4 ENVIRONMENTAL CONSEQUENCES

This chapter analyzes the potential environmental impacts, both beneficial and adverse, that would occur as a result of implementing the Preferred Alternative, Alternative 5A1-modified, as well as the potential impacts of the no action alternative. Impact topics analyzed for this project have been identified on the basis of NEPA, CEQ regulations implementing NEPA, NPS DOs, and the NPS document *Management Policies 2006*. This chapter also includes definitions of impact thresholds and methods used to analyze impacts. The environmental resources presented in this chapter correspond to the environmental resource discussions in Chapter 3.

4.1 General Methodology for Establishing Impact Thresholds and Measuring Impacts

WSSC and the NPS used the following elements in the general approach for establishing impact thresholds and determining the impacts of the alternatives on each environmental resource category:

- General analysis methods, as described in guiding regulations
- Basic assumptions used to formulate the specific methods in this analysis
- Thresholds used to define the level of impact resulting from each alternative
- Methods used to evaluate the cumulative impacts of each alternative

These elements are described in the following sections.

4.1.1 General Analysis Methods

The analysis of impacts is based on CEQ guidelines, the NPS *Management Policies 2006*, and DO #12 procedures.

4.1.2 Impact Thresholds

The potential impacts of each alternative are described in terms of type (beneficial or adverse), context, duration, and intensity. Definitions of these descriptors follow.

Beneficial: A positive change in the condition or appearance of the resource or a change that moves the resource toward a desired condition.

Adverse: A change that declines, degrades, and/or moves the resource away from a desired condition or detracts from its appearance or condition.

Context: The affected environment in which an impact would occur, such as site-specific, local, regional, affected interests, and so on. Context is variable and depends on the circumstances involved with each impact topic. The environmental impact analysis determines the context.

Duration: The duration of the impact is described as short-term or long-term. Duration is variable with each environmental impact topic. Short-term, in the context of this EA, is defined as occurring during and immediately following construction activities; long-term is defined as persisting after construction is completed for an indefinite period.

Intensity: Definitions of impact intensity (negligible, minor, moderate, and major) are specific to each environmental impact topic. The impact intensity threshold is determined by comparing the environmental impact to a relevant standard based on applicable or relevant guidance, standards, or best professional judgment.

4.1.3 Cumulative Impact Analysis Method

The CEQ regulations to implement NEPA require the assessment of cumulative impacts in the decision-making process for federal projects and actions. Cumulative impacts are defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions" (40 CFR 1508.7). As stated in the CEQ handbook, *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ, January 1997), cumulative impacts need to be analyzed in terms of the specific resource, ecosystem, and human community being affected and should focus on effects that are truly meaningful. Cumulative impacts are considered for all alternatives, including the no action alternative.

Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time. The cumulative impact assessment for the proposed Broad Creek WWPS Conveyance System Augmentation project is largely qualitative in nature because site-specific data are not sufficient to permit a quantitative analysis, and because a number of cause-and-effect relationships are not readily quantifiable. WSSC and the NPS used the following four steps to analyze cumulative impacts.

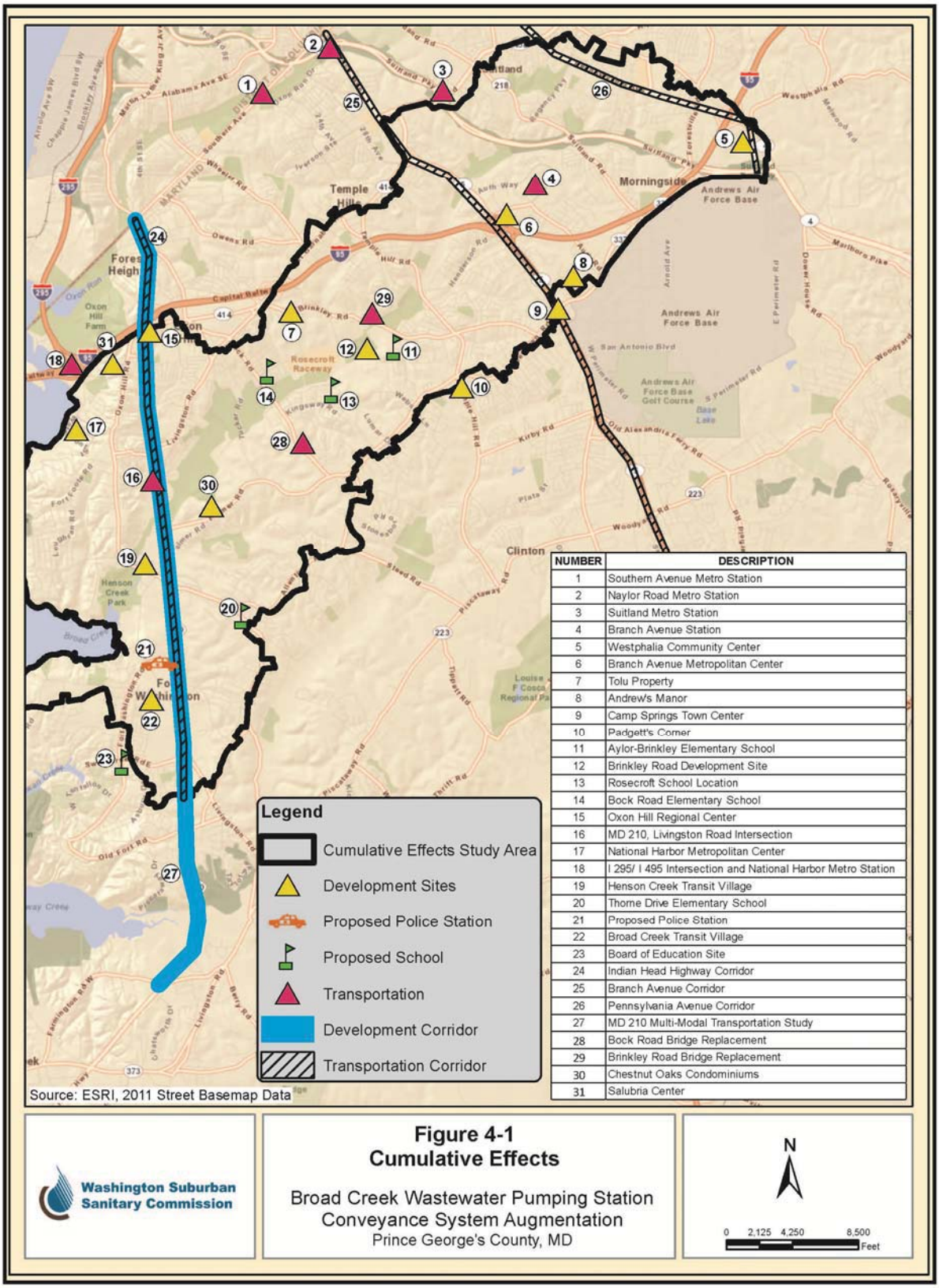
Step 1: Identify Resources Impacted—Fully identify resources impacted by the Preferred Alternative, including resources impacted by long-term maintenance activities. Resources include those addressed as impact topics in Chapter 3 and Chapter 4 of this EA.

Step 2: Set Boundaries—Identify an appropriate spatial and temporal boundary for each resource. Generally, the future temporal boundary for this project is 2025, which is the time frame of the Prince George's County *Approved General Plan* (M-NCPPC, October 2002). The spatial boundary for the cumulative impact analysis is the extent of the Broad Creek sewer basin.

Step 3: Identify Cumulative Action Scenario—Determine which past, present, and reasonably foreseeable future actions to include with each resource. This analysis is summarized in the text below.

Step 4: Cumulative Impact Analysis—Summarize impacts of these other actions, plus impacts of the proposed Broad Creek WWPS Conveyance System Augmentation project, to arrive at the total cumulative impact. This analysis is included for each resource discussed in this chapter.

To conduct the cumulative impact analysis, WSSC and the NPS researched the development potential within the Broad Creek sewer basin (see Figure 4-1, Cumulative Effects). The sewer basin boundary is generally the boundary for the cumulative effects study area. The cumulative effects study area is predominately located within the Prince George's County Developing Tier (M-NCPPC, October 2002). The Developing Tier encompasses the middle section of the county, which has been most subject to recent suburban expansion and would continue to experience the greatest market pressures for residential community development. The county anticipates that two of every three



NUMBER	DESCRIPTION
1	Southern Avenue Metro Station
2	Naylor Road Metro Station
3	Suitland Metro Station
4	Branch Avenue Station
5	Westphalia Community Center
6	Branch Avenue Metropolitan Center
7	Tolu Property
8	Andrew's Manor
9	Camp Springs Town Center
10	Padgett's Corner
11	Aylor-Brinkley Elementary School
12	Brinkley Road Development Site
13	Rosecroft School Location
14	Bock Road Elementary School
15	Oxon Hill Regional Center
16	MD 210, Livingston Road Intersection
17	National Harbor Metropolitan Center
18	I 295/ I 495 Intersection and National Harbor Metro Station
19	Henson Creek Transit Village
20	Thorne Drive Elementary School
21	Proposed Police Station
22	Broad Creek Transit Village
23	Board of Education Site
24	Indian Head Highway Corridor
25	Branch Avenue Corridor
26	Pennsylvania Avenue Corridor
27	MD 210 Multi-Modal Transportation Study
28	Bock Road Bridge Replacement
29	Brinkley Road Bridge Replacement
30	Chestnut Oaks Condominiums
31	Salubria Center

Washington Suburban Sanitary Commission

Figure 4-1
Cumulative Effects

Broad Creek Wastewater Pumping Station
Conveyance System Augmentation
Prince George's County, MD

N

0 2,125 4,250 8,500
Feet

new homes and three of every five new jobs would be within the Developing Tier. The most northern portion of the cumulative effects study area is located within the Developed Tier, which contains more than half of county's existing households and just under half of the county's employment. The county is supporting balanced growth in both the Developed and the Developing Tier, specifically targeting development within designated centers and corridors to capitalize on existing infrastructure by locating residential and commercial development closer to transit services. The following centers and corridors are located within or immediately adjacent to the cumulative effects study area (see Figure 4-1, preceding page):

- National Harbor Metropolitan Center—existing waterfront retail entertainment center with restaurants, hotels, and recreational uses
- Oxon Hill Regional Center—partially developed with retail and office uses
- Westphalia Community Center—proposed center to include office, retail, and residential uses
- Indian Head Highway Corridor
- Branch Avenue Corridor
- Pennsylvania Avenue Corridor

Currently, the National Harbor Metropolitan Center is the only center that is making steady progress towards completion. At completion, National Harbor would include 7.3 million square feet of mixed-use community space, which includes 4,000 hotel rooms; 2,500 residential units; 500,000 square feet of office space; one million square feet of retail, dining, and entertainment space; a convention center; a marina, the National Children's Museum; and 10,000 on-site parking spaces. In addition, an outlet mall is slated to be constructed and open by 2013. Currently, the Potomac Overlook residential development is underway in this area.

There are immediate plans for a mixed-use development on Oxon Hill Road near and south of the intersection of Oxon Hill Road and Harborview Avenue called Salubria Center. This development, which would support the Oxon Hill Regional Center, would consist of approximately 500,000 square feet of retail, dining, and hospitality uses.

Additionally, the *Approved Master Plan and Sectional Map Amendment for the Henson Creek-South Potomac Planning Area* (M-NCPPC, April 2006) indicates that the following areas are slated for future development.

- Broad Creek Transit Village and Medical Park—A proposed mixed-use development that capitalizes on proximity to the Fort Washington Hospital, using a pedestrian-friendly development pattern with a grid of short blocks, an internal main street, and a transit station.
- Henson Creek Transit Village—A proposed redevelopment of the existing commercial buildings to create a main street setting, the addition of moderate-density residential development along a grid pattern of new streets, and a transit station.
- Padgett's Corner—A proposed community-scale commercial area that supports the surrounding residential neighborhoods.
- Andrews Manor—A proposed mixed-use revitalization or redevelopment that serves as a gateway to the Andrews Air Force Base (AAFB).
- Camp Springs Town Center—A proposed revitalization or redevelopment.

The planning documents also identify several proposed transportation improvements and proposed public facilities within the basin:

- Southern Avenue Metro Station (proposed)
- Naylor Road Metro Station (proposed)
- Suitland Metro Station (proposed)
- Branch Avenue Metro Station (proposed)
- National Harbor Metro Station (proposed)
- Md. 210 and Livingston Road intersection improvements
- I-295 and I-495 intersection improvements
- Md. 210, Indian Head multi-modal transportation study
- Bock Road Bridge Replacement (under construction)
- Brinkley Road Bridge Replacement (under construction)
- Aylor-Brinkley Elementary School
- Bock Road Elementary School
- Thorne Drive Elementary School
- Rosecroft School site
- Board of Education site
- Proposed police station

According to the Prince George's County Development Activity Monitoring System, a townhouse development is planned in the northwest quadrant of Glen Rock Avenue and Brinkley Road, known as the Tolu Property. Outside of the planned developments listed above, small-scale development is ongoing within the cumulative effects study area, predominately renovations and development of individual parcels. For many of these individual parcels, the development supports the county's vision of centers and corridors. The environmental effects of this small-scale development cannot be accurately quantified. However, the collective development would have an incremental environmental contribution, which is discussed qualitatively in this cumulative effects analysis.

