reestablished after construction. Similarly, construction of the CSO 029 Control Options 1 or 2 would be phased to maintain access to Georgetown University. The impacted University entrance, as well as Canal Road, NW, and sidewalk would also be reestablished following construction.

Elements of CSO 027 Control Options 1 or 2 would be constructed within Georgetown Waterfront Park. As currently shown, both options could include construction of the emergency surge relief pipe, which would be installed from the proposed shaft, either within K Street NW under Option 1, or Georgetown Waterfront Park under Option 2, to the shoreline of the Potomac River. DC Water would evaluate possible strategies to maintain access through Georgetown Waterfront Park for pedestrians and bicyclists, including temporary detours and / or phasing construction during the 18-24-month construction period. However, if CSO 028 is selected for the emergency surge relief pipe, impacts to Georgetown Waterfront Park would be reduced under both CSO 027 Control Options 1 or 2. Impacts would be greatly reduced under Option 1, as only a small portion of the work would be conducted within the park. However, street parking along K Street would be temporarily removed during construction of Option 1, which would impact accessibility to the park and businesses and organizations in the vicinity. In addition, construction activities would temporarily detract from the setting and feeling of Georgetown Waterfront Park, particularly under Option 2. Following construction, DC Water would coordinate with NPS and other project stakeholders to reestablish the features and amenities that were displaced during construction. The configuration of the park where construction occurred may change to some degree depending on the final layout of at- and above-grade infrastructure associated with the ventilation control structures and equipment; however, these structures would be located and designed to minimize the visual intrusion.

The CSO 028 Control is proposed adjacent to the C&O Canal embankment and along the Capital Crescent Trail. During the 18-24-month period of construction, a temporary detour would be established to maintain pedestrian, bicycle, and vehicular access along the Capital Crescent Trail and Water Street NW. If CSO 028 is selected for the emergency surge relief pipe, construction phasing may additionally be required to help maintain access and connectivity along the Capital Crescent Trail and to maintain access to Washington Canoe Club, Potomac Boat Club, and the Key Bridge Boathouse throughout construction. Several sections of the floating dock used by the Potomac Boat Club would need to be temporarily removed during construction of the emergency surge relief pipe. DC Water would coordinate with the Potomac Boat Club to determine if these sections could be temporarily relocated to the downstream end of the dock or in a configuration that would provide adequate space in the river for construction. The C&O Canal towpath would not be affected; however, visitors on the towpath are likely to hear construction-related noise when in the vicinity during work periods. Once construction is completed, the Capital Crescent Trail would be reestablished. The elevated portions of the ventilation control structures and equipment would be incorporated into the C&O Canal embankment similar to existing structures currently along the trail. The design of the structures would be developed in coordination with the NPS and DC SHPO to minimize visual impacts of the facilities. The removed sections of the Potomac Boat Club floating dock could be reinstalled at their current location; however, the proximity of the docks to the emergency surge relief pipe, if constructed at CSO 028, may not be preferable as overflows, though infrequent, would occur at this location.

Scenic views associated with this area of the District would be temporarily impacted to varying degrees by construction. Construction equipment, including large cranes, would be visible and would temporarily detract from the scenic quality of some of the parks and memorials, as well as scenic views from adjacent residential and commercial properties for durations ranging from 18 months to six years depending on the location. DC Water would attempt to minimize the visual intrusion by placing barriers around construction sites to limit the visibility of construction activities and equipment; however, barriers would not be effective for some equipment such as cranes due to their height. Over the long term, scenic views would mostly be restored when construction is complete. The outfall of the emergency overflow structure would be partially visible resulting in a permanent modification to views from the Potomac River. Other permanent at- and above-grade features would also be visible but would be smaller in scale and, as with the emergency overflow structure, would be located and designed to minimize visual intrusion. The proposed ventilation control facility may be constructed as an above-grade one- to two-story building pending final design but would be in an area with limited scenic views.

In-river construction work may disrupt or inhibit boating and other activities along the shoreline of the Potomac River where the emergency overflow structure is constructed for approximately 18-24 months. Emergency Overflow Structure Options 1 or 2 would result in in-river construction at West Potomac Park where water-based recreational

activities occur relatively infrequently. Emergency Overflow Structure Option 3, which would be located along the waterfront near the mouth of Rock Creek, is very close to Thompson Boat Center and has the potential to impact operations conducted at the facility. Similarly, if selected, construction of the emergency surge relief pipe at the CSO 028 Control, could temporarily affect operations of the Potomac Boat Club and Washington Canoe Club.

Only approximately 1.15 acres of the Potomac River would be off-limits to water-based recreation during construction. DC Water would ensure that measures are taken to clearly define and restrict access to in-river construction areas to ensure the safety of visitors enjoying water-based activities. Following construction, nearshore activities would be allowed to continue, and water-based recreational experiences would be enhanced by the water quality improvements associated with CSO reduction from an estimated 74 events to 4 in a year of average rainfall. If selected, the emergency surge relief pipe at CSO 028 would likely result in negligible impacts to the boating facilities in the area as flow from the pipe would occur only during infrequent extreme filling events.

Under Alternative B, DC Water would ensure that businesses and other area destinations remain accessible during construction; however, traffic congestion and limited parking removal would likely reduce ease of accessibility for durations ranging from 18 months to six years depending on the location. Temporary pedestrian access routes would be provided for residences, businesses, and other facilities adjacent to construction areas that would be developed in consideration of Americans with Disabilities Act requirements. It is not expected that construction would result in the cancellation of local events, but temporary closures of certain areas of the parks may require their relocation. Area businesses and organizations that depend on tourism and special events would need to adapt to any temporary changes that might occur to the location, organization, or scheduling of events. Businesses that operate within the parks may be required to coordinate with the NPS to temporarily modify operations. Outside NPS lands, DC Water would coordinate with DDOT and local affected residents, businesses, and property owners to minimize disruption during construction. Impacts to businesses would be temporary and economic activity would largely return to preconstruction levels, save for a potential long-term benefit to water-based recreational businesses as improved water quality after completion of the Potomac River Tunnel may draw additional users.

Once operational, the tunnel system would be utilized to capture, store, and convey combined sewage containing potentially odorous compounds, such as hydrogen sulfide. However, due to the configuration of the tunnel and its diversions relative to the existing sewer system, the tunnel would only receive flows during rain events. Since the tunnel would be empty most of the time, air would be exhausted as the tunnel fills with captured combined sewage during large rain events. Substantial discharges of air from the tunnel would only occur during large rain events, when diverted combined sewage has been diluted by significant stormwater flows and outdoor receptors near the ventilation points would be reduced. DC Water's NPDES permit requires that the tunnel be pumped out promptly after rain events. As such, the tunnel would remain empty more than 90 percent of the time in a year of average rainfall. To prevent nuisance air circulation while the tunnel is empty during dry weather, each of the shafts would be fitted with gravity-operated, counterweighted dampers that isolate the tunnel from the surrounding atmosphere except during filling events. Additionally, flap gates would be provided to isolate the tunnel system from the existing sewer system except during filling events. In certain locations, additional protective measures, such as activated carbon treatment systems may be provided pending final design. During final design, DC Water would evaluate the need for these additional protective measures based on operational experience with the Anacostia River Tunnel system and further evaluation of the proposed Potomac River Tunnel and associated structures. Therefore, the tunnel system is not anticipated to create odor nuisance conditions.

Implementation of GI within the CSO 027, 028, and 029 sewersheds, if determined practicable, could detract from the experience of historic Georgetown. Construction of individual GI measures would result in temporary localized disruptions to the community and visitors that would include loss of parking spaces, visual intrusions from vehicles, equipment, and other construction-related disturbances that have the potential to detract from the aesthetic character of the historic neighborhood as well as impact accessibility to businesses and other area destinations. However, due to the small scale of the individual GI facilities that would be implemented, construction durations would be relatively short, and equipment needed to construct the facilities would be small and similar to equipment used for neighborhood utility work, which would minimize the impact. DC Water would ensure that safe pedestrian detours are provided around GI construction areas to ensure accessibility to residences, retail, entertainment, and other destinations within the neighborhood. To minimize long-term impacts from the implementation of GI, sites would be identified, and GI technologies selected, taking into consideration the historic character of Georgetown. DC Water would coordinate closely with project stakeholders to ensure that context-sensitive designs are developed to minimize impacts on character-defining features that contribute to the neighborhood's significance as a Historic District and a National

Historic Landmark. Seasonal monthly maintenance for GI facilities would be required after construction. Impacts to residents and visitors would be minimal for bioretention maintenance, as the activities follow typical landscape maintenance procedures. Impacts to residents and visitors due to permeable pavement maintenance would also be minimal, as noise generated by monthly street sweeping would be within allowable limits, and temporary no parking zones along parking lane permeable pavement facilities would typically be limited to a monthly 2-hour window for the months of March through December.