In conjunction with the proposed action, WSSC would undertake a number of separate but related actions to ensure the elimination of SSOs, compliance with the consent decree, and redundancy of the conveyance system. The actions related to the proposed project, some of which are already completed or underway, include an additional conveyance line outside of the NPS property, the repair of the delivery line and manholes (reduction of infiltration and inflow), the addition of generators to the pumping station (to prevent SSOs in the event of a power outage), upgrades to the pumping station pumps, and an overland sheet flow stormwater passive distribution system. These are considered present actions in this cumulative effects analysis.

Table 4 -1 summarizes the cumulative impact analysis for each environmental resource.

Table 4-1: Cumulative Impact Table

Impact Topic	Study Area	Past Actions	Present Actions (See Figure 4-1, p. 59)	Future Actions (See Figure 4-1)
Soils	Broad Creek sewer basin	Development that involved grading, excavation, placement of fill, or new impervious surfaces. Includes roadway projects and residential, commercial, recreational, and institutional construction. Specifically: • Construction of I-495 (in 1964) • Extension of I-295 to connect to Md. 210 (in 1990) • Construction of AAFB (from 1943 to 2011) • Rosecroft Raceway, the social and political center of the county (from 1949 to 1973) • The Suitland Federal Center, a major employment center (1941–2007) • National Harbor development (2008–present)	• National Harbor-Potomac Overlook residential development, • Bock Road Bridge construction • Brinkley Road Bridge construction • Chestnut Oaks Condominiums • Ongoing small-scale, residential development projects • Related project actions	Future developments to support the county's planned development goals are identified in Figure 4-1 (p. 61) and are described in the text that precedes this table.
Water Quality	Broad Creek sewer basin	Development that created impervious surfaces or involved grading/placement of fill, including: • Roadway, residential, commercial, parking, recreational, and institutional construction • Development that	• National Harbor-Potomac Overlook residential development, • Bock Road Bridge construction • Brinkley Road Bridge construction • Chestnut Oaks Condominiums	Future developments to support the county's planned development goals are identified in Figure 4-1 (p. 59) and are described in the text that precedes this table.

Table 4-1: Cumulative Impact Table				
Impact Topic	**Study Area**	**Past Actions**	**Present Actions (See Figure 4-1, p. 59)**	**Future Actions (See Figure 4-1)**
		modifies habitats and hydrologic processes • Sewer system and waterway projects and improvements • Nonpoint Source Management Program and other projects that provide open space, surface water mitigation, or reforestation Examples include: • Construction of I-495 • Extension of I-295 to connect to Md. 210 • Construction of AAFB • Rosecroft Raceway • The Suitland Federal Center • National Harbor development	• Ongoing small-scale, residential development projects • Related project actions	
Hydrology	Surface waters within Broad Creek sewer basin	Development that impacted surface water by dredging, increasing sedimentation, and other permanent waterway impacts, and projects that involve stream bank restoration or other waterway mitigation, including the National Harbor development	• National Harbor-Potomac Overlook residential development, • Bock Road Bridge construction • Brinkley Road Bridge construction • Chestnut Oaks Condominiums • Ongoing small-scale, residential development projects •Related project actions	Future developments to support the county's planned development goals are identified in Figure 4-1 (p. 59) and are described in the text that precedes this table.
Wetlands	Broad Creek sewer basin	Development that involved dredging, filling wetlands and waterways, or permanent wetland and	•National Harbor-Potomac Overlook residential development,	Future developments to support the county's planned development

Table 4-1: Cumulative Impact Table				
Impact Topic	**Study Area**	**Past Actions**	**Present Actions (See Figure 4-1, p. 59)**	**Future Actions (See Figure 4-1)**
		waterway impacts, and projects that involve stream bank restoration or other waterway mitigation, including the following projects that influenced multiple types of development: • Construction of I-495 • Extension of I-295 to connect to Md. 210 • Construction of AAFB • Rosecroft Raceway • The Suitland Federal Center • National Harbor development	•Bock Road Bridge construction •Brinkley Road Bridge construction •Chestnut Oaks Condominiums •Ongoing small-scale, residential development projects •Related project actions	goals are identified in Figure 4-1 (p. 59) and are described in the text that precedes this table.
Floodplains	Floodplains within Broad Creek sewer basin	Development that impacted surface water by dredging, increasing sedimentation, and other permanent waterway impacts, and projects that involve stream bank restoration or other waterway mitigation, including the National Harbor development	• National Harbor-Potomac Overlook residential development, • Bock Road Bridge construction • Brinkley Road Bridge construction • Chestnut Oaks Condominiums • Ongoing small-scale, residential development projects • Related project actions	Future developments to support the county's planned development goals are identified in Figure 4-1 (p. 59) and are described in the text that precedes this table.
Wildlife, Wildlife Habitat, and Vegetation	Broad Creek sewer basin	Development or initiatives that involved the removal or addition of vegetative communities, alteration of impervious surfaces, grading/placement of fill, or landscaping, including:	• National Harbor-Potomac Overlook residential development, • Bock Road Bridge construction • Brinkley Road Bridge construction	Future developments to support the county's planned development goals are identified in Figure 4-1 (p. 59) and are described in the text that

Table 4-1: Cumulative Impact Table				
Impact Topic	**Study Area**	**Past Actions**	**Present Actions (See Figure 4-1, p. 59)**	**Future Actions (See Figure 4-1)**
		• Development that modifies habitats and hydrologic processes • Sewer system and waterway projects and improvements • Nonpoint Source Management Program • Roadway, residential, commercial, parking, recreational, and institutional construction • Projects that provide open space, reforestation, or surface water mitigation Major projects that influenced other developments include: • Construction of I-495 • Extension of I-295 to connect to Md. 210 • Construction of AAFB • Rosecroft Raceway • The Suitland Federal Center • National Harbor development	• Chestnut Oaks Condominiums • Ongoing small-scale, residential development projects • Related project actions	precedes this table.
Protected Species and Habitat	Broad Creek sewer basin	Development or initiatives that alter critical habitat, increase impervious surface, or affect landscaping: • Development that modifies habitats and hydrologic processes • Sewer system and waterway projects and improvements • Nonpoint Source Management Program	• National Harbor-Potomac Overlook residential development, • Bock Road Bridge construction • Brinkley Road Bridge construction • Chestnut Oaks Condominiums • Ongoing small-scale, residential development projects	Future developments to support the county's planned development goals are identified in Figure 4-1 (p. 59) and are described in the text that precedes this table.

Table 4-1: Cumulative Impact Table				
Impact Topic	**Study Area**	**Past Actions**	**Present Actions (See Figure 4-1, p. 59)**	**Future Actions (See Figure 4-1)**
		• Roadway, residential, commercial, parking, recreational, and institutional construction • Projects that provide open space, reforestation, or surface water mitigation Major projects that influenced other developments include: • Construction of I-495 • Extension of I-295 to connect to Md. 210 • Construction of AAFB • Rosecroft Raceway • The Suitland Federal Center • National Harbor development	• Related project actions	
Cultural Resources	Within the NACE property	Archeological resources: Development with soil disturbance extending into intact soils. Historic sites and districts, as well as cultural landscapes: Development, including construction and improvements of roadways and recreational, residential, commercial, institutional, and parklands facilities.	Related project actions.	Future developments to support the county's planned development goals are identified in Figure 4-1 (p. 59) and are described in the text that precedes this table.
Visitor Use and Experience	Within the NACE property	All past development, including construction and improvements of roadways and	Related project actions.	Future developments to support the county's planned

Table 4-1: Cumulative Impact Table				
Impact Topic	**Study Area**	**Past Actions**	**Present Actions (See Figure 4-1, p. 59)**	**Future Actions (See Figure 4-1)**
		recreational, residential, commercial, institutional, and parklands facilities. Event and visitor services at Harmony Hall.		development goals are identified in Figure 4-1 (p. 59) and are described in the text that precedes this table.
Human Health and Safety	Broad Creek sewer basin	All past development, including construction and improvements of roadways and recreational, residential, commercial, institutional, and parklands facilities; landscaping and maintenance projects; and sewer system, waterway, and utility projects. Major projects include: • Construction of I-495 • Extension of I-295 to connect to Md. 210 • Construction of AAFB • Rosecroft Raceway • The Suitland Federal Center • National Harbor development	• National Harbor-Potomac Overlook residential development, • Bock Road Bridge construction • Brinkley Road Bridge construction • Chestnut Oaks Condominiums • Ongoing small-scale, residential development projects • Related project actions	Future developments to support the county's planned development goals are identified in Figure 4-1 (p. 59) and are described in the text that precedes this table.

The proposed project would change the handling of sanitary waste within the Broad Creek sewer basin to improve the water quality of receiving waters. The project has been developed in response to the incremental effects of development within the Broad Creek sewer basin, which has put stress on the capacity of the existing sewer system. The water quality in Broad Creek and the Potomac River has been directly affected by SSOs. In addition, decades of development has increased the amount of impervious areas, and the resulting increases in stormwater runoff rates and volumes have also impacted water quality in the river and throughout the region. Likewise, related degradation of aquatic resources and other environmental resources has occurred.

The proposed project would not involve new public parking areas, access roads, or other features that would encourage local development. The project would be located in an urbanized and developing area, and it would result in increased sewer capacity. Although not the purpose of this project, the proposed project would support future development within the sewer basin. WSSC and the NPS assessed cumulative impacts to appropriate resources and topics; these impacts are described in some of the following sections where the proposed alternative would add to the incremental effect on that resource.

4.2 Soils

4.2.1 Methodology and Assumptions

To quantify and assess potential impacts to soils, the NPS and WSSC evaluated the amount of soil disturbance and the potential for soil erosion resulting from the proposed actions. The amount of disturbance analyzed for the Preferred Alternative (Alternative 5A1-modified) included the amount of soil proposed to be excavated and the amount of soil that would be needed for backfill.

4.2.2 Impact Thresholds

The following thresholds for impact analysis were identified for impacts on soil resources.

Negligible—Soil resources impacts would be below, or at the lower levels of, detection.

Minor—Impacts to soil resources would be detectable. Impacts to undisturbed areas would be small. Mitigation would be needed to offset adverse impacts, would be relatively simple to implement, and would likely be successful.

Moderate—Impacts to soil resources would be readily apparent and result in a change to the soil character over a relatively wide area. Mitigation measures would be necessary to offset adverse impacts and would likely be successful.

Major—Impacts to soil resources would be readily apparent and would substantially change the character of the soils over a large area, both in and out of the park. Extensive mitigation measures necessary to offset adverse impacts would be needed, and their success would not be guaranteed.

Duration—Short-term impacts occur during the construction period; long-term impacts extend beyond implementation of the alternative.

4.2.3 Impacts of No Action Alternative

The no action alternative would not involve construction or excavation and would not disturb any soil. Therefore, the no action alternative would have no impact on soils, both in the short term and the long term.

Cumulative Impacts on Soils. Because no construction would be associated with the no action alternative, it would not contribute to cumulative effects on soils when combined with other past, present, and future actions, as identified in Table 4-1. Therefore, the no action alternative would have no cumulative impact on soils.

Conclusion. Because the no action alternative would not involve construction excavation and would not disturb any soil, this Alternative would have no impact on soils.

4.2.4 Impacts of Preferred Alternative

The Preferred Alternative would have adverse short-term, minor impacts to soils. Adverse impacts would be minimized by implementing BMPs, such as those discussed later in this section for open-trench and trenchless installation activity. Soil within the LOD would be subject to compaction from heavy machinery used during construction. Disturbed soil during construction would also be subject to erosion transport by both stormwater and winds during construction. However, these short-term, minor impacts would be controlled through the implementation of standard WSSC sediment and erosion control practices listed below and would be moderated because of the nearly flat topography and high permeability of the soils.

WSSC and the NPS assume that the 0.62 acres within the proposed LOD would be disturbed for construction, including access to the site and earthwork on the NPS site, and would include excavation for the construction of the tunnel receiving shaft, site piping, and the vault and piping work from the pumping station.

Currently, 2,440 square feet of impervious area exists within the LOD. An existing meter vault has a three-foot-wide by three-foot-long access hatch at grade, which would be removed and replaced by a new six-foot-wide by eight-foot-long access hatch for the proposed WSSC/NPS west vault. Additionally, two new manholes, each with a 30-inch diameter, for the tunnel shaft vault would be installed at grade. An existing sidewalk to the existing force main vault hatch would be removed and relocated to allow access to the new vault hatch. Assuming that the length of the sidewalk would stay the same, the construction of the new vault access hatch and two manholes would result in an increase of approximately 58 square feet of impervious area, or a one percent increase. As such, the Preferred Alternative would have a long-term, minor effect on soils as a result of increased impervious area.

Microtunneling is proposed to minimize impacts for installing the 48-inch-diameter force main. An MTBM would be used to advance the borehole while casing pipe is simultaneously jacked into place behind it. The MTBM is steerable and laser guided to precisely control line and grade for a straight bore with specified slope. The rotating cutter face uses slurry or earth pressure balance to fully support the face of the tunnel. It is ideal in soil conditions where groundwater or soft soil make other tunneling methods difficult or dangerous. The MTBM would not be located on NPS property, and the soil excavated by the tunnel operation would be removed from the M-NCPPC Harmony Hall Regional Center. Excavation would be necessary to construct the tunnel receiving shaft and to install the proposed west vault and piping work from the pumping station plans. The total volume of soil to be excavated from the NPS site is estimated at 23,200 cubic feet. Occasionally during construction, excavated material would be temporarily stockpiled on NPS property. However, the contractor would be required to dispose of excavated soil and all other materials at an approved regulated or permitted location off-site.

The WSSC design team conducted soil borings at the Broad Creek WWPS. Measurable water levels were encountered in all of the boreholes and ranged from three to 16 feet below grade. Therefore, WSSC and the NPS anticipate that groundwater would be encountered at an approximate elevation of 3.8 feet amsl. Temporary dewatering may be needed in some areas to place the vaults. This would be done using standard sump pits, and discharge would be directed to portable sediment

tanks (WSSC, March 2011). Standard WSSC sediment and erosion control practices would be employed for this project.

WSSC expects that it would use open cut pipeline installation between the east vault and the west vault and for the receiving shaft. For open cut pipeline installation, the following practices would be employed:

- Minimization of bare soil exposure
- Silt fences on the downgradient side of any spoil stockpiles
- Side-cast spoils on the upgradient side of trenches
- Control of run-on
- Dewatering using standard sump pits and portable sediment tanks
- Temporary stabilization of all disturbed areas within 14 days
- Establishment of permanent stabilization as soon as practical after completion

Deep open cut trenches would require dewatering. Sediment control of dewatering discharge would be accomplished using portable sediment tanks or other approved methods. For open cut pipeline installation across natural drainages, these practices would include:

- Stream bank protection
- Stream invert protection
- Stream diversions

For pipeline sections constructed using trenchless installation, detailed sediment and erosion control plans would be necessary for jacking pits and laydown areas because of the duration of the disturbance. Impacts would be of the same type encountered from trench excavation (removal of materials to off-site locations after temporary storage on-site, as well as sediment from dewatering of the jacking pits), but would be less extensive. Erosion and sedimentation control practices would include:

- Minimization of bare soil exposure
- Installation of silt fences on the downgradient side of any disturbed areas
- Control of run-on
- Dewatering using standard sump pits and portable sediment tanks
- Sediment traps
- Stabilized construction entrances
- Temporary stabilization of all disturbed soil areas
- Temporary stabilization of all disturbed areas within 14 days
- Establishment of permanent stabilization upon completion

The WSSC would review and issue an erosion and sediment control plan for the proposed Broad Creek WWPS Conveyance System Augmentation project. As part of its review and issuance of special use permits, which are intended to protect environmental resource on NPS property, the NPS would also review the design and mitigation measures. Long-term, negligible impacts would occur with the Preferred Alternative, and would be minimized or mitigated as described above.

Cumulative Impacts on Soils. The Preferred Alternative would contribute to cumulative effects on soils when combined with other past, present, and future actions, as identified in Table 4-1. Collectively, these projects would expose an unknown amount soil, which would be subject to

erosion or compaction. Existing soils could be replaced by fill or impervious surfaces. Also, some of the soils may contain contaminants. To mitigate the potential cumulative soil impacts, construction contracts must include requirements for the handling and disposal of contaminated materials. Also, construction documents, which are required for construction permits in Prince George's County, must include measures to control dust, protect exposed soil from precipitation and erosion, protect workers and any nearby sensitive receptors from exposure to soil contaminants, and include measures to manage stormwater. As such, the Preferred Alternative would have a minor adverse, cumulative impact on soils. Because of increased impervious areas due to building expansion (a separate action), stormwater would increase. This would be accommodated via a proposed overland flow system to allow infiltration and transpiration in the existing wooded land. NPS has no plans to convert the proposed area to uses other than natural vegetation.

Future maintenance would occur infrequently. Most commonly, maintenance would occur at the subsurface vault, proposed to be located approximately 60 feet south of the Broad Creek WWPS for Alternative 5A1-modified. Maintenance would entail foot traffic, and possibly light equipment, traversing the 60-foot length of lawn area, via an access easement, on the NPS Harmony Hall property; this would have negligible to minor temporary impacts upon soils.

Conclusion. The Preferred Alternative would have minor adverse impacts on soils in the short term; WSSC would minimize these impacts by using BMPs and standard WSSC sediment and erosion control practices. Because of increased impervious area due to the Preferred Alternative and other construction at the Broad Creek WWPS (e.g., the access vault, generator buildings, and pumping station building expansion), stormwater would increase. WSSC would accommodate this expected increase by using an overland flow system to allow infiltration and transpiration in the existing wooded land on the NPS property. When combined with the cumulative effects of other past, present, and future actions, the Preferred Alternative would contribute to minor adverse impacts on soils and sedimentation.

4.3 Water Quality

Currently, SSOs occur one or more times per year, on average, when wet weather causes RDII, in which inflow from the collection system exceeds the capacity of the Broad Creek WWPS and its extant single conveyance system main. These SSOs are directed into an intermittent stream channel, which leads to Broad Creek. Diluted, untreated sewage is an aesthetic detraction, a health concern, and an ecological concern to the receiving stream. Excess nutrients (detergents, food, and human waste), heavy metals, organic chemicals, debris (solids from washing and toilet waste), and bacteria (indicated by *E. coli*, a bacterium of the digestive system of warm blooded animals) are detrimental to local ecosystems. For instance, nutrient pollution is responsible for biogeochemical oxygen demand (BOD), which can influence the growth of algae, which can in turn decompose and reduce oxygen levels in the water, disrupting populations of aquatic insects and fish.

4.3.1 Methodology and Assumptions

To assess the magnitude of impacts of water quality, the NPS and WSSC examined Maryland water quality standards governing these resources as well as available baseline water quality data.

4.3.2 Impact Thresholds

For the purpose of analyzing potential impacts to surface water quality, the thresholds of change for the intensity of an impact are identified as follows.

Negligible—Water quality impacts (chemical, physical, or biological) would not be detectable, would be within water quality standards or criteria, and would be within historical or desired water quality conditions. All permit requirements would be met. Impacts on water or wastewater treatment facilities would not be detectable.

Minor—Water quality impacts (chemical, physical, or biological) would be detectable but would be within water quality standards or criteria and within historical or desired water quality conditions. All permit requirements would be met. Impacts on water or wastewater treatment facilities would be detectable, but would not impact or disrupt plant operations or water demands. Mitigation, if needed, would be simple and successful.

Moderate—Water quality impacts (chemical, physical, or biological) would be detectable but would be at or within water quality standards or criteria; however, historical baseline or desired water quality conditions would be temporarily altered. Necessary permits could be obtained and requirements would be met most of the time. Impacts on water or wastewater treatment facilities would be detectable, and could impact or disrupt plant operations or water demands from other customers. Mitigation measures to offset potential adverse impacts could be extensive, but would be successful.

Major—Water quality impacts (chemical, physical, or biological) would be detectable and many measures of water quality would be frequently altered from the historical baseline or desired water quality conditions and/or chemical, physical, or biological water quality standards; or criteria would temporarily be slightly and singularly exceeded. There would be substantial difficulty in obtaining permits or meeting permit requirements. However, necessary permits could be obtained and requirements would be met most of the time. Impacts on water or wastewater treatment facilities would be detectable, and would frequently impact or disrupt plant operations or water demands from other customers. Mitigation measures to offset potential adverse impacts would be extensive and their success could not be guaranteed.

Duration—Short-term impacts would require less than one year for recovery after the disturbance or change occurs; long-term impacts would take longer than one year to recover after the disturbance or change occurs.

4.3.3 Impacts of No Action Alternative

Under the no action alternative, SSO discharges would continue to occur during extreme weather events, which occur several times per year (sometimes as many as five times per year). Accordingly, water quality would be detrimentally affected by the no action alternative. SSOs would continue to affect water quality, and oil, grease, and trash accumulation would continue. SSOs would continue to cause total suspended solids (TSS), BOD, bacterial contamination, and the release of organic and heavy metal chemical contamination into the receiving waters, affecting water quality. Broad Creek and the Potomac River Upper Tidal subwatershed would continue to experience high concentrations of fecal coliform due, in part, to the Broad Creek WWPS. Adverse impacts of SSO discharges on water quality would be moderate (in the short term and long term) because of recreational use restrictions that would be imposed by the Prince George's County Health Department and the MDE during and after SSO events.

Cumulative Impacts on Water Quality. The no action alternative would contribute to cumulative effects on water quality when combined with other past, present, and future actions, as identified in

Table 4-1. Collectively, past and present development has incrementally increased the impervious surface in the sewer basin and in the larger watershed; development has also contributed to the exceedance of the Broad Creek WWPS capacity. Present and future development projects would likely increase impervious surface area and exacerbate runoff and pollutant loadings into Broad Creek and the Potomac River. Additionally, upstream sources would continue to add pollutants to the rivers. However, the NPS, EPA, USACE, and various public agencies within Maryland and the surrounding states are creating regulations, enforcing project-specific mitigation, funding projects to improve water quality, and encouraging the public to reduce nonpoint pollution sources. Private and nonprofit organizations are involved in similar initiatives. Under the no action alternative, SSOs would continue. These discharges, in conjunction with incremental water quality impacts associated with other reasonably foreseeable development, would result in moderate adverse, cumulative impacts on water quality.

Conclusion. Under the no action alternative, the water quality of Broad Creek and the Potomac River would not be impacted by construction. However, SSOs from the Broad Creek WWPS during wet weather events would continue to contaminate receiving waters with nutrients, bacteria, heavy metals, oil, and grease. Thus, the no action alternative would have minor to moderate adverse impacts on water quality over the short term and long term. When combined with other past, present, and future actions, particularly development and the resultant increase in impervious surfaces in the sewer basin, the no action alternative would contribute to moderate, adverse cumulative impacts to water quality.

4.3.4 Impacts of Preferred Alternative

Under the Preferred Alternative, the capacity of the Broad Creek WWPS would be improved to eliminate SSO events, potentially reducing the diluted sewage overflow by millions of gallons per year to Broad Creek and the Potomac River. By eliminating SSOs, the Preferred Alternative would reduce nutrient loads (BOD); oil, grease, and chemical contaminants; TSS; and high concentrations of bacteria from degraded water quality of Broad Creek and the Potomac River. Therefore, WSSC and the NPS expect that the Preferred Alternative would have a long-term, beneficial effect on water quality and would facilitate the overall goal of meeting water use designations in the watershed.

Short-term impacts, such as increased turbidity as a result of erosion or discharge of contaminants during construction, would be minimized through the use of BMPs such as erosion and sediment control devices and by keeping spill prevention kits available at the construction site. Overall, negligible short-term, adverse impacts to water quality are expected as a result of construction activities.

In a regional context, the proposed project is one of many improvements that WSSC is planning to eliminate or reduce direct SSO discharges of untreated sewage effluent. Locally, elimination of these SSOs are detrimental and moderate in nature, but regionally, and compared to the volume of the Potomac, the improvements represent long-term, beneficial impacts due to the Preferred Alternative.

Cumulative Impacts on Water Quality. The Preferred Alternative would contribute to cumulative effects on water quality when combined with other past, present, and future actions, as identified in Table 4-1. Collectively, past and present development has incrementally increased the impervious surface in the sewer basin and in the larger watershed; this development has also contributed to the exceedance of the Broad Creek WWPS capacity. Present and future development projects would

likely increase impervious surface area and exacerbate runoff and pollutant loadings into Broad Creek and the Potomac River. Additionally, upstream sources would continue to add pollutants to the rivers. However, the NPS, EPA, USACE, and various public agencies within Maryland and the surrounding states are creating regulations, enforcing project-specific mitigation, funding projects to improve water quality, and encouraging the public to reduce nonpoint pollution sources. Private and nonprofit organizations are involved in similar initiatives. Although the no action alternative includes SSO reduction and would have a beneficial effect on water quality, various other point and nonpoint sources would continue to adversely affect water quality. The effect of this project would not adversely contribute to the cumulative effect on water quality in this area.

Conclusion. The construction activities under the Preferred Alternative would result in minor adverse impacts on water resources in the short term. However, by eliminating SSOs, the Preferred Alternative would result in long-term, ,beneficial impacts on water quality. Short-term adverse impacts would be mitigated through the use of BMPs during construction and by postconstruction restoration. When combined with the cumulative effects of other past, present, and future actions, the Preferred Alternative would contribute to beneficial impacts on water quality.

4.4 Hydrology

Currently, SSOs occur one or more times per year, on average, and are directed to the north and west, into an intermittent stream channel that leads to Broad Creek. Diluted, untreated sewage enters this swale, but although these flows can be tens of millions of gallons per day, this flow does not appreciably change the hydraulic or hydrologic conditions of Broad Creek.

Construction to the south of the Broad Creek WWPS could impact another ephemeral (intermittent) stream channel, an unnamed tributary of the Broad Creek embayment.

4.4.1 Methodology and Assumptions

To determine potential impacts to waterway hydrology, the NPS and WSSC overlaid the LOD footprint onto the field delineated stream boundaries. WSSC and the NPS considered short-term impacts due to construction, and the placement of permanent structures in or near the waterways, in determining impacts to waterway hydrology.

4.4.2 Impact Thresholds

For the purpose of analyzing potential impacts to waterway hydrology, the thresholds of change for the intensity of an impact are identified as follows.