4.4.3.1 Noise

Noise levels would be temporarily elevated during operations at all the construction sites. Noise would be generated by heavy equipment, site preparation, minimal blasting, and other construction-related activities. Typical noise levels generated by construction equipment generally range from 75 to 100 dBA at a distance of 50 feet from the source of the noise (US Department of Transportation 2006). When multiple pieces of equipment are operated concurrently, noise levels can be relatively high within several hundred feet of active construction sites. Using reference noise levels assuming a crane, a truck, and generator 50 feet from a noise-sensitive location, a sound pressure level of greater than 90 dBA can be expected at the closest noise-sensitive locations to the construction activities, which would exceed the DCMR limits described in *Chapter 3*. However, any activities more than 150 feet from noise-sensitive locations would comply with the DCMR weekday daytime 80 dBA Leq limit, based on acoustical properties DC Water 2018.

For construction activities closer than 150 feet from noise-sensitive locations, compliance with the DCMR limits would be possible for weekday daytime operations by limiting the timing of equipment operations. To minimize noise impacts, construction of supporting tunnel infrastructure, except for the tunnel mining site, would be limited to Monday through Friday from 7:00 AM to 7:00 PM, with hauling hours between 9:30 AM and 3:30 PM. Construction operations at the tunnel mining site under either option would be conducted 24 hours a day and seven days a week, but material hauling hours would be limited to 7:00 AM to 7:00 PM to minimize noise impacts along haul routes. Temporary noise barriers could be installed around construction areas to provide noise reductions of up to 10 dBA for equipment less than 15 feet in height. However, for equipment greater than 15 feet in height, such as cranes, noise barriers would not be effective. Additional mitigation measures that may be used to reduce noise levels during construction include, specifying quiet equipment models, maintaining equipment mufflers, lubrication to prevent unnecessary noise, limiting the number and duration of idling equipment, positioning loud equipment and activities as far as possible from noise-sensitive locations, minimizing the use of backup alarms, monitoring construction noise levels regularly, and providing a noise complaint hotline. It is anticipated that with the use of noise barriers and / or other mitigation measures, construction noise would be reduced to permissible levels.

Implementation of GI, if determined practicable, would generate noise during construction. However, due to the small scale of the GI facilities; use of smaller, less impactful construction equipment; shorter construction durations as compared to the tunnel infrastructure; and implementation of noise reducing mitigation measures, as appropriate, it is anticipated that noise generating construction activities would be conducted within permissible levels.

Once construction is complete, the study area would return to ambient background noise levels. None of the permanent tunnel infrastructure or GI facilities would generate noise above ambient conditions; therefore, there would be no long-term noise impacts.

4.4.3.2 Traffic

Construction of the Potomac River Tunnel and supporting infrastructure would result in increased traffic congestion on District roadways. As described in *Chapter 3*, LOS analysis was conducted for various intersections throughout the study area. Included in the analysis was an estimate of traffic conditions for the year 2025, which marks the beginning of construction. The analysis projected the 2025 baseline LOS and the LOS that would result in 2025 during project implementation. Traffic conditions for the year 2025, rather than current conditions, have been used for this analysis to provide a more accurate comparison of how traffic would be impacted by the project at that time. Traffic volumes during construction of the Potomac River Tunnel were predicted to include hauling and worker vehicles in the study areas. Further, the predicted traffic volumes during construction include changes to study area roadways taking into consideration maintenance of traffic at each of the construction areas, as necessary.

Prior to initiating construction of the Potomac River Tunnel, DC Water and PEPCO would extend high voltage electricity distribution lines to the mining site to deliver power for the TBM from an existing line to the east near 14th Street SW. The high voltage lines would be installed via trenching within the roadway of Independence Avenue SW (applicable only to Tunnel Mining Site Option 1) or within East Basin Drive SW and Ohio Drive SW (applicable to either Tunnel Mining Site Options 1 or 2). Trenching would require the temporary closure of one traffic lane on East

Basin Drive SW and Ohio Drive SW, or one lane on Independence Avenue SW, depending on the mining site and power delivery options ultimately selected for implementation. Maintenance of traffic would be provided along short sections of the roadway while the distribution lines are extended to the site. Two of three lanes of the affected side of Independence Avenue SW would remain open to traffic while the distribution lines are extended under this power delivery option. Along East Basin Drive, one lane would remain open to traffic. Short-term closure of one lane on Ohio Drive SW would be required. DC Water and PEPCO would coordinate with NPS and DDOT, as appropriate, to determine suitable work periods to extend the distribution lines to minimize impacts to traffic, such as during off-peak visitation and outside rush hour timeframes. As the lines are extended, PEPCO would backfill the trench and resurface the section of roadway before progressing.

To construct Emergency Overflow Structure Option 1, two bypass options are being considered for Ohio Drive SW, including an option that proposes a temporary bypass road from Ohio Drive SW to Independence Avenue SW with one lane in each direction to tie into Daniel French Drive SW / Independence Avenue SW, creating a new temporary intersection. This option would result in a reduction in the LOS at the Daniel French Drive SW / Independence Avenue SW intersection during construction from LOS A to LOS D in the morning and LOS A to LOS B in the evening. The intersection of Independence Avenue SW and 23rd Street SW / Ohio Drive SW, which has a background condition of LOS E for both the AM and PM, would improve to LOS B in the morning and to LOS D in the afternoon. Other intersections associated with this option would maintain a LOS A during construction. Once construction is completed, the temporary bypass road would be removed, and Independence Avenue SW and Ohio Drive SW would be returned to pre-construction conditions.

Other potentially notable traffic impacts during construction include:

- CSO 022 Control Option 2 (Virginia Ave NW / 27th St NW): Substantially decreased LOS and excessive queuing lengths are predicted. As such, this location has not been included in the preferred alternative for construction of the CSO 022 Control.
- CSO 024 Control and UPI Diversion Structure (K St NW / 30th St NW): Moderately decreased LOS and increased queuing lengths are predicted; however, these would be mitigated by phasing construction to maintain at least one lane open in each direction throughout construction.
- CSO 027 Control Option 1 (K St NW / Potomac St NW): Moderately decreased LOS and increased queuing lengths are predicted; however, these would be mitigated by establishment of temporary signals to act as a 24-hour flagging operation.
- CSO 029 Control Option 1 (Canal Rd NW / Georgetown University Entrance): Substantially decreased LOS and excessive queuing lengths are predicted. As such, this location has not been included in the preferred alternative for construction of the CSO 029 Control.

Construction at the remaining sites would result in minimal traffic impacts, as the work is proposed primarily outside of the existing roadways and does not require extended temporary lane closures or detours.

DC Water would explore and take into consideration maintenance of traffic opportunities to reduce impacts at all the proposed construction areas with traffic-related impacts. Increased traffic congestion is likely to occur as part of construction; however, it is anticipated that maintenance of traffic plans, when fully developed and coordinated with DDOT and other project stakeholders, would minimize impacts to commuters, visitors, residents, local businesses, and other commercial properties and would not limit accessibility to park features and amenities.

Construction of GI within the CSO 027, 028, and 029 sewersheds, if determined practicable, is anticipated to result in minimal traffic impacts in Georgetown due to the small scale of the proposed GI facilities. It is anticipated that short-term local detours would be effective in reducing traffic congestion or that using temporary single travel or parking lane closures would provide sufficient space in most instances for GI facilities to be constructed.

After construction, traffic would return to LOS consistent with the projected 2025 conditions, as none of the proposed facilities would permanently eliminate roadways or travel lanes. Therefore, there would be no long-term impacts to traffic from implementing GI. However, the permanent removal of select street parking spaces may potentially occur to accommodate GI facilities and would have an adverse impact in areas where there is currently a shortage of available street parking. DC Water would attempt to select GI measures for implementation that would not require removal of a substantial amount of street parking.