Negligible—Waterway hydraulics and hydrology impacts would be at the lower levels of detection.

Minor—Impact to waterway hydraulics and hydrology would be detectable and relatively small in terms of the area and the nature of the change. However, the stability of the stream channel upstream and downstream of the impact would remain unaffected.

Moderate—Impacts to waterway hydraulics and hydrology would be readily apparent and short-term with regard to the waterway's dynamics. In addition, waterway processes, functions, and integrity would be temporarily impacted.

Major—Impacts to waterway hydraulics and hydrology would be long-term and readily apparent with regard to the waterway's dynamics. In addition, waterway processes, functions, and integrity would likely be eliminated or severely impacted.

Duration—Short-term impacts would require less than one year to recover after the disturbance or change occurs; long-term impacts would require more than one year to recover after the disturbance or change occurs.

4.4.3 Impacts of the No Action Alternative

No construction would occur under the no action alternative. Waterways (the unnamed tributaries to Broad Creek, Broad Creek itself, and the Potomac River) would not be impacted adversely by construction. However, these waterways (except for the unnamed southern ephemeral stream) would continue to experience SSOs from the Broad Creek WWPS during wet weather events and would receive minor amounts of increased hydrology in the form of untreated sewage. SSOs would cause discharge of not only increased flow, but also solid materials causing minor amounts of debris and solids accumulation to continue to occur. Therefore, the no action alternative would have minor to moderate short- and long-term adverse impacts on receiving waters (Broad Creek and its tributary, as well as the Potomac River).

Cumulative Impacts on Hydrology. The no action alternative would contribute to cumulative impacts on waterway hydraulics and hydrology. Cumulative impacts on waterway hydraulics and hydrology include potential dredging, filling, and conversion of waterways; increases in impervious surfaces; and increased source and nonsource pollutant loads associated with past, present, and future actions, as identified in Table 4-1. Direct and cumulative impacts to waterway hydraulics and hydrology would be minimized and mitigated by project-specific federal and local protective regulations (including Sections 404 and 401 of the CWA). However, incremental cumulative impacts to waterway hydraulics and hydrology, especially associated with pollution loads like TSS, would still occur due to SSOs. Therefore, the no action alternative would have a minor adverse, cumulative impact on waterway hydraulics and hydrology.

Conclusion. Under the no action alternative, waterway hydrology would not be impacted by construction. However, SSOs from the Broad Creek WWPS during wet weather events would contribute flow of SSOs, including solid materials. Thus, the no action alternative would have minor adverse impacts on waterway hydology over the short term and long term. When combined with other past, present, and future actions, particularly development and the resultant increase in impervious surfaces in the sewer basin, the no action alternative would contribute negligible to minor adverse, cumulative impacts to waterway hydrology.

4.4.4 Impacts of the Preferred Alternative

Under the Preferred Alternative, the construction of the receiving shaft and permanent access vault would temporarily disturb 11 linear feet of streambank and 124 square feet of streambed in the unnamed intermittent stream south of the Broad Creek (see Figure 3-2, Wetlands, p. 43; and Appendix C). This adverse impact to waterway hydraulics and hydrology would be short-term and minor, incurred by activity such as temporary fill to accommodate construction equipment within a portion of the stream channel, but not blocking the entire waterway. During construction, the occasional low-volume, low-velocity flows in the shallow channel would be diverted around the LOD (which would be occupied by fill and/or sheet piling creating a sort of coffer , and normal flow conditions would be restored at the conclusion of construction.

WSSC has applied for a joint permit from the USACE and MDE for impacts to waterways. WSSC and the NPS anticipate that the temporary impacts to waterway hydraulics and hydrology would be mitigated by restoring the stream to preconstruction conditions.

Cumulative Impacts on Hydrology. The Preferred Alternative would contribute to cumulative effects on waterway hydraulics and hydrology when combined with other past, present, and future actions, as identified in Table 4-1. Collectively, past and present development has incrementally increased the impervious surface in the sewer basin and in the larger watershed; this development has also contributed to the storm flows exceeding of the Broad Creek WWPS capacity. Present and future development projects would likely increase impervious surface area and exacerbate runoff and pollutant loadings into Broad Creek and the Potomac River. The effect of this project would not adversely contribute to the cumulative effect on water hydraulics and hydrology in this area.

Conclusion. The construction activities under the Preferred Alternative would result in minor adverse impacts on waterway hydrology in the ephemeral stream to the south of Broad Creek WWPS in the short term. However, by eliminating SSOs, the Preferred Alternative would result in long-term beneficial impacts to the northern intermittent channel and Broad Creek. Short-term adverse impacts would be mitigated through the use of BMPs during construction and by postconstruction restoration of the impacted stream channel. When combined with the cumulative effects of other past, present, and future actions, the Preferred Alternative would contribute to beneficial impacts on waterway hydrology.

4.5 Wetlands

Currently, SSOs occur one or more times per year, on average, and are directed into an intermittent stream channel that leads to Broad Creek. Diluted, untreated sewage is an aesthetic detraction, a health concern, and an ecological concern to the receiving stream and affiliated wetland habitat. Excess nutrients (detergents, food, and human waste), heavy metals, organic chemicals, debris (solids from washing and toilet waste), and bacteria (indicated by *E. coli*, a bacterium of warm blooded animals' and the human digestive system) are detrimental to local wetland ecosystems.

4.5.1 Methodology and Assumptions

To quantify and assess potential impacts to waterways, the NPS and WSSC overlaid the LOD footprint onto the field delineated stream boundaries. WSSC and the NPS considered short-term impacts due to construction and the placement of permanent structures in determining impacts to waterways.

To quantify and assess potential impacts to wetlands, the NPS and WSSC overlaid the LOD footprint onto the field delineated wetland boundaries. The NPS and WSSC considered short-term and long-term impacts due to construction and the placement of permanent structures, as well as impact based on principle functions and values (defined by the US Fish and Wildlife Service), in determining impacts to wetlands.

4.5.2 Impact Thresholds

For the purpose of analyzing potential impacts to wetlands, the thresholds of change for the intensity of an impact are identified as follows.

Negligible—Wetlands impacts would be at the lower levels of detection.

Minor—The impact to wetlands would be detectable and relatively small in terms of the area and the nature of the change. However, wetland processes, functions, and integrity would remain unaffected.

Moderate—Impacts to wetlands would be readily apparent and short-term with regard to the resource's defining attributes. In addition, wetland and waterway processes, functions, and integrity would be temporarily impacted.

Major—Impacts to wetlands would be long-term and readily apparent with regard to the resource's defining attributes. In addition, wetland and waterway processes, functions, and integrity would likely be eliminated or severely impaired.

Duration—Short-term impacts would require less than one year to recover after the disturbance or change occurs; long-term impacts would require more than one year to recover after the disturbance or change occurs.

4.5.3 Impacts of No Action Alternative

No construction would occur under the no action alternative. Wetlands would not be impacted by construction or fill material. However, wetlands would continue to experience SSOs from the Broad Creek WWPS during wet weather events. Since 2003, 15 SSOs have occurred, with an average of more than one event per year. Wetlands and waterways would receive associated nutrients and sewage materials. The excess nutrients and impurities would continue to affect the health and biological diversity of the wetlands downgradient from the SSO outfall. Therefore, the no action alternative would have a minor to moderate short- and long-term impact on wetlands.

Cumulative Impacts on Wetlands. The no action alternative would contribute to cumulative impacts on wetlands and waterways. Cumulative impacts on wetlands and waterways include potential dredging, filling, and conversion of wetlands and waterways; increases in impervious surfaces; and increased source and nonsource pollutant loads associated with past, present, and future actions, as identified in Table 4-1. Direct and cumulative impacts to wetlands and waterways would be minimized and mitigated by project-specific federal and local protective regulations (including Sections 404 and 401 of the CWA). Also, stormwater, sediment, and erosion control measures are conditions of development within Prince George's County. Additionally, the NPS, EPA, USACE, and various public agencies within Maryland and the surrounding states are creating regulations, funding projects to restore or mitigate wetlands and waterways, and educating the public about wetland benefits. Private and nonprofit organizations are involved in similar initiatives. However, incremental cumulative impacts to wetlands and waterways, especially associated with pollution loads, would still occur. Therefore, the no action alternative would have a minor adverse, cumulative impact on wetlands and waterways.

Conclusion. Under the no action alternative, wetlands and waterways would not be impacted by construction. However, SSOs from the Broad Creek WWPS during wet weather events would continue to contaminate receiving waters and affiliated wetlands with nutrients, bacteria, heavy metals, oil, and grease. Thus, the no action alternative would have minor to moderate adverse impacts on wetlands and water bodies over the short term and long term. When combined with other past, present, and future actions, particularly development and the resultant increase in

impervious surfaces in the sewer basin, the no action alternative would contribute to moderate adverse, cumulative impacts to wetlands and waterways.

4.5.4 Impacts of Preferred Alternative

Under the Preferred Alternative, WSSC would construct a temporary access road along the western and southern edges of the existing Broad Creek WWPS and install a 16-foot-wide by 20-foot-long concrete vault for accessing the force main on the southeastern corner of the Broad Creek WWPS. The installation of the vault would result in the permanent conversion of about 0.10 acres of the 3.53-acre forested wetland to upland, as shown in Figure 3-2 (Wetlands, p. 43). This represents about a three percent reduction in the overall size of the forested wetland. Although the adverse impacts are both short-term and long-term, they are considered to be minor. The impact area is detectable but relatively small, and wetland processes, functions, and overall integrity would remain unaffected. A very small area (0.03 acres) of an intermittent waterway would also be temporarily impacted within the LOD during construction, but would be restored entirely prior to the end of construction. The Preferred Alternative would eliminate SSOs and, in turn, would reduce nutrient loads (BOD); oil, grease, and chemical contaminants; TSS; and high concentrations of bacteria from entering wetlands downgradient from the Broad Creek WWPS overflow channel. Eliminating these sources of pollution would enhance the wetland systems' health and could result in improved biodiversity. Furthermore, by eliminating SSOs, the Preferred Alternative would result in long-term beneficial impacts through reduced nutrient pollution and debris accumulation in the wetland system.

WSSC has initiated coordination with the USACE and MDE to discuss possible mitigation for impacts to wetlands and waterways for the entire length of the conveyance system (between the Broad Creek WWPS and the Piscataway Creek WWTP); decisions regarding mitigation would occur after the NEPA decision-making process concludes. Per DO #77-1, WSSC would compensate for unavoidable impacts to wetlands through mitigation. At this time, the NPS and WSSC are considering opportunities for mitigating wetland impacts that would occur on NPS property The NPS and WSSC developed a conceptual wetland mitigation strategy, which consists of two additional activities – direct restoration as well as non-native invasive species management. The agencies would conduct direct restoration of a portion of the disturbed palustrine wetlands (approximately 0.030 acres within the LOD).In addition, the agencies would compensate where impacts are irreversible, [i.e., where restoration of the LOD would not be possible due to permanent structure (access vault) and maintenance access requirements (0.073 acres)]. See Appendix D (Wetland Statement of Finding) for discussion on wetland compensation for wetlands and waterways affected on the NPS Harmony Hall property. The project will result in no net loss of wetlands.

Cumulative Impacts on Wetlands. Cumulative impacts would include potential dredging, filling, and conversion of wetlands and waterways; increases in impervious surfaces; and increased source and nonsource pollutant loads associated with past, present, and future actions, as listed in Table 4.1. The Preferred Alternative would contribute to the incremental cumulative effects on wetlands and waterways. Direct and cumulative impacts to wetlands and waterways would be minimized and mitigated by project-specific federal and local protective regulations (including Sections 404 and 401 of the CWA) and stormwater, sediment, and erosion control measures that would be conditions of development. Additionally, the NPS, EPA, USACE, and various public agencies within Maryland and the surrounding states are creating regulations, funding projects to restore or mitigate wetlands and waterways, and educating the public about wetland benefits. Private and nonprofit organizations are involved in similar initiatives. However, incremental cumulative

impacts to wetlands, especially associated with pollution loads, would still occur. Although the Preferred Alternative would eliminate SSO discharges, an adverse cumulative impact on wetlands and waterways would still occur.

Conclusion. The construction activities under the Preferred Alternative would result in minor adverse impacts on wetlands and waterways in the short term. However, by eliminating SSOs, the Preferred Alternative would result in long-term beneficial impacts on wetlands and waterways. Short-term adverse impacts would be mitigated through the use of BMPs during construction and by postconstruction restoration and/or wetland mitigation or banking for long-term alteration. When combined with the cumulative effects of other past, present, and future actions, the Preferred Alternative would contribute to beneficial impacts on wetlands and waterways.

4.6 Floodplains

4.6.1 Methodology and Assumptions

To quantify and assess potential impacts to floodplains, the NPS and WSSC evaluated (1) the proximity of the regulated floodplain to the project site and (2) the micro-topographic elevation data collected during the site survey. The NPS and WSSC then evaluated the potential for the alternatives to impact flood elevation or velocities upstream and downstream, whether the alternatives would result in promoting development or occupancy of the floodplain, the risk of damage to capital improvements that could occur as a result of flooding, and impacts to the natural functions and values that could occur in the short-term and long-term.

4.6.2 Impact Thresholds

For the purpose of analyzing potential impacts to floodplains, the thresholds of change for the intensity of an impact are identified as follows

Negligible—Floodplains impacts would be at the lower levels of detection.

Minor—The impact to floodplains would be detectable and relatively small in terms of the area and the nature of the change. However, floodplain processes, functions, and integrity would remain unaffected.

Moderate—Impacts to floodplains would be readily apparent and short-term with regard to the resource's defining attributes. In addition, floodplain processes, functions, and integrity would be temporarily impacted.

Major—Impacts to floodplains would be long-term and readily apparent with regard to the resource's defining attributes. In addition, floodplain processes, function, and integrity would likely be eliminated or severely impaired.

Duration—Short-term impacts would require less than one year to recover after the disturbance or change occurs; long-term impacts would require longer than one year to recover after the disturbance or change occurs.

4.6.3 Impacts of No Action Alternative

No construction would occur under the no action alternative. Floodplains would not be impacted by construction; therefore, this Alternative would have a negligible short-term and long-term impact on floodplains due to SSO events (local flood volumes in the manmade channel, debris, maintenance to remove debris, etc., adjacent to park property).

Cumulative Impacts on Floodplains. The no action alternative would not require any construction in a floodplain or coastal zone so it would not contribute to the cumulative effect on floodplains or the coastal zone. Therefore, the no action alternative would have no cumulative effect on floodplains.

Conclusion. The no action alternative would have negligible adverse impacts on floodplains.

4.6.4 Impacts of Preferred Alternative

The Preferred Alternative would be constructed partially within the floodplain, and permanent fixtures would remain within the floodplain as a result of the proposed Broad Creek WWPS Conveyance System Augmentation project. During construction, there would be some temporary fill (geotextile) in the floodplain; however, short-term impacts are expected to be minor to negligible. Although the proposed tunnel receiving shaft and permanent access vault would be installed at a grade elevation of about nine feet amsl, an elevation below the BFE, long-term impacts to floodplains are expected to be negligible. The total cross-section of floodplain profile that could occur as a result of installing the shaft and vault is estimated to be about 32 square feet in a floodplain cross-sectional area estimated at greater than 120,000 square feet. Given these assumptions, the proposed shaft and vault would occupy about 0.03 percent of the floodplain profile. Moreover, the Broad Creek WWPS is located in a forested area on the floodplain fringe where flood velocities are the lowest. Given the volume of floodplain loss and the location of the proposed project on the floodplain fringe, WSSC and the NPS do not expect that increased flood elevations or velocities would be detectable.

WSSC and the NPS do not expect that upgrading the Broad Creek WWPS would promote floodplain development or would otherwise promote floodplain occupancy. Improving the pumping station's capacity would not increase or reduce the risk of flooding in the area.

Construction of capital improvements in the floodplain typically conforms with the minimum criteria outlined by the National Flood Insurance Program to minimize flood damage susceptibility during a flood event. These criteria include elevating critical functions above the BFE, flood-proofing facilities that would remain below BFE, and potentially anchoring facilities at risk of movement during flood.

NPS DO #77-2 is applicable to actions in a floodplain, with exceptions. In accordance with DO #77-2, a Floodplain Statement of Findings is attached (see Appendix D). Although portions of the construction of the proposed Broad Creek WWPS Conveyance System Augmentation project would be located within the 100-year floodplain, the action would not result in changes to floodplain function or increases in upstream or downstream flooding. The permanent access vault and temporary construction areas, respectively, would be designed in a manner that would not impede or accelerate high flows or inhibit the ability of the floodplain to disperse the volume and energy of floodwaters from Broad Creek and the Potomac River. Thus, the proposed construction would result in negligible impacts on floodplain functions or values.

Cumulative Impacts on Floodplains. The Preferred Alternative, when combined with other past, present, and future actions as identified in Table 4.1, would have a negligible effect on floodplains. Although construction would occur within the floodplain, the direct effect of this Alternative on floodplains is negligible; it would not affect flood frequency, flood intensity, or the natural and beneficial values served by floodplains. Past, ongoing, and reasonably foreseeable future development projects within the floodplain—especially development associated with the National Harbor Metropolitan Center—will have a greater impact on the floodplain. The cumulative effect of the proposed alternative would be minor.

Conclusion. In the Preferred Alternative, construction would take place partially within the floodplain, and permanent sanitary sewer facilities would remain within an area susceptible to flooding. During construction, some temporary fill (about 330 cubic yards) would be added in the 100-year floodplain to create a level access road that would be removed after construction is completed. Approximately 27 cubic yards would be occupied permanently by the concrete pad associated with the maintenance access vault. However, short- and long-term adverse impacts—including cumulative effects on floodplains—are expected to be negligible to minor. NPS and WSSC will continue to evaluate each alternative's potential to be inconsistent with the CZMA through consultation with the CAC during the EA public and agency review process, but at this time, it is believed that the proposed improvements would not be inconsistent with the Act based on a Memorandum of Understanding approved June 9, 2003 and CAC review correspondence dated November 29, 2011. The Preferred Alternative would have negligible to minor, generally short-term, adverse effects on coastal zones.

4.7 Wildlife andWildlife Habitat

4.7.1 Methodology and Assumptions

Terrestrial Wildlife and Wildlife Habitat. To quantify and assess potential impacts to the terrestrial environment, the NPS and WSSC evaluated the footprint of the alternatives in the context of the environment at large.

Aquatic Wildlife and Wildlife Habitat. To quantify and assess potential impacts to the aquatic environment, the NPS and WSSC evaluated the footprint of the alternatives in the context of the environment at large.

4.7.2 Impact Thresholds

Terrestrial Wildlife and Wildlife Habitat. For the purpose of analyzing potential impacts to the terrestrial environment, the thresholds of change for the intensity of an impact are identified as follows.

> **Negligible**—Impacts would have no measurable or perceptible changes in plant community size, integrity, or continuity. No species of concern (declining, threatened, or endangered species) are present, and no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them would occur. Impacts would be of short duration and well within natural fluctuations.
>
> **Minor**—Impacts would be measurable or perceptible, but would be localized within a relatively small area. The overall viability of the plant community would not be impacted and, if left alone, would recover. Nonbreeding animals of concern and/or their habitats are

present, but only in low numbers. No critical habitats are present. Occasional disturbance to wildlife and wildlife habitat may occur but would not impact feeding, nesting, or breeding.

Moderate—Impacts would cause a change in the plant community (e.g., abundance, distribution, quantity, or quality); however, the impact would remain localized. Breeding animals of concern and/or their habitats are present, as are animals in vulnerable life stages. Occasional mortality or interference with survival activities are expected but would not threaten the species present.

Major—Impacts to the plant community would be substantial, highly noticeable, and long-term. Breeding animals are present in relatively high numbers and/or during vulnerable life stages. Habitat has a history of being used by wildlife during critical periods and is somewhat limited. Mortality is expected on a regular basis and could threaten species survival.

Duration—Short-term impacts would require less than one year to recover after the disturbance or change occurs; long-term impacts would require longer than one year to recover after the disturbance or change occurs.

Aquatic Wildlife and Wildlife Habitat. For the purpose of analyzing potential impacts to the aquatic environment, the thresholds of change for the intensity of an impact are identified as follows.

Negligible—Impacts would have no measurable or perceptible changes in aquatic community size, integrity, or continuity. No species of concern (declining, threatened, or endangered species) are present, and there would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them. Impacts would be of short duration and well within natural fluctuations.

Minor—Impacts would be measurable or perceptible, but would be localized within a relatively small area. The overall viability of the aquatic community would not be impacted and, if left alone, the community would recover. Nonbreeding animals of concern and/or their habitats are present, but only in low numbers. No critical habitats are present. Occasional disturbance to wildlife and wildlife habitat may occur but would not impact feeding, nesting, or breeding.

Moderate—Impacts would cause a change in the aquatic community (e.g., abundance, distribution, quantity or quality); however, the impact would remain localized. Breeding animals of concern and/or their habitats are present, as are animals in vulnerable life stages. Occasional mortality or interference with survival activities are expected but would not threaten the species present.

Major—Impacts to the aquatic community would be substantial, highly noticeable, and long term. Breeding animals are present in relatively high numbers and/or during vulnerable life stages. Habitat has a history of being used by wildlife during critical periods and is somewhat limited. Mortality is expected on a regular basis and could threaten species survival.

Duration—Short-term impacts would require less than one year to recover after the disturbance or change occurs; long-term impacts would require longer than one year to recover after the disturbance or change occurs.

4.7.3 Impacts of No Action Alternative

Terrestrial Wildlife and Wildlife Habitat. No construction would occur under the no action alternative. The terrestrial environment in the vicinity of the Broad Creek WWPS would not be impacted. However, this Alternative would have a negligible to minor adverse, short- and long-term impact, as well as a negligible to minor cumulative effect, on terrestrial habitat due to debris and excess nutrients from SSOs.

Aquatic Wildlife and Wildlife Habitat. No construction would occur under the no action alternative. This alternative would result in both short- and long-term moderate adverse impacts to the aquatic environment during storm events as a result of nutrients and debris from SSOs, which affect aquatic insects, fish, and vegetation, should the Broad Creek WWPS capacity be exceeded (see Sections 4.3–4.4, Water Quality and Wetlands).

Cumulative Impact on Wildlife and Wildlife Habitat. The no action alternative would contribute to cumulative effects on aquatic and terrestrial habitat when combined with other past, present, and future actions, as identified in Table 4-1. The reasonably foreseeable future development projects occur in an urban environment, and wildlife in these areas are typical of urban environments and urban development. Local and federal regulations protect and require mitigation for tree removal and habitat disturbance. Federal and local governments, as well as private organizations, are implementing regulations and funding projects that would provide more trees, green space, or waterways restoration; this would support terrestrial wildlife habitat and vegetation. However, an incremental reduction in vegetation is likely as a result of anticipated development within the sewer basin. Aquatic wildlife and their habitat would continue to be exposed to SSOs during storm events, and aquatic habitat would still be vulnerable to an incremental reduction in waterways and water quality changes that result from anticipated development within the sewer basin (see Figure 4.1, p.61). As such, the no action alternative would have minor adverse, cumulative impacts on wildlife habitat, predominately on aquatic habitat.

Conclusion. Under the no action alternative, terrestrial habitats would experience only negligible impacts; however, aquatic habitats would experience moderate adverse impacts attributable to continued SSOs in the short term and the long term. The no action alternative would have negligible short- and long-term adverse effects on coastal zones. When combined with other past, present, and future actions, the no action alternative would contribute to minor adverse, cumulative effects on aquatic habitat and, to a lesser extent, terrestrial habitat.

4.7.4 Impacts of Preferred Alternative

Terrestrial Wildlife and Wildlife Habitat. The proposed tunnel receiving shaft and permanent access vault would be installed outside the currently maintained limits of the Broad Creek WWPS. Although most of the microtunneling activities and soil removal would occur from an off-site area outside of NPS property, about 28,000 square feet (0.64 acre) of Harmony Hall park property would be disturbed to create temporary access to the project site and install the tunnel receiving shaft and permanent access vault. Of this disturbance, about 10,500 square feet (0.22 acre) is limited to mowed grasses; 18,700 square feet (0.43 acre) consists of pioneer forest edge, which represents about two percent of the forest on park property at this location. WSSC would provide appropriate

compensation for trees removed within the LOD for construction – either (1) with direct replanting where appropriate onsite, and/or (2) with in-lieu-of compensation payments. Further discussion of those options is presented in Subsection 4.8.3, below. Given the small area of proposed disturbance, the marginal value of the habitat quality, and the abundance of habitat nearby, the permanent impact of 0.43 acre of forest removal is considered minor; and both short- and long-term.

Aquatic Wildlife and Wildlife Habitat. The aquatic environment would be improved, with beneficial impacts due to the elimination of nutrients and debris from SSOs. Given the small area of proposed disturbance to the aquatic environment, and the abundance of aquatic habitat nearby, the temporary impact is considered minor short-term and negligible long-term.

Cumulative Impact on Wildlife and Wildlife Habitat. The Preferred Alternative would contribute to cumulative effects on terrestrial and aquatic habitat when combined with other past, present, and future actions, as identified in Table 4-1. The reasonably foreseeable future development projects occur in an urban environment, and wildlife in these areas are typical of urban environments and urban development. Local and federal regulations protect trees and require mitigation for tree removal and habitat disturbance. Federal and local governments, as well as private organizations, are funding projects that would provide more trees, green space, or waterways restoration; this would support wildlife habitat. Although aquatic species would benefit from the increased water quality afforded by the Preferred Alternative, a minor adverse, cumulative impact on wildlife and wildlife habitat would still occur as a result of reasonably foreseeable future development (see Figure 4.1, p.61). Incremental reductions in vegetation and water quality are likely; aquatic vegetation would also be exposed to pollution from other sources.

Conclusion. Under the Preferred Alternative, about 28,000 square feet of the NPS Harmony Hall property would be disturbed during construction activities. A maximum total of 129 trees between two and 20 inches in diameter would be removed (compared to 184 estimated originally with a wider LOD and separate ingress/egress routes). However, the adverse impact to terrestrial habitat would be minor, in both the short term and the long term. Further, WSSC wouldmitigate the forest removal by compensation payment to the NPS. In addition, a certain portion of the temporary construction access area (LOD) would be allowed to regrow into forest naturally or facilitated by planting (planting would only occur where archeological investigations have already been conducted, near the vault). Only an area 12 feet from the permanent access vault and currently mowed areas would be needed long-term for occasional maintenance access. Cumulative effects on vegetation and invasive species would be minor and adverse due to aggregate losses of woodland, but would be offset by mitigation. .