4.4.3.3 Cumulative Impacts

All present and future projects listed in **Table 4-1** require construction that could temporarily disrupt access to interpretive and recreational areas, and residences and businesses, and result in traffic and noise impacts and temporary visual effects. Cumulative impacts from construction activities associated with these projects would only occur if they coincide with the construction-related impacts of Alternative B. It is anticipated that short-term cumulative impacts would be minimal as there would likely only be some overlap among the projects. In the long term, all the projects listed in **Table 4-1** are anticipated to result in beneficial impacts to residents and visitors by improving the transportation network, enhancing local and regional connectivity, creating new recreational facilities and interpretive experiences, and improving water quality in other areas of the District. Alternative B would contribute small adverse increments to long-term cumulative impacts from the removal of flowering cherry trees along the Potomac River and from the potential removal of a small number of street parking spaces in Georgetown to accommodate GI facilities if determined practicable. However, it is anticipated that cumulative impacts to visitor / community use and experience would be beneficial over the long term due to the drastic reduction in untreated CSO discharges to the Potomac River from Alternative B.

4.4.3.4 Conclusion

Construction of the Potomac River Tunnel and supporting tunnel infrastructure under Alternative B would be disruptive to visitors, residents, and commercial businesses. DC Water would coordinate closely with NPS and other project stakeholders to identify strategies to minimize construction related impacts. Construction of GI facilities would also be disruptive, but due to the small scale of the projects and the implementation of mitigation strategies, impacts would be minimal. Once construction is complete, the project area would largely be restored to its existing condition. Minimal at- and above-grade infrastructure would be visible but would be located and designed to minimize the visual intrusion, resulting in minimal adverse impacts to visitors and residents. Additionally, adverse impacts to historic Georgetown would be minimized and construction would be coordinated with project stakeholders, developing context sensitive designs, and by being empathetic to the historic character of the neighborhood. Implementation of the project would result in long-term benefits from the reduction in CSOs to the Potomac River and the associated water quality improvements that would enhance the experience for water-based recreation and potentially improve patronage to associated businesses. Alternative B would contribute small adverse increments to cumulative impacts from the removal of flowering cherry trees along the Potomac River and from the potential removal of street parking in Georgetown to accommodate GI facilities, if determined practicable. Alternative B would also contribute a beneficial increment to cumulative impacts that would overall be beneficial due to the drastic reduction in untreated CSO discharges to the Potomac River.

4.5 HISTORIC STRUCTURES AND DISTRICTS

4.5.1 About the Analysis

Potential impacts to DC Inventory and National Register-listed or eligible resources were analyzed in consideration of regulations implementing Section 106 of the National Historic Preservation Act and guidelines stated within the *Secretary of Interior's Standards for the Treatment of Historic Properties* (NPS 1995). The analysis of the potential impacts of the project on historic structures focused on whether the proposed undertaking would "…alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association" (36 CFR 800.5(a)(1)).

4.5.2 Impacts of Alternative A – No-Action

There would be no construction under the no-action alternative; therefore, there would be no impacts because character-defining features of historic structures or districts would not be altered, and the overall integrity of these resources would not be compromised. It is not anticipated that continued discharges of CSOs to the Potomac River at their current frequency and magnitude would have noticeable impacts to historic structures or districts.

4.5.2.1 Cumulative Impacts

There would be no impacts to historic structures or districts under the no-action alternative; therefore, there would be no cumulative impacts.

4.5.2.2 Conclusion

Construction would not occur that would alter character-defining features or compromise the overall integrity of historic structures or districts; therefore, there would be no impacts under the no-action alternative, and no cumulative impacts.

4.5.3 Impacts of Alternative B – Proposed Action

Under Alternative B, the Potomac River Tunnel would be constructed between 75 and 125 feet below the ground surface. Vibration from tunnel mining operations has the potential to result in potential damage to historic structures located within the tunnel vibration zone of influence. To minimize the potential for damage the tunnel would be routed sufficiently far from historic properties such that they are outside the tunnel vibration zone of influence. In addition, DC Water would conduct preconstruction surveys, implement a thorough monitoring plan, implement structural protections (if needed), and identify other construction means and methods to minimize the potential effects of vibration. Based upon this approach to minimization, vibration from tunnel mining operations is not anticipated to result in damage to historic properties. This would be confirmed by monitoring conducted during tunneling operations and through detailed pre- and post-construction surveys.

Construction of the tunnel mining site would occur within the National Mall and East and West Potomac Parks Historic Districts. Two softball fields under Tunnel Mining Site Option 1 at West Potomac Park (North), or three softball fields under Tunnel Mining Site Option 2 at West Potomac Park (South), would be displaced, as would open recreational space. The recreational use of the athletic fields and open space is a significant aspect of the National Mall and East and West Potomac Parks Historic District, although they are not specifically contributing elements to the historic district. Also, trees along Ohio Drive SW and along the gravel drive at the southeast corner of Tunnel Mining Site Option 1 at West Potomac Park (North) would be removed within the limits of the mining site to accommodate construction. Views to and from historic properties would be temporarily impacted by construction barriers and equipment depending on their height. There would be no impacts to historic properties from the installation of high voltage electricity distribution lines to deliver power for the TBM, as all construction activities would be limited to the public right-of-way of Independence Avenue SW (applicable to Tunnel Mining Site Option 1) or East Basin Drive SW and Ohio Drive SW (applicable to either Tunnel Mining Site Options 1 or 2).

The construction area would be restored substantially to preconstruction conditions upon completion of the tunnel mining operations. The mining shaft and ventilation control vault would be underground, while manholes, access hatches, and other structure access points would be visible at-grade; and an electrical cabinet, tunnel ventilation grating, and access to the ventilation control vault would also be visible as they would be elevated to extend above the 100-year floodplain. Park functions and facilities, including athletic fields and recreational open spaces, would be reestablished, and trees of the same or similar species would be planted to replace the trees removed during construction. DC Water, in consultation with NPS, DC SHPO, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for the site. Impacts to views within the National Mall and West Potomac Park and to and from the Lincoln Memorial, Arlington Memorial Bridge, and Washington Monument would be minimal due to the relatively small scale of the visible infrastructure.

Construction of Emergency Overflow Structure Option 1 at West Potomac Park (North), or Option 2 at West Potomac Park (South), in conjunction with the associated mining site options, would occur within the National Mall and East and West Potomac Parks Historic Districts. To construct the emergency overflow structure, relocation of Ohio Drive SW and Rock Creek Park Trail would be required to maintain traffic circulation. Trees would be removed along Ohio Drive SW and the Potomac River waterfront, including approximately 20 flowering cherry trees under Option 1, and six under Option 2. None of the significant Japanese cherry trees around the Tidal Basin or Hains Point would be impacted. Temporary modifications to Independence Avenue SW, depending on how traffic circulation is maintained during construction under Option 1, would also result in the removal of several American elms that line the roadway. Also, a section of the historic seawall along the Potomac River, a contributing resource, would be demolished to accommodate the emergency overflow structure under both options. Views to and from historic properties would be temporarily impacted by construction barriers and equipment depending on their height.

Following construction of Emergency Overflow Structure Options 1 or 2, Ohio Drive SW and Rock Creek Park Trail would be reconstructed along their preconstruction alignments, and Independence Avenue SW would be restored if a temporary intersection is constructed for maintenance of traffic. Manholes and access hatches would be visible at-grade, but would be placed within Ohio Drive SW, to the extent practicable, to minimize the visual effect. Removal of a section of the historic seawall would physically modify the feature but the majority of the seawall would remain

intact. The emergency overflow structure would be underground, but the structure outfall would partially protrude above the water line of the Potomac River and would be visible from the Potomac River, as well as from the Arlington Memorial Bridge, Arlington National Cemetery, George Washington Memorial Parkway / Mount Vernon Memorial Highway, and Lady Bird Johnson Park. Park functions and facilities would be reestablished, and trees of the same or similar species would be planted to replace the trees removed during construction. DC Water, in consultation with NPS, DC SHPO, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for the site.

Construction of Emergency Overflow Structure Option 3 at CSO 022 would occur within the Rock Creek and Potomac Parkway Historic District. To construct the emergency overflow structure, the temporary relocation of Rock Creek Park Trail would be required to maintain pedestrian and bicycle traffic circulation. Construction access to the site would utilize the Parkway, but the road itself would not be physically modified. Trees would be removed along the Potomac River and Rock Creek, and a section of the historic seawall would be demolished to accommodate the emergency overflow structure; however, the seawall in this area has been severely altered with the addition of a contemporary, poured concrete seawall on top. In addition, the existing CSO 022 sewer outfall has been integrated into the seawall and is visible from the Potomac River. Views to and from historic properties would be temporarily impacted by construction barriers and equipment depending on their height.

Following construction of Emergency Overflow Structure Option 3, the shaft, CSO 022 diversion structure, and ventilation control vault would be underground, while manholes and access hatches would be visible at-grade. An electrical cabinet, tunnel ventilation grating, and access to the ventilation control vault would also be visible as they would be elevated to extend above the 100-year floodplain. The emergency overflow structure outfall would partially protrude above the water line of the Potomac River; however, it would not be higher than the extant seawall. The outfall would be visible from the Potomac River, as well as Theodore Roosevelt Island. Aside from the emergency overflow structure outfall, other visible infrastructure would minimally impact views to and from the Watergate Complex, Kennedy Center, Theodore Roosevelt Island, and the Georgetown Waterfront due to the small scale of the at- and above-grade features. Park functions and facilities, including Rock Creek Park Trail, would be reestablished, and trees of the same or similar species would be planted to replace the trees removed during construction. DC Water, in consultation with NPS, DC SHPO, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for the site.

Construction of the ventilation control facility and UPIRS diversion structure would occur within the Rock Creek and Potomac Parkway Historic District. The structures would be located within a more urban area of the park. The above-grade portion of the ventilation control facility is presented in orange on the conceptual layout of the site provided as **Figure 2-8** in *Chapter 2.* As the facility has the potential to reach up to two stories in height, there would be impacts to viewsheds of nearby historic properties, including the Foggy Bottom Historic District and Watergate Complex. The facility would be designed in consultation with NPS, DC SHPO, and others, as appropriate, to ensure that the facility design is compatible with the Historic District and surrounding historic properties. Furthermore, manholes and access hatches would be constructed at-grade as part of the UPIRS diversion structure that would also need to be incorporated into the site layout.

Construction of CSO 020 Control Options 1 or 2 would occur within the National Mall and East and West Potomac Parks Historic Districts. As the location of CSO 020 Control Option 1 is in an infrequently used area of West Potomac Park, other than the removal of trees from the site, including approximately 10 flowering cherry trees, no construction-related impacts would occur. Construction of CSO 020 Control Option 2 would require the temporary relocation of Rock Creek Park Trail to maintain pedestrian and bicycle traffic circulation. In addition, four existing volleyball courts and adjacent recreational space would be displaced, and the trees within the construction area would be removed, including approximately 10 flowering cherry trees. Views to and from historic properties would be temporarily impacted by construction barriers and equipment depending on their height.

Following construction of the CSO 020 Control, the shaft, diversion structure, and ventilation vault would be underground, while manholes, access hatches, and other structure access points would be visible at-grade; and an electrical cabinet, tunnel ventilation grating, and access to the ventilation control vault would also be visible as they would be elevated to extend above the 100-year floodplain. Park functions and facilities would be reestablished, including Rock Creek Park Trail and the volleyball courts displaced under CSO 020 Control Option 2, and trees of the same or similar species would be planted to replace the trees removed during construction. DC Water, in consultation with NPS, DC SHPO, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for the site. Due to the relatively small scale of the visible infrastructure, there would be

minimal impacts to views within the National Mall and West Potomac Park and views to and from the Kennedy Center and east to the Washington Monument and Lincoln Memorial.

Excavations and construction of new permanent features at- and above-grade for the CSO 021 Control are being completed in conjunction with the Kennedy Center Expansion Project. Minor construction activities would occur at the ground surface under the Potomac River Tunnel project, but these disturbances would be temporary and would not result in additional impacts to historic properties.

Construction of CSO 022 Control Options 1 or 2 would occur within the Rock Creek and Potomac Parkway Historic District. To construct the diversion facility under Option 1, Rock Creek Park Trail would be temporarily relocated to maintain pedestrian and bicycle traffic circulation. Construction access to the site would utilize the Parkway, but the road itself would not be modified. In addition, trees would be removed along the Potomac River and Rock Creek. CSO 022 Option 2 is in an urban portion of Rock Creek and Potomac Parkway Historic District, as well as the Plan of the City of Washington. During construction of CSO 022 Control Option 2, temporary impacts would occur to this resource due to temporary lane closures through the intersection. Additionally, views to and from historic properties would be temporarily impacted by construction barriers and equipment depending on their height.

Following construction of the CSO 022 Control Option 1, the shaft, diversion structure, and ventilation vault would be underground, while manholes, access hatches, and other structure access points would be visible at-grade; and an electrical cabinet, tunnel ventilation grating, and access to the ventilation control vault would also be visible as they would be elevated to extend above the 100-year floodplain. Park functions and facilities, including Rock Creek Park Trail would be reestablished, and trees of the same or similar species would be planted to replace the trees removed during construction. Due to the relatively small scale of visible infrastructure, there would be minimal impacts to views to and from the Watergate Complex, Kennedy Center, Theodore Roosevelt Island, and the Georgetown Waterfront. DC Water, in consultation with NPS, DC SHPO, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for the site. Under CSO 022 Control Option 2, all the structures would be underground, with only manholes, access hatches, and tunnel ventilation grating visible at-grade. DC Water would coordinate with NPS and DDOT, as appropriate, to reconstruct impacted sections of Virginia Avenue NW, 27th Street NW, and I Street NW, and to reestablish vegetation.

The CSO 024 Control and UPI diversion structure would be constructed within the Georgetown National Historic Landmark District in the public right-of-way of K Street NW and 30th Street NW. A phased approach to construction would be required to maintain vehicle traffic, and sidewalks within the construction area would be closed and detoured to maintain pedestrian circulation around the site to Georgetown and the waterfront. Views to and from historic properties would be temporarily impacted by construction barriers and equipment depending on their height.

Following construction of the CSO 024 Control and UPI diversion structure, the shaft, diversion structure, and ventilation vault would be underground, while manholes, access hatches, and other structure access points would be visible at-grade; and an electrical cabinet, tunnel ventilation grating, and access to the ventilation control vault would also be visible as they would be elevated to extend above the 100-year floodplain. K Street NW, 30th Street NW, and adjacent sidewalks and other public space would be restored to preconstruction conditions. Due to the relatively small scale of visible infrastructure, there would be minimal impacts to views to and from C&O Canal NHP, Duvall Factory, and West Heating Plant, as well as views north and south on 30th Street NW, and east and west on K Street NW. DC Water, in consultation with DDOT, the DC SHPO, and Commission of Fine Arts (CFA), would develop site restoration plans and locate and design visible infrastructure to be appropriate for the site.

Construction of CSO 027 Control Options 1 or 2 would occur within the Georgetown National Historic Landmark District. CSO 027 Control Option 1 would primarily be constructed within the public right-of-way of K Street NW, at Potomac Street NW, requiring temporary lane closures. Sidewalks along K Street NW would be closed and detoured to maintain pedestrian circulation around the site to Georgetown and the waterfront. Additionally, portions of CSO 027 Control Option 1, as well as the entirety of CSO 027 Control Option 2, would be constructed within Georgetown Waterfront Park. Either CSO 027 Control Options 1 or 2 would require the temporary displacement of park features, such as paths, landscaping, and open space. Detours would be implemented to maintain pedestrian and bicycle access through Georgetown Waterfront Park, or by creating a temporary detour around the construction area on K Street NW. Views to and from historic properties would be temporarily impacted by construction barriers and equipment depending on their height.

Following construction of CSO 027 Control Option 1, K Street NW and adjacent sidewalks would be restored to preconstruction conditions. Under both options, the shaft, diversion structure, and ventilation vault would be

underground, while manholes, access hatches, and other structure access points would be visible at-grade; and an electrical cabinet, tunnel ventilation grating, and access to the ventilation control vault would also be visible as they would be elevated to extend above the 100-year floodplain. The emergency surge relief pipe, should it be constructed at CSO 027, would be visible from the river, but would be integrated into the existing seawall. Georgetown Waterfront Park would be restored, either to preconstruction or improved conditions, as coordinated between DC Water, DDOT, NPS, DC SHPO, CFA, and others, as appropriate. Due to the relatively small scale of visible infrastructure, there would be minimal impact to views to and from the Potomac River, and surrounding historic properties, including C&O Canal NHP, Bomford Mill, Paper Mill, Francis Scott Key Bridge, George Washington Memorial Parkway, Theodore Roosevelt Island, Watergate Complex, and Kennedy Center. Should the emergency surge relief pipe be constructed at CSO 028, impacts to Georgetown Waterfront Park would be greatly reduced under CSO 027 Option 1 because only a very small portion of construction would occur within the park. Under CSO 027 Option 2, construction would remain in the park, but by eliminating the emergency surge relief pipe, disturbance would be less than if the pipe were constructed.