4.8 Vegetation

Vegetation. To quantify and assess potential impacts to vegetation, the NPS and WSSC evaluated the footprint of the alternatives in the context of the environment at large.

Invasive Species. To quantify and assess potential impacts to native vegetation species that are present, the NPS and WSSC evaluated the proximity of the project site to areas containing invasive species, as well as the pathways for nonnative invasive species to affect an area. The NPS and WSSC then evaluated the potential for the alternatives to impact native vegetation through the introduction of nonnative invasive species, both in the short term and the long term.

4.8.1 Impact Thresholds

For the purpose of analyzing potential impacts to vegetation, the thresholds of change for the intensity of an impact are identified as follows.

Negligible— Impacts would have no measurable or perceptible changes in plant community size, integrity, or continuity. No species of concern (declining, threatened, or endangered species) are present, and no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them would occur. Impacts would be of short duration and well within natural fluctuations.

Minor— Impacts would be measurable or perceptible, but would be localized within a relatively small area. The overall viability of the plant community would not be impacted and, if left alone, would recover. No critical habitats are present.

Moderate— Impacts would cause a change in the plant community (e.g., abundance, distribution, quantity, or quality); however, the impact would remain localized.

Major— Impacts to the plant community would be substantial, highly noticeable, and long-term.

Duration—Short-term impacts would require less than one year to recover after the disturbance or change occurs; long-term impacts would require longer than one year to recover after the disturbance or change occurs.

4.8.2 Impacts of No Action Alternative

Vegetation. No construction would occur under the no action alternative. Vegetation in the vicinity of the Broad Creek WWPS would not be impacted. However, this Alternative would have a negligible to minor adverse, short- and long-term impact, as well as a negligible to minor cumulative effect, on vegetation due to debris and excess nutrients from SSOs.

Invasive Species. No construction would occur under the no action alternative. No new nonnative invasive species would be introduced to the site, and no spread of existing nonnative invasive species would be facilitated. Therefore, the impacts would have no impacts and this Alternative would result in no cumulative effects.

Cumulative Impact on Vegetation. The no action alternative would contribute to cumulative effects on vergetation and invasive species when combined with other past, present, and future actions, as identified in Table 4-1. The reasonably foreseeable future development projects occur in an urban environment, and vegetation typical of urban environments and urban development. Local and federal regulations protect and require mitigation for tree removal and habitat disturbance. Federal and local governments, as well as private organizations, are implementing regulations and funding projects that would provide more trees, green space, or waterways restoration. However, an incremental reduction in vegetation is likely as a result of anticipated development within the sewer basin. As such, the no action alternative would have minor adverse, cumulative impacts on wildlife habitat, predominately on aquatic habitat.

Conclusion. Under the no action alternative, vegetation and invasive species would experience only negligible impacts. When combined with other past, present, and future actions, the no action alternative would contribute to negligible adverse, cumulative effects on vegetation and invasive species.

4.8.3 Impacts of Preferred Alternative

Vegetation. Construction would occur at the northern edge and in the northern interior portions of the 65-acre Harmony Hall historic park property, affecting less than an acre of park property surrounding the WWPS compound fence, and impacting approximately 0.4 acres of forest land dominated by forest edge and pioneer species as well as 0.22 acres of mowed grass lawn.

Originally, the construction of the Preferred Alternative would require the removal or trimming of up to 184 native trees (which are between 2 inches and 20 inches in diameter). However, reduction of the access driveway width using a combined ingress/egress lane was investigated in December 2012. By reducing the width of the LOD on the west, WSSC has reduced the number of trees that would be impacted by approximately 55 within the original LOD. The maximum estimated number of native trees to be cleared is therefore 129, encompassing 38.99 square feet of basal area. This is a maximum, "worst case" assessment that assumes the potential loss of all trees within the limits of construction surrounding the pumping station. The tree removal is necessary to provide truck access around the perimeter of the existing WSSC facility, to allow for construction of underground vaults, to provide a temporary settling basin for pit dewatering operations, and to provide staging areas for equipment and haul trucks. Tree clearing would be noticeable but localized and would not prevent any passive recreational activities. Also, because of a lack of access and the proximity to the Broad Creek WWPS, the construction area is unlikely to experience frequent visitors. A beneficial long term impact would result from the absence of SSO debris accumulation in the overflow channel adjacent to the Harmony Hall historic park property.

For the Preferred Alternative, the limits of disturbance (including approximately 0.40 acres of forested area) would be allowed to regrow naturally, since the surrounding woods are managed as a natural area, and the archeological sensitivity of the area precludes extensive planting. Therefore, natural forest regeneration will be encouraged by restoring the soils along the access route, and seeding with appropriate native understory vegetation. The NPS also will require "hard" protection (staked fencing or other physical barrier) for any trees within the construction zone that are deemed specimen trees, species of concern, or otherwise significant to the site. WSSC also proposes replanting of trees/shrubs in a limited area of the LOD, which has been investigated and found to have no potential for yielding significant archeological deposits. Given a setback of about 12 feet from the proposed vault, the proposed replanting area is illustrated in Appendix D (page D16), encompassing the southeastern portion of the LOD.

WSSC would provide appropriate compensation for trees removed within the LOD for construction, minus existing maintenance Right-of-Way (for the existing pressure sewer), with in-lieu-of compensation payment. Discussion of that mitigation option is presented below. The maximum estimated number of native trees to be cleared on NPS property (outside of existing ROW) is 67, encompassing 27.40 square feet of basal area.

In addition to other methods (replanting and forest conservation plan outside of NPS property) in-lieu-of payments would be used as compensatory mitigation. The removed trees would be valued by the Trunk Formula Method, developed by the Mid-Atlantic Chapter of the International Society of Arboriculture and used by the National Park Service for historic properties since 1997; or another equitable method. The Trunk Formula Method assigns a base value of $75.00 per square inch of cross-section trunk area, according to the most recent factors available. The base value can be reduced based on (1) tree species, (2) site location, and (3) tree condition. Prior to the application of these percentage reductions, the total base value, assuming that all 67 trees would be removed in a "worst case scenario", would be $295,920.00. Once the number of trees actually

cleared is determined by reconciliation of the accounting by the NPS and WSSC, the total mitigation sum would be be calculated and deposited in a NPS account designated for the restoration of natural and cultural landscapes within the park's Southern District.

Invasive Species. Under the Preferred Alternative, about 10,500 square feet of mowed grasses and 18,700 square feet (0.43 acre) of pioneer forest edge with nonnative invasive species dominant in the herbaceous layer would be disturbed to construct the access road and install the proposed tunnel receiving shaft and permanent access vault. After construction activities are concluded, the disturbed area would be seeded with turf grass for areas that would be maintained into the future, or seeded with native wetland species certified free of nonnative invasive species. As a result of the extensive presence of nonnative invasive species in the herbaceous layer around the project area, nonnative invasive species are expected to recolonize disturbed areas that would not be maintained into the future. Therefore, impacts to the environment as a result of nonnative invasive species expansion are considered to be short-term and minor. Although seeds from invasive species could feasibly be transported to the site by machinery and workers' boots, there is only a remote possibility that new noninvasive plant species would be introduced, because there are many invasive species already. Therefore, few if any *new* nonnative invasive species are expected to be introduced to the site as a result of the Preferred Alternative.

Cumulative Impact on Vegetation. The Preferred Alternative would contribute to cumulative effects on vegetation and invasive species when combined with other past, present, and future actions, as identified in Table 4-1. The reasonably foreseeable future development projects occur in an urban environment, and vegetation in these areas are typical of urban environments and urban development. Local and federal regulations protect trees and require mitigation for tree removal and habitat disturbance. Federal and local governments, as well as private organizations, are funding projects that would provide more trees, green space, or waterways restoration. Minor adverse, cumulative impact on vegetation and invasive species would still occur as a result of reasonably foreseeable future development (see Figure 4.1. p.61) involving incremental reductions in vegetation.

Conclusion. Under the Preferred Alternative, about 28,000 square feet of the NPS Harmony Hall property would be disturbed during construction activities. A total of 129 trees between two and 20 inches in diameter would be removed. However, the adverse impact to terrestrial habitat would be minor, in both the short term and the long term. Further, WSSC would mitigate the forest removal by providing compensation paybments for the replacement value of the impacted forest on NPS properties, and the previously forested 0.40 acres of temporary construction access area LOD would be allowed to naturally regrow with the exception of a 12 foot buffer around the permanent access vault (and a sidewalk to the concrete pad leading to the vault). Cumulative effects on vegetation and due to introduction of invasive species would be minor and adverse due to aggregate losses of woodland, but would be offset by mitigation.

4.9 Cultural Resources

4.9.1 Methodology and Assumptions

The cultural resources impact analyses are intended to comply with the requirements of both NEPA and Section 106 of the NHPA. In accordance with the Advisory Council of Historic Preservation's regulations implementing NHPA Section 106 (CFR Part 800, "Protection of Historic Properties"), impacts to cultural resources would be identified and evaluated by:

- Determining the APE
- Identifying cultural resources present in the APE that are either listed in, or eligible for listing in, the NRHP
- Applying the criteria of adverse effect to affected cultural resources that are either listed in, or eligible for listing in, the NRHP
- Considering ways to avoid, minimize, or mitigate adverse effects

The Section 106 regulations require that an adverse effect or no adverse effect determination be made for all NRHP listed or eligible cultural resources that would be affected by the project undertaking. An adverse effect occurs whenever an impact alters, directly or indirectly, any characteristic of a cultural resource that qualifies it for inclusion in the NRHP. Adverse effects also include reasonably foreseeable future effects caused by the Preferred Alternative that would occur later in time, be farther removed in distance, or be cumulative (36 CFR Part 800.5, "Assessment of Adverse Effects"). A determination of no adverse effect means that an effect might occur, but would not diminish in any way the characteristics of the cultural resource that qualify it for inclusion on the NRHP.

The Section 106 regulations require that the agency undertaking the project consult with the SHPO and other consulting parties to mitigate adverse effects to cultural resources. Section 106 has been undertaken with Maryland's SHPO, MHT, and M-NCPPC; correspondence is included in Appendix G, Cultural Resources Agency Coordination.

As discussed in Section 3.7.1, WSSC archeologists completed a Phase I archeological investigation in June 2011 within the proposed LOD. Additional archeological consideration of the microtunnel alignments was undertaken in December 2011 by a qualified archeologist (Tyler and Ward, June 2011). Review of the Phase I report and the geotechnical report (T.L.B. Associates, March 2011) prepared for the project, indicated that the construction of the proposed sewer line via microtunneling would involve construction disturbance only in culturally sterile soils.

For the purpose of analyzing impacts to archeological resources, thresholds of change for the intensity of an impact are based on the potential of the site(s) to yield information important in prehistory or history.

4.9.2 Impact Thresholds

Archeological Resources. For the purposes of analyzing potential impacts to archeological resources, the thresholds of change for the intensity of an impact are identified as follows.

> **Negligible**—The impact is at the lowest level of detection or barely measurable, with no perceptible consequences, either adverse or beneficial, to archeological resources. For purposes of Section 106, the effect determination would be *no adverse effect*.
>
> **Minor**—The disturbance of a site(s) would be confined to a small area with little, if any, potential for the loss of important information. For purposes of Section 106, the determination of effect would be *no adverse effect*.
>
> **Moderate**—Disturbance of a site would not result in a substantial loss of important information. For purposes of Section 106, the determination of effect would be *adverse effect*.

Major—Disturbance of a site would not result in the loss of most or all of the site and its potential to yield important information. For purposes of Section 106, the determination of effect would be *adverse effect*.

Duration—Short-term impacts would occur during and immediately following the construction; long-term impacts would be those persisting or occurring after construction.

Historic Resources. For the purpose of analyzing potential impacts to historic sites, districts and landscapes, the thresholds of change for the intensity of an impact are identified as follows.

Negligible—The impact is at the lowest level of detection or barely perceptible and not measurable. For purposes of Section 106, the effect determination would be *no adverse effect*.

Minor—The impact would not affect the character-defining features of a structure or building listed on or eligible for the NRHP. For purposes of Section 106, the effect determination would be *no adverse effect*.

Moderate—The impact would alter a character-defining feature(s) of the structure, building, or historic district but would not diminish the integrity of the resource to the extent that its NRHP eligibility would be jeopardized. For purposes of Section 106, the effect determination would be *no adverse effect*.

Major—The impact would alter a character-defining feature(s) of the structure, building, or district, diminishing the integrity of the resource to the extent that it is no longer eligible to be listed on the NRHP. For purposes of Section 106, the determination of effect would be *adverse effect*.

Duration—Short-term impacts would occur during and immediately following construction; long-term impacts would be those persisting or occurring after construction.

4.9.3 Impacts of No Action Alternative

Archeology. The no action alternative would involve no construction and would have no potential to affect the historic scatter of artifacts identified as the Broad Creek Wastewater Site (18PR1023). The site was determined ineligible for listing in the NRHP. Therefore, the no action alternative would have a negligible short- and long-term adverse effect on archeological resources.