Construction of the CSO 028 Control would occur within the Georgetown National Historic Landmark District, the C&O Canal NHP, and the Potomac Gorge. As currently designed, the diversion structure would be underground, while manholes, access hatches, and other structure access points would be visible at-grade; the drop shaft access and tunnel ventilation grating would also be visible as they would be elevated to extend above the 100-year floodplain. The emergency surge relief pipe, should it be constructed at CSO 028, would require the removal of shoreline vegetation. The drop shaft would be constructed partially within the C&O Canal embankment and the exposed portions would be finished with materials coordinated between DC Water, NPS, and other stakeholders.

To accommodate construction of the CSO 028 Control, the Capital Crescent Trail would be rerouted around the construction area to maintain access west towards the Washington Canoe Club and east towards the Potomac Boat Club and Water Street NW. Views to and from historic properties would be temporarily impacted by construction barriers and equipment depending on their height. Once construction of the CSO 028 Control is completed, park functions and facilities, including the Capital Crescent Trail, would be reestablished, and trees of the same or similar species would be planted to replace the trees removed during construction. The emergency surge relief pipe would impact the Potomac River shoreline, as a portion of the outfall would be visible above the waterline. Views to and from the Potomac Aqueduct Abutment and Pier, Francis Scott Key Bridge, and George Washington Memorial Parkway would not be impacted due to the relatively small scale of visible infrastructure. DC Water, in consultation with NPS, DC SHPO, CFA, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for the site. Should the emergency relief pipe not be constructed at CSO 028, all associated impacts to the shoreline would be eliminated.

Construction of CSO 029 Control Options 1 or 2 would occur within the Georgetown National Historic Landmark District. Option 1 would require lane closures of Canal Road NW at the southwest entrance to Georgetown University. A phased construction approach would be required to maintain vehicle traffic circulation, and the sidewalk along westbound Canal Road NW would be closed and detoured, if possible, to maintain pedestrian circulation along Canal Road NW and to the University. Option 2 would avoid traffic-related impacts along Canal Road but would also require a phased construction approach to maintain access to Georgetown University at the southwest entrance. Views to and from historic properties would be temporarily impacted by construction barriers and equipment depending on their height. Once construction of the CSO 029 Control is completed, Canal Road NW, the University entrance, and pedestrian circulation would be restored to preconstruction conditions, except for manholes, access hatches, an electrical cabinet, and tunnel ventilation grating that would be visible at-grade. Pending final design, temporary or permanent retaining wall(s) may be required to facilitate underground facility construction or maintenance of traffic and to secure the steep slope(s) to the east and / or west of the Georgetown University entrance. The materials and design of any permanent walls would be executed in consultation with DC SHPO, CFA, Georgetown University, and others, as appropriate. Views to and from surrounding historic properties would not be impacted.

No at- or above-grade construction would occur to connect the Potomac River Tunnel to the existing shaft at JBAB, as this work has been completed in conjunction with DC Water's Blue Plains Tunnel; therefore, there would be no impacts to historic properties from the tunnel connection.

The Georgetown National Historic Landmark District, where many of the GI facilities would be implemented pending the practicability determination, has unique characteristics which elevate the historic district to the level of a National Historic Landmark. Features like the historic trolley tracks, cobblestone streets, brick sidewalks and alleys, and historic call boxes all combine with the neighborhood architecture to create a unique streetscape. GI controls within the CSO

027, 028, and 029 sewersheds would be constructed primarily in the public right-of-way, similar to GI projects implemented in nearby neighborhoods such as Burleith and Glover Park. Three primary types of GI are likely to be considered within the CSO 027, 028, and 029 sewersheds, including bioretention in the planter strips and as curb extensions, permeable pavement in the parking lanes and alleys, and subsurface storage within aggregate layers beneath roads and sidewalks. By altering streets, sidewalks, and alleys, implementation of these GI controls in the CSO 027, 028, and 029 sewersheds have the potential to adversely impact character-defining features of the Georgetown National Historic Landmark District, as well as the various other historic properties listed in **Appendix D**. DC Water would consult with DC SHPO, CFA, DDOT, and other stakeholders, as appropriate, to avoid or minimize impacts to these characteristics and to develop mitigation measures as necessary.

Until the practicability of GI is determined, the type, number, location, design, and construction techniques of GI facilities throughout sewersheds 027, 028, and 029, cannot be finalized. Should GI be determined practicable, DC Water would follow the appropriate regulatory processes and reviews associated with the location, source of funding, and other factors, for the specific projects. As any GI facilities move through the siting and design phases, all local permitting and review processes, including reviews by CFA under the Old Georgetown Act of 1950, as applicable, would be followed.

4.5.3.1 Cumulative Impacts

Most of the current and future projects identified within the study area would result in construction-related impacts by temporarily altering or displacing character-defining features of historic properties, as well as temporarily affecting views to and from these and other nearby resources. Projects such as the Martin Luther King, Jr. Memorial, Kennedy Center Expansion, Vietnam Veteran Memorial Visitor Center, National Desert Storm and Desert Shield Memorial, Georgetown Nonmotorized Boathouse Zone Development Plan, Arlington Memorial Bridge Rehabilitation, the C&O Canal NHP Georgetown Canal Plan, and the Union Station to Georgetown Streetcar Transportation Improvements would have long-term adverse impacts on historic properties from permanent modifications to individual resources, as well as permanent changes to views and vistas. While these projects will or may potentially impact historic structures or districts, the responsible agencies have been consulting with the DC SHPO to mitigate adverse effects in accordance with Section 106 of the National Historic Preservation Act or Section 9B of the Historic Landmark and Historic District Protection Act, as appropriate, resulting in minimal adverse cumulative impacts to historic structures or districts. Similarly, adverse impacts to historic structures and districts would be minimized under Alternative B through design and consultation and coordination with the NPS, DC SHPO, and appropriate stakeholders. Therefore, although the extent of impacts is not fully known, it is anticipated that Alternative B would add an adverse increment to the adverse impacts of other projects and actions on historic structures and districts, resulting in a noticeable overall adverse cumulative impact.

4.5.3.2 Conclusion

Construction of the Potomac River Tunnel, including tunnel boring, hauling, and other construction-related activities have the potential to cause vibrations that could result in impacts to historic structures. In addition, construction of the various supporting tunnel infrastructure would temporarily alter or displace character-defining features of the National Mall and East and West Potomac Parks Historic Districts, Rock Creek and Potomac Parkway Historic District, Georgetown National Historic Landmark District, C&O Canal NHP, and Potomac Gorge. Following construction, DC Water would coordinate with NPS, other impacted landowners, and stakeholders, and would consult with DC SHPO, to reestablish the functions and facilities of the impacted parks, restore vehicle, pedestrian, and bicycle circulation, reestablish trees and other vegetation, and ensure that the character-defining features and overall integrity of impacted historic properties are restored. Minimal impacts are anticipated to views within historic properties directly impacted by the project, as well as to and from surrounding historic properties.

As the detailed extent of impacts to historic properties from various aspects of the project are not fully known, DC Water, NPS, and DC SHPO have initiated development of an agreement document to define the continued consultation process for the design and construction phases of the project. Ultimately, it is anticipated that implementation of the processes and stipulations of the agreement document would minimize or mitigate adverse impacts to historic properties. Alternative B is anticipated to result in adverse impacts and would contribute to noticeable adverse cumulative impacts on historic structures and districts.

4.6 ARCHEOLOGICAL RESOURCES

4.6.1 About the Analysis

The NPS defines archeological resources as the remains of past human activity. Archeological remains usually take the form of artifacts (e.g., fragments of tools or ceramic vessels), features (e.g., remnants of walls, cooking hearths, or trash middens), and ecological evidence (e.g., pollens remaining from plants that were in the area when the activities occurred), and may be "prehistoric" (pre-European contact), "historic" (post-European contact), or contain artifacts from both periods (Little et al. 2000).

The analysis of impacts to archeological resources is a phased approach that conforms to the standards and guidelines of the NPS and the District of Columbia. The initial phases include a desktop analysis (Phase IA) and field survey (Phase IB) designed to identify archaeological sites within the project's limit of disturbance. If present, the subsequent Phase II investigations determine the National Register-eligibility of the archaeological sites. Finally, if the archaeological sites are found to be National Register eligible, Phase III data recovery is implemented to mitigate any adverse effects that cannot be avoided by the proposed undertaking. To date, Phase IA assessment has been conducted for the tunnel-related components of the project and Phase IB survey has been completed at several of the construction areas. A summary table of the results of the Phase IA assessment and Phase IB survey for the project, along with recommendations for further investigations, can be found in **Appendix D**.

4.6.2 Impacts of Alternative A – No-Action

As there would be no construction-related ground disturbance under the no-action alternative, there would be no impacts to archeological resources.

4.6.2.1 Cumulative Impacts

There would be no impacts to archeological resources under the no-action alternative; therefore, there would be no cumulative impacts.

4.6.2.2 Conclusion

There would be no impacts to archeological resources under the no-action alternative.

4.6.3 Impacts of Alternative B – Proposed Action

Phase I archeological site survey investigations conducted for the Potomac River Tunnel project resulted in the identification of resources, or areas of high potential for resources, at the location of CSO 022 Control Option 1 / Emergency Overflow Structure Option 3, the ventilation control facility and UPIRS diversion structure, CSO 027 Control Options 1 or 2, CSO 028 Control, and CSO 029 Control Option 1. Each site yielded evidence of Historic period archeological resources ranging from the remains of residential structures to commercial and industrial structures (Kreisa et al. 2018). Construction of any of these options has the potential to impact the identified archeological resources. Furthermore, the CSO 024 Control and UPI diversion structure areas outside the road right-of-way, and CSO 029 Control Option 2, have the potential to contain either prehistoric Native American or Historic period archeological resources (Kreisa et al. 2018). If Alternative B is implemented, surveys would be needed at these locations to determine if archeological resources are present.

The location of the emergency surge relief pipe, if constructed as part of CSO 027 Control Options 1 or 2, includes areas where the remains of historic docks and wharves could be present near the shoreline. Similarly, if the pipe is constructed at CSO 028, the potential exists for the remains of historic structures, including boat club buildings and associated docks, to be present. If Alternative B were to be selected, additional archeological investigations would be needed to determine if archeological resources are present.

Archeological resources identified at sites selected for implementation would need to be evaluated for listing in the National Register and appropriate avoidance, minimization, and mitigation approaches developed in consultation with the NPS and DC SHPO.

Pending the results of the GI practicability determination, there is the potential that GI construction activities could impact archeological resources in the CSO 027, 028, and 029 sewersheds. As potential locations of GI facilities are identified, archeological investigations would be conducted to assess the potential for archeological resources. DC Water would first attempt to avoid any areas with high to moderate potential for archeological resources. If these areas could not be avoided, DC Water would undertake additional survey and site evaluation to determine NRHP eligibility, and if necessary, develop mitigation in consultation with the NPS and DC SHPO.

DC Water, NPS, and DC SHPO have initiated development of an agreement document that defines the continued consultation process for the resolution of any adverse effects on archeological resources associated with the Potomac River Tunnel project. The agreement document provides a process for the identification and evaluation of archeological resources, as well as identification of mitigation of adverse effects to archeological resources found to be eligible for listing in the National Register. Implementation of the processes and stipulations of the agreement document would result in the mitigation of adverse impacts to archeological resources.

4.6.3.1 Cumulative Impacts

Most of the current and future projects and actions identified within the study area are situated within areas of made land, or land created by filling with dredge materials, along the Potomac River and in the National Mall. These projects have a low potential for the presence of, and hence to impact, archeological resources. However, improvements along the C&O Canal proposed under the C&O Canal NHP Georgetown Canal Plan, the Union Station to Georgetown Streetcar project, and the Long Bridge project have the potential to impact archeological resources .The responsible agencies have been and will continue consulting with the DC SHPO to minimize and / or mitigate adverse effects in accordance with Section 106 of the National Historic Preservation Act or Section 9B of the Historic Landmark and Historic District Protection Act, as appropriate, resulting in minimal adverse cumulative impacts to archeological resources. Similarly, adverse impacts to archeological resources would be minimized and / or mitigated under Alternative B. Therefore, Alternative B would add an adverse increment impact to the adverse impacts of other projects and actions, resulting in adverse cumulative impacts to archeological resources.

4.6.3.2 Conclusion

Phase I archeological investigations have identified Historic period archeological resources, and areas of high potential for resources, at several locations within the study area, as well as locations of deeply buried land surfaces that have the potential to contain Native American artifacts. Archeological resources would be identified and evaluated for listing in the National Register. Attempts at avoidance and minimization of disturbance to those sites determined eligible for listing in the National Register would be considered, and mitigation of any adverse effects to archeological resources that cannot be avoided would be identified through continued consultation as outlined in the agreement document to be executed by DC Water, NPS, and the DC SHPO. Alternative B is anticipated to result in adverse impacts that would add to the overall adverse cumulative impacts on archeological resources.

4.7 CULTURAL LANDSCAPES

4.7.1 About the Analysis

Cultural landscapes consist of "a geographic area (including both cultural and natural resources and the wildlife or domestic animals therein) associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values (NPS 1992)." Potential impacts, direct or indirect, to the cultural landscape, were analyzed in consideration of regulations implementing Section 106 of the National Historic Preservation Act and guidelines stated within The Secretary of the Interior's *Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (NPS 1992).

4.7.2 Impacts of Alternative A – No-Action

There would be no construction under the no-action alternative; therefore, there would be no new impacts because existing landscape features would not be altered, and new elements would not be added within the cultural landscapes identified in the study area.

4.7.2.1 Cumulative Impacts

There would be no new impacts to cultural landscapes under the no-action alternative; therefore, there would be no cumulative impacts.

4.7.2.2 Conclusion

There would be no new impacts to cultural landscapes under the no-action alternative because construction would not occur that would modify existing landscape features or add new elements within cultural landscapes. There would be no cumulative impacts because there would be no impacts under the no-action alternative.

4.7.3 Impacts of Alternative B – Proposed Action

Under Alternative B, construction of the tunnel mining site would result in temporary modifications to features of the East and West Potomac Parks cultural landscape under both options, including softball fields, trees, and open

recreational space. Views to and from cultural landscapes would be temporarily impacted by construction barriers and equipment depending on their height. Park functions and facilities, including athletic fields and recreational open spaces, would be reestablished, and trees of the same or similar species would be planted to replace the trees removed during construction. Permanent supporting tunnel infrastructure would be visible at- and above-grade, adding new elements to the landscape, but DC Water, in consultation with NPS, DC SHPO, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for the site and to minimize the visual intrusion to other cultural landscapes in the vicinity, including the Lincoln Memorial Grounds, Memorial Avenue Corridor, Franklin Delano Roosevelt Memorial, Thomas Jefferson Memorial, and Potomac River Landscape.

There would be no impacts to cultural landscapes from the installation of high voltage energy distribution lines to deliver power for the TBM, as all construction activities would be limited to the public right-of-way of Independence Avenue SW (applicable to Tunnel Mining Site Option 1) or East Basin Drive SW and Ohio Drive SW (applicable to either Tunnel Mining Site Options 1 or 2), except in the vicinity of the mining site and the connection to existing power infrastructure.

Construction of Emergency Overflow Structure Options 1 or 2, in conjunction with the associated mining site options, would also occur within the East and West Potomac Parks cultural landscape. Temporary modifications to landscape features, including Ohio Drive SW and Rock Creek Park Trail, would occur in addition to the permanent removal of a section of the historic seawall. Construction would also result in the removal of flowering cherry trees along Ohio Drive SW and the Potomac River waterfront that are important landscape features of East and West Potomac Parks. None of the significant Japanese cherry trees around the Tidal Basin or Hains Point would be impacted. Depending on the selected maintenance of traffic approach, modifications to Independence Avenue SW may also occur, which would consequently result in the removal of several American elms that line the roadway and are also important landscape features. However, following construction, park functions and facilities would be reestablished, and trees of the same or similar species would be planted to replace the trees removed during construction. Views to and from cultural landscapes would be temporarily impacted by construction barriers and equipment depending on their height. Permanent manholes and access hatches would be visible at the ground surface but would be placed within Ohio Drive SW to the extent practicable to minimize the visual effect and impacts to surrounding park land. The emergency overflow structure would add minor new elements within the landscape that would be visible from the Lincoln Memorial Grounds, Memorial Avenue Corridor, George Washington Memorial Parkway / Mount Vernon Memorial Highway, Lady Bird Johnson Park, and the Potomac River Landscape. DC Water, in consultation with NPS, DC SHPO, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for the site and to minimize the visual intrusion.