Historic Sites and Districts. The no action alternative would involve no construction and would have no potential to affect historic sites and districts in the short term. Therefore, the no action alternative would have no effect on historic properties, in terms of short- and long-term adverse impacts .

Cultural Landscapes. The no action alternative would involve no construction but adverse impacts would be associated with continued SSOs, which detract from the setting. Therefore, the no action alternative would have no effect on cultural landscapes, in terms of short- and long-term adverse impacts.

Cumulative Impacts on Cultural Resources. The no action alternative would not require construction and would not impact cultural resources. Although over time, development projects

could collectively impact cultural resources, the no action alternative would not contribute to that impact. Therefore, this Alternative would have a negligible cumulative effect on cultural resources.

Conclusion. The no action alternative would have no more than negligible short- or long-term adverse effects on archeological resources or historic sites, districts and landscapes.

4.9.4 Impacts of Preferred Alternative

Archeology. The archeological site identified within the project's APE (18PR1023) is located within a disturbed context and is not historically significant. The force main proposed to extend from the Broad Creek WWPS to Livingston Road would be constructed within culturally sterile soils via horizontal boring and has no potential to disturb archeological resources.

The Preferred Alternative would not cause any long-term direct impacts to NRHP-eligible archeological resources because site 18PR1023 is not considered to be eligible for the NRHP; therefore, long-term adverse impacts would be negligible. The force main proposed to extend from the Broad Creek WWPS to Livingston Road would be constructed within culturally sterile soils via horizontal boring and has no potential to disturb archeological resources.

Historic Sites and Districts. The Preferred Alternative would result in a short-term change in the visual character and noise levels of the Broad Creek and Harmony Hall historic districts during construction due to the presence of items such as construction trailers, vehicles, and temporary construction fencing, which would be removed following construction. These features would cause negligible short-term impacts to the Harmony Hall Historic District, Broad Creek Historic District, and Piscataway House. Construction activity would not be visible or discernible from the historic resources or publicly accessed places within the historic districts, because the Broad Creek WWPS and the LOD are over 500 feet from the nearest roadway and over 800 feet from the Harmony Hall manor, the closest historic structure. Also, the area between the construction area and the LOD is heavily wooded and obscures the construction activity from vantage points within the Harmony Hall Historic District.

The Preferred Alternative would result in a long-term change in the visual environment due to the construction of a concrete pad and manhole cover at ground level. The placement of the pad and manhole cover, adjacent to the existing Broad Creek WWPS, would not result in physical disturbance to any historic structures or a change in the auditory environment; in addition, its low profile would not be visible from the closest yard areas of the Want Water, Piscataway House, and Harmony Hall structures. The concrete pad would cause negligible long-term impacts to the Harmony Hall Historic District, Broad Creek Historic District, and Piscataway House. It is unlikely that the concrete pad for vault access would be visible from vantage points such as Harmony Hall manor or the other architectural resources.

Future maintenance would occur infrequently. Most commonly, maintenance would occur at the subsurface vault, proposed to be located approximately 60 feet south of the Broad Creek WWPS for Alternative 5A1-modified. Maintenance would entail foot traffic and possibly light equipment traversing the 60-foot length of lawn area, via an access easement, on NPS Harmony Hall property; this could have minor temporary impacts on cultural resources.

Cultural Landscapes. The Preferred Alternative would result in almost indiscernable short-term change in the surrounding cultural landscape. Construction would cause negligible short-term impacts to the Broad Creek Historic District and Harmony Hall cultural landscapes and would not

alter character defining features such as setting, spatial organization, topography, views, buildings, or structures within the landscapes. Construction activity would not be visible or discernible from the publicly accessed places within the historic districts or from the west shore of the Potomac (George Washington Memorial Parkway). Furthermore, the Broad Creek WWPS and the LOD of Alternative 5A1-modified are over 500 feet from Livingston Road, over 800 feet from the Harmony Hall manor, and 2.3 miles directly across-river from the George Washington Memorial Parkway (Virginia Route 400). Furthermore, the area between the construction area and the LOD is heavily wooded and obscures the construction activity from vantage points within the Cultural Landscape.

The permanent access vault's concrete pad would cause negligible long-term impacts to the surrounding cultural landscapes and would not alter character defining features such as setting, spatial organization, topography, views, buildings, or structures within the landscapes. It is unlikely that the concrete pad for vault access would be visible from vantage points within the cultural landscape, beyond the immediate environs of the Broad Creek WWPS. Furthermore, the trees to be removed for construction would not be visible from any key vantage points within the cultural landscape.

Cumulative Impacts on Cultural Resources. The Preferred Alternative could affect cultural resources when combined with other past, present, and future actions, as identified in Table 4-1. Within the sewer basin, development and construction would occur within the historic district and on historic property, and subsurface construction would have the potential to affect archeological resources. However, all cultural resources located on federal property or associated with projects that use federal funding are protected by multiple federal laws, including the NHPA, which require mitigation to protect cultural resources. Also, any construction or development within a designated historic district must conform to specified design criteria, a requirement that is intended to protect cultural resources. The cumulative impact of the Preferred Alternative to cultural resources would be negligible.

Conclusion. The Preferred Alternative would have no more than negligible short- or long-term adverse effects on archeological resources or historic sites, districts and landscapes. However, the Preferred Alternative would alter the visual character and noise levels of the Broad Creek and Harmony Hall historic districts during construction due to the presence of items such as construction trailers, vehicles, and temporary construction fencing, but would result in no adverse long-term change in the visual environment due to the construction of a concrete pad and manhole cover. Cumulative effects on cultural resources within the Broad Creek Historic District would be negligible, and would not adversely affect the district.

4.10 Visitor Use and Experience

4.10.1 Methodology and Assumptions

WSSC and the NPS assessed potential impacts to visitor use and experience based on the potential of the proposed actions to (1) impair park resources or values; (2) create an unsafe or unhealthful environment for other visitors or employees; and (3) unreasonably interfere with the atmosphere of peace and tranquility, or the natural soundscape maintained in wilderness and natural, historic, or commemorative locations within the park.

4.10.2 Impact Thresholds

For the purposes of analyzing potential impacts to visitor use and experience, the thresholds of change for the intensity of an impact are identified as follows

Negligible—The impact on visitor use and experience would not be measurable or perceptible.

Minor—The impact on visitor use and experience would be measurable or perceptible, but it would be limited to a relatively small number of visitors, residents, or employees at localized areas.

Moderate—The impact on visitor use and experience would be sufficient to cause a change in visitor satisfaction, attendance rates, or capacity of employees to perform their duties at affected locations.

Major—The impact on visitor use and experience would be substantial. Visitor satisfaction, attendance rates, or the capacity of employers to perform their duties are expected to substantially decrease in the short term and long term.

Duration—Short-term impacts are those lasting during and immediately following construction; long-term impacts are those lasting beyond construction.

4.10.3 Impacts of No Action Alternative

The no action alternative would not result in a noticeable change in visitor use and experience; therefore, short-term and long-term impacts would be minor. Measurable and perceptible annoyances would occur for visitors due to SSO debris on park property at the outfall from the Broad Creek WWPS. The occurrence of SSOs would cause MDE and the PGC DER to ban water contact recreation; this would affect visitor satisfaction and attendance rates (to the watercraft or water contact recreational aspects of Broad Creek adjacent to the Harmony Hall historic site) and would be a moderate (short- and long-term) adverse impact.

Cumulative Impacts on Visitor Use and Experience. The no action alternative would not require construction within NPS property, and the current visitor use and experience within the NACE property would not be affected. Therefore, the no action alternative would not contribute to the cumulative effect on visitor use and experience within the NPS property.

Conclusion. Under the no action alternative, visitors may notice SSO-related debris on park property; in addition, the occurrence of SSOs would cause county and state agencies to ban water contact recreation, affecting visitor satisfaction and attendance rates. This represents a moderate adverse impact over the short term and the long term.

4.10.4 Impacts of Preferred Alternative

For the Preferred Alternative, there would be a short-term minor impact on visitor use and experience. Construction would occur at the northern edge and in the northern interior portions of the 65-acre Harmony Hall historic park property, affecting less than an acre (0.64 acres) of park property surrounding the WWPS compound fence. The construction of the Preferred Alternative would require the removal of 129 or fewer trees within the refined LOD (reduced width of access

road). The tree removal would be noticeable but localized and would not prevent any passive recreational activities. Also, because of a lack of access and the proximity to the Broad Creek WWPS, the construction area is unlikely to experience frequent visitors.

For the Preferred Alternative, the area containing the removed trees (totaling 38.99 square feet in basal area) would be mitigated as discussed in Section 4.8.3 (Vegetation). Part of the mitigation would include compensation from WSSC to the NPS for 67 trees on NPS land without existing WSSC Right-of-Way (approximately 27.40 square feet of basal area compensated with replacement value using a trunk formula method or other equitable value). Also, the area of cleared forest would be allowed to regrow naturally or would be replanted, and over time the impacts would become less perceptible. The exception to this is the area of the permanent access vault and a 12 foot buffer around the concrete pad; as well as a sidewalk from the WWPS compound to the access vault. A beneficial long term impact would result from the absence of SSO debris accumulation in the overflow channel adjacent to the Harmony Hall historic park property.

Future maintenance would occur infrequently. Most commonly, maintenance would occur at the subsurface vault, proposed to be located approximately 60 feet south of the Broad Creek WWPS for Alternative 5A1-modified. Maintenance would entail foot traffic and possibly light equipment traversing the 60-foot length of lawn area, via an access easement, on NPS Harmony Hall property; this could have minor temporary impacts on visitor use and experience.

Cumulative Impacts on Visitor Use and Experience. The Preferred Alternative, when combined with past and future developments, would contribute to the cumulative effect on visitor use and experience within the NACE property. Aside from the Preferred Alternative, the only reasonably foreseeable future activities within the park are (1) nonspecified future improvements to Harmony Hall and (2) future maintenance of the WSSC sewer facilities located within the park. Neither of those events would prohibit or worsen visitor use and experience; the park would cumulatively benefit from these activities.

Conclusion. Construction occurring under the Preferred Alternative would have a minor adverse impact on visitor use and experience over the short term. Visitors may notice the tree removal under the Preferred Alternative, but this would not prevent passive recreational activities. And because the removed trees would be replanted, the impacts would become less perceptible over time. A beneficial, long-term impact would result from the absence of SSO debris accumulation on NPS property, and from reduced frequency of water contact recreation bans. Beneficial, cumulative effects would be realized when county plans to create a historic trail for visitors are implemented because Harmony Hall's park environment would be improved for visitors to the Want Water ruins, as a result of the elimination of SSOs.

4.11 Human Health and Safety

4.11.1 Methodology and Assumptions

WSSC and the NPS assessed potential impacts to human health and safety based on the exposure of workers and residents to hazardous materials, changes in pedestrian or vehicle access that could impact human safety, and changes to existing pollutant sources that could impact human health.

Specific sites of interest were identified based on their distance and topographical relationship to the proposed construction areas. "Closed" or fully remediated sites were assumed to have no potential to impact human health or environmental resources. The NPS and WSSC also considered

the project's ability to change pedestrian and vehicle access and change or create new pollutant sources.

4.11.2 Impact Thresholds

For the purposes of analyzing potential impacts to human health and safety, the thresholds of change for the intensity of an impact are identified as follows

Negligible—The impact on health and safety would not be measurable or perceptible.

Minor—The impact on health and safety would be measurable or perceptible, but it would be limited to a relatively small number of visitors, residents, or employees within localized areas.

Moderate—The impact on health and safety would be local, but measurable or perceptible by many visitors, residents, or employees.

Major—The impact on health and safety would be substantial and noticeable by all visitors, residents, or employees.

Duration—Short-term impacts are those occurring during and immediately following construction; long-term impacts are those lasting beyond construction.

4.11.3 Impacts of No Action Alternative

The no action alternative would not alter any pedestrian paths or roadways. However, existing health and safety risks—for example, those related to bacterial infection—would remain as the result of sewer overflow discharges. Continued sewer overflows would further deteriorate the quality of the watershed. Therefore, the no action alternative would result in minor regional, short- and long-term, adverse impacts as well as moderate localized, short- and long-term, adverse impacts to human health and safety.

Cumulative Impacts on Human Health and Safety. The no action alternative would contribute to cumulative effects on human health and safety when combined with other past, present, and future actions, as identified in Table 4-1. Under the no action alternative, SSO discharges would not be reduced and, therefore, continued degradation of water quality would occur. Present and future development activities would continue to incrementally increase impervious surfaces and pollutant loading, thereby contributing to existing water quality impacts in Broad Creek and the Potomac River. Furthermore, during the construction of these projects, workers could be exposed to various hazardous materials found underground or in the water. Construction documents would require mitigation on the handling and disposal of all contaminated materials, although minimal risks from the release of and exposure to hazardous materials would remain. Cumulative impacts to human health and safety would be minor and adverse.

Conclusion. The no action alternative would result in continued human health and safety risks from the bacterial contamination of water bodies attributable to undiminished SSOs. Thus, this Alternative would result in minor to moderate adverse impacts over the short term and long term, at both localized and regional scales. Cumulative impacts, considered in light of past, present and future development activities, would be beneficial.