Construction of Emergency Overflow Structure Option 3 and CSO 022 Control Option 1 would occur within the Potomac Waterfront Section of the Rock Creek and Potomac Parkway cultural landscape. Temporary modifications to landscape features, including Rock Creek Park Trail, would occur. Trees would be removed in addition to the permanent removal of a section of the historic seawall, which had previously been severely altered. However, following construction, park functions and facilities would be reestablished, and trees of the same or similar species would be planted to replace the trees removed during construction. Views to and from cultural landscapes would be temporarily impacted by construction barriers and equipment depending on their height. Permanent supporting tunnel infrastructure, including the emergency overflow structure under Option 3, would be visible at- and above-grade, adding new elements to the landscape that would be visible from the Watergate Complex, the Kennedy Center, Theodore Roosevelt Island, and the Potomac River Landscape. DC Water, in consultation with NPS, DC SHPO, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for the site and to minimize the visual intrusion.

Construction of the ventilation control facility and UPIRS diversion structure would not occur within a cultural landscape. However, because the facility has the potential to reach up to two stories in height, new permanent elements would be added within view of cultural landscapes in the vicinity, including the Watergate Complex and the Potomac Waterfront Section of the Rock Creek and Potomac Parkway. Views to and from cultural landscapes would be temporarily impacted by construction barriers and equipment depending on their height. DC Water, in consultation with NPS, DC SHPO, and others, as appropriate, would design the facility to be appropriate for the site and to minimize the visual intrusion on surrounding cultural landscapes and historic properties.

Construction of CSO 020 Control Options 1 or 2 would occur within the East and West Potomac Parks cultural landscape. As the location of Option 1 includes very few landscape features, the removal of trees from the site, including flowering cherry trees, would account for the only construction-related impact. Construction of CSO 020

Control Option 2 would result in temporary modifications to the landscape by displacing the Rock Creek Park Trail and four existing volleyball courts. Flowering cherry trees that are important landscape features would be removed from the construction area. Views to and from cultural landscapes would be temporarily impacted by construction barriers and equipment depending on their height. Following construction of the CSO 020 Control, park functions and facilities would be reestablished, and trees of the same or similar species would be planted to replace the trees removed during construction. Permanent supporting tunnel infrastructure would be visible at- and above-grade, adding new elements to the landscape that would be visible from the Lincoln Memorial Grounds and the Kennedy Center. DC Water, in consultation with NPS, DC SHPO, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for the site and to minimize the visual intrusion.

The majority of excavations and construction of new permanent features at- and above-grade for the CSO 021 Control are being completed in conjunction with the Kennedy Center Expansion Project. Minor construction activities would occur at the ground surface under the Potomac River Tunnel project, but these disturbances would be temporary and would not result in additional impacts to cultural landscapes.

Construction of CSO 022 Control Option 2 would not occur within a cultural landscape, as this area of Rock Creek and Potomac Parkway does not fall within the Potomac Waterfront Section.

The proposed location of the CSO 024 Control and UPI diversion structure is not within a cultural landscape. In addition, cultural landscapes in the vicinity would not be impacted because of existing obstructions that block views to and from the site.

Construction of CSO 027 Control Options 1 or 2 would not occur within a cultural landscape. However, views to and from cultural landscapes would be temporarily impacted by construction barriers and equipment depending on their height. Additionally, visible infrastructure, particularly the outfall of the emergency surge relief pipe if constructed at CSO 027, would potentially be visible from George Washington Memorial Parkway, Theodore Roosevelt Island, and the Potomac River Landscape. DC Water, in consultation with NPS, DC SHPO, CFA, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for the site and to minimize the visual intrusion. Should the emergency surge relief pipe be constructed at CSO 028, permanent viewshed impacts from the George Washington Memorial Parkway and Theodore Roosevelt Island cultural landscapes would be eliminated.

Construction of the CSO 028 Control would occur within the C&O Canal NHP cultural landscape. Temporary modifications to landscape features would be necessary, including relocation of the Capital Crescent Trail and removal of vegetation. Views to and from cultural landscapes would be temporarily impacted by construction barriers and equipment depending on their height. Following construction, park functions and facilities would be reestablished at the site. Permanent supporting tunnel infrastructure would be visible at- and above-grade that would add new elements within the landscape. As currently designed, the drop shaft of the CSO 028 Control would be constructed partially within the C&O Canal embankment, resulting in a permanent modification to this important landscape feature. The outfall of the emergency surge relief pipe, should it be constructed at CSO 028, would be partially visible above the waterline and would impact views from the Potomac River Landscape, as well as the C&O Canal NHP. DC Water, in consultation with NPS, DC SHPO, CFA, and others, as appropriate, would develop site restoration plans and locate and design visible infrastructure to be appropriate for the site and to minimize the visual intrusion to cultural landscapes. Should the emergency surge relief pipe not be constructed at CSO 028, all associated impacts to the shoreline would be eliminated and there would be no visual impacts to the Potomac River Landscape.

Construction of the CSO 029 Control under Option 1 or 2 would not occur within a cultural landscape. Views to and from cultural landscapes would be temporarily impacted by construction barriers and equipment depending on their height. However, cultural landscapes in the vicinity would not be permanently impacted.

The majority of excavations and construction of new permanent features at- and above-grade to connect the Potomac River Tunnel to the existing shaft at JBAB have been completed as part of DC Water's Blue Plains Tunnel project. Minor construction activities would occur at the ground surface under the Potomac River Tunnel project, but these disturbances would be temporary and would not result in additional impacts to cultural landscapes.

Of the cultural landscapes listed in *Chapter 3* and briefly described in **Appendix D**, only the C&O Canal NHP is located within the sewersheds where GI would be implemented, if determined practicable. As DC Water would not construct GI facilities within the boundaries of C&O Canal NHP, there would be no modifications, temporary or permanent, to elements of the cultural landscape. However, GI facilities could be constructed in the vicinity of C&O

Canal NHP, potentially adding new elements within view of this resource. DC Water would consult with NPS, DC SHPO, CFA, and others, as appropriate, to ensure that GI facilities constructed in the vicinity of C&O Canal NHP are designed to minimize the visual intrusion on the cultural landscape.

As previously stated, site restoration plans would be developed, and visible infrastructure appropriately located and designed to minimize impacts to cultural landscapes. Adverse impacts would be noticeable but would be minimized through consultation and coordination with NPS, DC SHPO, and other project stakeholders, as appropriate, and the development of context-sensitive designs for permanent visible infrastructure elements within the landscape. Alternative B would result in long-term beneficial impacts from the 93 percent reduction of untreated CSO discharges, thereby improving water quality of the Potomac River and improving important features of the Potomac River Landscape.

4.7.3.1 Cumulative Impacts

Several projects identified within the study area have or will have impacts to cultural landscapes. Martin Luther King, Jr. Memorial, Vietnam Veterans Memorial Visitor Center, and National Desert Storm and Desert Shield Memorial have or will be constructed within the East and West Potomac Parks cultural landscape. In addition, the Arlington Memorial Bridge Rehabilitation will occur within the Memorial Avenue Corridor and the Georgetown Canal Plan and Georgetown Nonmotorized Boathouse Zone projects will occur with the C&O Canal NHP, modifying important landscape features and adding new elements within these cultural landscapes. The establishment of Georgetown Waterfront Park has added new elements within view of cultural landscapes, as will current and future projects, including the Kennedy Center Expansion, the Francis Scott Key Bridge and Theodore Roosevelt Bridge Rehabilitations, Georgetown Nonmotorized Boathouse Zone Development Plan, and Long Bridge Project. Many of the projects are also located within the Potomac River Landscape and would result in various impacts from bridge rehabilitation and other development-related activities. While these projects have or may potentially impact cultural landscapes the responsible agencies, through planning and design, are minimizing impacts to the extent possible. However, these projects are collectively resulting in adverse impacts that are noticeable. Similarly, DC Water, in consultation with NPS, DC SHPO, and others, as appropriate, would develop designs for permanent supporting tunnel infrastructure under Alternative B that minimize modifications to important landscape features and visual intrusions.

Conversely, the DC Clean Rivers Project and DC Water's NMC and Phase 1 CSO Control Programs have benefited the Potomac River Landscape by drastically reducing CSO discharges. Alternative B would result in beneficial impacts to the Potomac River Landscape from the improved water quality that would result from implementation of the project. Therefore, it is anticipated that Alternative B would add adverse and beneficial increments to the overall adverse cumulative impacts to cultural landscapes.

4.7.3.2 Conclusion

Construction of the Potomac River Tunnel, including the various supporting tunnel infrastructure, would modify important landscape features and add new elements within the East and West Potomac Parks and C&O Canal NHP cultural landscapes. Furthermore, views from other cultural landscapes in the vicinity of the various construction areas would also be impacted by permanent visible infrastructure. It is anticipated that adverse impacts would be minimized through consultation and coordination with NPS, DC SHPO, and other project stakeholders, as appropriate, and the development of context-sensitive designs. Alternative B is also anticipated to result in beneficial impacts by reducing CSOs to the Potomac River and improving important features of the Potomac River Landscape. Alternative B would add adverse and beneficial increments to the overall adverse cumulative impacts to cultural landscapes.

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5.0 CONSULTATION AND COORDINATION

DC Water and NPS conducted public involvement during the NEPA process to provide an opportunity for the public to comment on the proposed action. Consultation and coordination with federal and District agencies, American Indian tribes, and other interested parties was also conducted to identify issues and / or concerns related to natural and cultural resources. This section provides a summary of the public involvement and agency consultation and coordination that occurred during the preparation of the EA.

5.1 PUBLIC INVOLVEMENT

As a part of the NEPA process, and to comply with the requirements of Section 106 of the National Historic Preservation Act, DC Water and NPS involved the public in project planning by holding a public scoping period from July 2, 2014 to August 31, 2014. The public, agencies, stakeholders, and other interested parties were invited to submit comments on the project during this period and to attend a public scoping meeting on July 31, 2014 at the Lab School of Washington. The public scoping meeting was held to provide interested members of the public with an opportunity to learn about the Potomac River Tunnel project, identify any areas of concern regarding the proposed project, provide the opportunity for the public to share their knowledge of important environmental and cultural issues that should be considered during planning, and gain public feedback to help inform the development of project alternatives.

To announce the public scoping comment period and meeting, DC Water and NPS published ads in four local papers (*The Washington Post* [July 6, 2014]*, The Northwest Current* [July 2, 2014]*, The Washington City Paper* [July 4, 2014]*,* and *The Georgetowner* [July 2, 2014]); distributed a public scoping newsletter (July 14, 2014) to individuals and groups within ½ mile of the Potomac River Tunnel study area using GIS / address data from DC Water's customer service database; posted project information, including the scoping newsletter, to the NPS Planning, Environment and Public Comment (PEPC) website and DC Water's website; issued an email blast (July 17, 2014) announcing the public scoping meeting to Advisory Neighborhood Commission (ANCs) within the Potomac River Tunnel study area as well as other interested parties; and made robocalls (July 21, 2014) announcing the public scoping meeting to DC Water customers within ½ mile of the project study area. Seventeen public correspondences and two agency correspondences were received during the scoping period.

5.2 AGENCY AND TRIBAL CONSULTATION AND COORDINATION

5.2.1 Section 106 of the National Historic Preservation Act

Following the implementing regulations of the National Historic Preservation Act (36 CFR § 800), NPS and DC Water initiated consultation with the DC SHPO in November 2014. The NPS and DC Water have hosted a series of Section 106 meetings to discuss the project, including a public scoping meeting on July 31, 2014, a joint NEPA / Section 106 agency informational meeting on October 24, 2017, and Section 106 consulting parties' meetings on January 29, 2015, December 15, 2017, and June 20, 2018. Section 106 consultation is ongoing at the time of this EA. DC Water, NPS, and DC SHPO are currently in the process of developing an agreement document that defines the continued consultation process for the identification and evaluation of resources, and the resolution of any adverse effects on historic properties, including archeological resources, associated with the project.

5.2.2 Tribal Consultation

DC Water and NPS initiated tribal consultation on August 29, 2017. Letters seeking consultation were sent to the Delaware Nation and the Pamunkey Indian Tribe. In response, Delaware Nation's Director of Cultural Resources/Section 106 Compliance responded that the Delaware Nation concurred at present with the proposed plan and requested to be a consulting party. The response requested that the Delaware Nation be kept up to date on the progress of the project and to be contacted if any discoveries arise. To date, the Pamunkey Indian Tribe has not provided comments on the project but has requested consulting party status.

5.2.3 Section 7 of the Endangered Species Act

DC Water obtained an official list of terrestrial and freshwater species and critical habitat that may occur within the study area from the US Fish and Wildlife Service on January 23, 2017 that identified the federally listed Hay's spring amphipod (*Stygobromus hayi*) as potentially occurring within the study area. Through continued coordination, a letter received from US Fish and Wildlife Service dated April 19, 2017, stated the proposed project is "not likely to adversely affect" endangered, threatened, or candidate species because while the project is within the range of the species, it is unlikely that the species would occur within the project area that was submitted.

NMFS identified the federally listed shortnose sturgeon and the Gulf of Maine, New York Bight, Chesapeake Bay, South Atlantic, and Carolina Distinct Population Segments (DPS) of the federally listed Atlantic sturgeon as potentially occurring in the Potomac River in reply to a request for technical assistance dated February 17, 2015. Furthermore, NMFS designated this portion of the Potomac River as critical habitat for the Atlantic sturgeon Chesapeake Bay DPS in a final rule published in the Federal Register on August 17, 2017. On February 2, 2018, DC Water and NPS sent a letter to NMFS to request concurrence with the determination that the Potomac River Tunnel project is not likely to adversely affect the Atlantic or shortnose sturgeon and is also not likely to destroy or adversely modify critical habitat of the Atlantic sturgeon. NMFS concurred with the determination in a letter dated July 27, 2018.

The following agencies and stakeholder organizations were contacted to request input on the project as part of the NEPA and / or Section 106 of the National Historic Preservation Act compliance processes. In addition, individuals without affiliation were consulted, but their names are excluded for privacy.

Agency and Stakeholder Organizations		
Advisory Council on Historic Preservation	Georgetown Business Improvement District	Seafarers Yacht Club of Annapolis
ANCs 2A, 2B, 2E, 3B, and 3D	Georgetown Heritage	Sierra Club
Audubon Naturalist Society	Georgetown University	St. Albans School
B-CC Crew & Boosters	Georgetown Women's Rowing	St. John's College HS
C&O Canal Association	Grace Episcopal Church	Surfrider Foundation
C&O Canal Trust	Guest Services, Inc.	The Federal City Council
Capital Rowing Club	Guild of Professional Tour Guides of DC	The Georgetown Voice
Capital SUP	Historical Society of Washington, DC	The Georgetowner
Capital Yacht Club	House of Sweden	The Hoya
Chesapeake Bay Yacht Club Association	JBAB	Trout Unlimited
Citizens Association of Georgetown	Kennedy Center	Trust for the National Mall
Coalition for the Capital Crescent Trail	Key Bridge Boathouse	United States Coast Guard
CFA	Marine Evolutions	US Army Corps of Engineers
Committee of 100 on the Federal City	Muse Architects	US Institute of Peace
DC Office of Planning	National Association for Olmsted Parks	Virginia Scholastic Rowing Association
DC Preservation League	NCPC	Washington Area Bicyclist Association
Defenders of Potomac River Parkland	National Cathedral and St. Albans Crew	Washington Canoe Club
Delaware Nation	National Coalition to Save Our Mall	Washington City Paper
DOEE	NOAA Fisheries	WMATA
DDOT	NPS (incl. all relevant parks and programs)	Washington-Lee HS Crew
District of Columbia Council	National Trust for Historic Preservation	Watergate East - Management Office
Executive Office of the Mayor	Palisades Citizens Association	Watergate Hotel
Foggy Bottom Association	Pamunkey Indian Tribe	Watergate West Apartments and Co-op
Foxhall Community Citizens Association	Port of Washington Yacht Club	WaveOne Swimming
Friends of Georgetown Waterfront Park	Potomac Boat Club	WeCanRow DC
General Services Administration	Potomac River Sailing Association	West End Citizens Association
George Washington University	Potomac River Sports Foundation	Winston Real Estate
George Washington University Rowing	Potomac Riverkeeper	Woodrow Wilson HS Crew Boosters
Georgetown Business Association	Rock Creek Rowing	Yorktown HS Crew Boosters

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As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under US administration.

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