4.11.4 Impacts of Preferred Alternative

The majority of potential health and safety hazards would occur during the construction phase. Of the four listed environmental concern sites within close proximity of the Broad Creek WWPS site, two (10307 and 10511 Livingston Road, which are listed on Table 3-3: Records of Environmental Concerns from Public Databases) have the highest potential to pose a threat to human health and safety. Based on the analysis of potential hazardous material exposure, the Preferred Alternative would result in a low potential for construction workers to be exposed to hazardous materials.

Construction of the Preferred Alternative could require short-term traffic alterations that could impact both vehicles and pedestrians. Trucks and heavy machinery accessing the site from Livingston Road could slow or stop traffic as they pull in and out of the driveway leading to the construction site. The increased truck traffic would occur only during the construction period and would have no long-term impacts. Proper implementation of traffic control measures would mitigate any potential health or safety risks.

Unexpected hazards, such as the discovery of undocumented contamination in soil or groundwater, may be encountered during construction. Proper handling procedures for potentially hazardous materials would be required to minimize the risk to construction workers. Therefore, the Preferred Alternative would result in minor short-term, adverse impacts.

The Preferred Alternative would have a long-term beneficial impact on human health and safety. It would eliminate the diluted sewage overflows and facilitate the overall goal of meeting water use designations in the watershed.

Cumulative Impacts on Human Health and Safety. The Preferred Alternative would contribute to cumulative effects on human health and safety when combined with other past, present, and future actions, as identified in Table 4-1. Once operational, the Preferred Alternative would have a beneficial impact on human health and safety by improving water quality and reducing human health risks associated with primary contact with fecal coliform bacteria and other pathogens found in SSOs. Current and future development activities identified in Table 4-1 could continue to incrementally increase impervious surfaces and pollutant loading, thereby contributing to existing water quality impacts in Broad Creek and the Potomac River. Current and future soil contamination, although difficult to project, is expected to be minimal as a result of strict environmental regulations. Although substantial efforts would be made to eliminate the release of and exposure to hazardous materials during construction of present and future development, past development has resulted in an array of hazardous materials at sites in or near the sewer basin. Future development could uncover or release contaminants. Construction documents would require mitigation on the handling and disposal of all contaminated materials, although minimal risks related to the release of and exposure to hazardous materials would remain. There is the potential for minor adverse, cumulative impacts to human health and safety.

Future maintenance would occur infrequently. Most commonly, maintenance would occur at the subsurface vault, proposed to be located approximately 60 feet south of the Broad Creek WWPS for Alternative 5A1-modified. Maintenance would entail foot traffic and possibly light equipment traversing the 60-foot length of lawn area, via an access easement, on NPS Harmony Hall property; this could have negligible short-term impacts on human health and safety.

Conclusion. Over the short term, the Preferred Alternative would result in minor adverse impacts to human health and safety—including a low potential for construction workers to be exposed to

hazardous materials and an increase in truck traffic—primarily during the construction phase of the project. Over the long-term, the Preferred Alternative would have a beneficial impact on human health and safety by eliminating SSOs and thereby improving water quality and reducing the health risks associated with fecal coliform bacteria and other pathogens found in SSOs.

5 AGENCY CONSULTATION AND COORDINATION

The NPS places priority on public involvement in the NEPA process and on giving the public an opportunity to comment on proposed actions. As part of the NPS NEPA process, issues associated with the proposed Broad Creek WWPS Conveyance System Augmentation project were identified during scoping meetings, and have been communicated to other affected agencies and stakeholders.

Coordination with local and federal agencies and various interest groups was conducted by NPS and WSSC during the NEPA process to identify issues and/or concerns related to the proposed Improvements to Broad Creek WWPS. This correspondence is included in Appendices F and G.

In accordance with Section 7 of the ESA, consultation letters were sent (see Appendix F) from the WSSC in May 2010 to the USFWS (Chesapeake Bay Field Office); the NOAA NMFS Habitat Conservation Division (Annapolis Office); and the MDNR Wildlife Heritage Services (Annapolis Office). As shown in Appendix F, USFWS replied in May 2010; NOAA NMFS replied in June 2010; and MDNR WHS replied in July 2010.

In accordance with Section 404 of the CWA, WSSC has sent and would continue to send consultation letters to the USACE (Baltimore District) and the MDE as part of a permit application. In accordance with the CZMA and Chesapeake Bay Critical Area Protection Act, WSSC has consulted (as shown in Appendix H) and would continue to consult the MDNR CAC as needed. A MOU between WSSC and the CAC dated June 9, 2003 indicates no individual approval would be necessary for most WSSC projects (see Appendix H). Further consultation occurred; the CAC concluded November 29, 2011 that the proposed project applied under the 2003 MOU – no further coordination is required and no special provisions to protect the CZMA are necessary (see Appendix. H).

In accordance with Section 106 of the NHPA, NPS sent consultation letters to the MHT in April 2012 (see Appendix G). MHT concurred that there were no adverse effects to historic properties in their reply in June 2012. Correspondence is included in Appendix G.

Furthermore, agencies, organizations, and stakeholders were and will be invited to participate in the process, including:

- A PRG including representatives from the Broad Creek Historic District, MDE, MDNR, M-NCPPC, PGC DPW&T, PGC DER, and SHA has participated in the process.
- A Citizen's Advisory Committee including community representatives has participated.
- CAC was consulted during the NEPA evaluation and prior to the permit application.

Comment Period: To comment on this EA you may mail comments to the address below, or submit them online at the NPS PEPC Site web page listed below. Please be aware that your comments and personal identifying information may be made publicly available at any time.

http://parkplanning.nps.gov/projectHome.cfm?projectID=38937

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7 GLOSSARY

air quality controls	Scrubbers and odor control structures to filter air constituents.
amphibious	Adapted for both land and water.
aquatic	Pertaining to water. Aquatic habitats include rivers, streams, lakes, and ponds.
aquifer	An underground body of porous materials, such as sand, gravel, or fractured rock, containing water and capable of supplying useful quantities of water to a well or spring.
archeological	Relating to material remains of past human life or activities found in soil. In this region of the United States, it, may refer to Native American remains or to remains of early American or European settlement.
architectural	Relating to structures, such as buildings.
area of potential effects	The geographic area or areas within which an activity may directly or indirectly cause alterations in the character or use of historic properties.
augmentation	Improvement, betterment, supplement, or addition of capacity.
avoidance alternative	Avoidance alternatives are those that avoid the use of specified environmental resources.
backfill	Material used to refill an excavated site.
backwater	Water held in place by a structure, such as a dam, or backed up in a smaller water body due to flooding at that stream's confluence with another (usually larger) water body.
basal	Located at the bottom.
base flood elevation	Elevation to which water would rise during a flood that has a one percent chance of occurring in a single year.
best management practices	Methods that have been determined to be effective, practical means of preventing or reducing pollution or protecting resources.
buoyancy	Tendency of an empty watertight vessel to float on liquid, and in this case for a concrete tank to be lifted by groundwater.
carbonaceous	Containing carbon, such as limestone (calcium carbonate), dolomite (magnesium carbonate), or coal (bituminous or anthracite).

centers and corridors	Areas designated by the Prince George's County 2002 General Plan for more concentrated development that will make transportation investments cost-effective.
clayey	A type of soil that contains a predominance (generally greater than 40 percent) of mineral granular material with particle sizes smaller than 0.00015 inch (< 3.90625 µm, or 0.004 mm), exhibiting plastic and elastic tendencies at moist consistency.
coastal barrier	A strip of land, such as an island or sandbar that protects the coast from erosion due to waves.
coastal zone management	The development of objectives, policies, and standards to guide public and private uses of coastal waters and their adjacent shorelands.
collection sewer optimization and storage technologies	Various strategies employed to enhance the operating efficiency of the sewer piping system (prior to the wastewater treatment plant in this case), such as methods to control inflow and infiltration, including lining pipes and repairing manholes; increasing storage volume to attenuate peak wastewater flows reaching the pumping station to make the most effective use of the existing pumping capacity.
collection system	(Sanitation term.) A system of sewer drains, sewer lines, lift stations, and sewer mains upgradient from a wastewater pumping station, delivering effluent.
compaction	The process by which space between soil particles decreases as a result of the application of force
comprehensive plan	A long-range plan prepared by a local government to guide future land use.
consent decree	A settlement of a lawsuit that details actions the defendant must take to remedy the situation that led to the lawsuit.
constant-speed pumps	Devices for moving fluids (pumps) that are driven by a motor that operates at a specific rotational speed (rpm); motor speed is not varied to adjust the rate of flow.
constructability	The ease and efficiency with which a construction project can take place.
conveyance system	(Sanitation term.) A system of pressurized force main(s), gravity drain pipe(s), and/or pressure pipe(s) carrying effluent from a wastewater pumping station to a wastewater treatment plant.
Criteria Pollutants	Six commonly found air pollutants—ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead—that are regulated by the U.S. Environmental Protection Agency.

critical habitat	Areas that (1) are essential to the conservation of an officially listed endangered or threatened species and (2) may require special management considerations or protection.
cultural resources	Natural or anthropogenic (human-derived) features having cultural or historical significance, such as structures, graves, religious sites, vistas, or bodies of water.
culturally sterile soils	Soil that contains no cultural material; in other words, soil that was formed geologically in place prior to historic or prehistoric inhabitation.
cumulative impact	The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions.
cut and cover	(Engineering term.) Construction method using excavation and backfill to install buried pipe sections.
dendritic	Organized in a branched form.
downgradient	Downhill; downstream.
drill recovery area	A pit for extraction of a tunnel boring machine at its terminal point of operation following pipeline/tunnel installation. Synonymous with tunnel receiving shaft.
easement	A right for one party to use the land of another for a specific purpose, such as a right-of-way or a utility, without being the fee simple absolute owner.
effluent	(Sanitation term.) An outflow of liquid from a sewer or sewage system.
endangered species	An animal or plant species in danger of extinction throughout all or a significant portion of its range that has been listed as such under the *Endangered Species Act*.
Environmental Assessment	A preliminary assessment of the likely influence of a project on the environment, used to determine if more detailed evaluations of environmental impacts are needed.
ephemeral stream	A channel that contains running water for only part of the year—that is, an intermittent stream.
erosion	The loosening and transportation of rock and soil debris by wind, rain, or running water.
erosion and sediment control plan	Measures using best management practices to slow or prevent erosion, and to slow or stop sediment from reaching surface waters.

erosion control practices	Management practices for preventing or controlling erosion.
estuarine	Refers to resident species of an estuary.
estuary	A partially enclosed body of water in which fresh water from rivers and streams mixes with salt water from the ocean. An area of transition from land to sea.
fecal coliform	Fecal coliforms are a specific class of bacteria that only inhabit the intestines of warm-blooded animals. The presence of coliforms is an indication that the media/water is polluted and may contain pathogenic organisms.
floodflow	Stream discharge during a flood
floodplain	Areas inundated during storm events defined by the Federal Emergency Management Agency (typically withfrequencies of 100 years and 500 years) and delineated on flood insurance rate maps.
force main	A pipe that carries sewage flow under pressure.
fugitive dust	A type of nonpoint source air pollution – small airborne particles that do not originate from a specific point such as a gravel quarry or grain mill; significant sources include unpaved roads, agricultural cropland and construction sites.
geotechnical study	Conducting core borings, electronic soundings, and other analysis in order to determine the composition, and affiliated scientific and engineering properties, of rock and soil
geotextile	(Engineering term.) Manufactured fabric used to enhance load resistance properties of soil or to permit water movement in soil while limiting movement of soil particles.
grading	Altering the slope of the land for construction purposes—for instance, to establish a level foundation.
habitat integrity	The condition of the physical habitat, such as a water body, in terms of its ability to support life.
herbaceous	Refers to plants without woody stems.
hydrologic	Refers to water on the earth and in the atmosphere.
impact thresholds	The points at which environmental impacts are deemed to reach specific intensities (e.g., negligible, minor, moderate, or major).
infiltration	The passage of surface water into soil or porous rock or as an engineering term, the leakage of groundwater into underground pipes

	and manholes.
inflow	The entry of extraneous rain water into a sewer system from sources other than infiltration, such as basement drains, manholes, storm drains, and street washing.
intermittent stream	A channel that contains running water for only part of the year—that is, an ephemeral stream.
jack-and-bore drilling	The installation of an underground pipe or casing on a fixed line and grade using horizontal auger to remove soil while the pipe or casing is jacked into place behind the auger head. This requires the use of jacking and receiving pits to perform the construction.
laydown areas	Areas that have been cleared for the storage of construction equipment and supplies.
lignitized	(Geology term.) A type of soil containing decomposed woody vegetation (peat) and other plant matter.
limit of disturbance (LOD)	Physical area within which construction and related activities would take place.
loamy	A type of soil containing a relatively even mixture (generally 40-40-20 percent, respectively) of sand, silt, and clay mineral granular soil material.
marsh	A type of wetland that does not accumulate appreciable peat deposits and is dominated by herbaceous vegetation. Marshes may be either freshwater or saltwater, tidal or nontidal.
microtunneling	(Engineering term.) A construction method using a subterranean drilling machine to insert pipe sections. The microtunnel boring machine (MTBM) is inserted and operated at one end of the tunnel, and recovered from a shaft at the other end.
mixed-use development	Development consisting of multiple, interdependent land uses that are physically and functionally integrated.
mobile-source emissions	Emissions from nonstationary sources of air pollution such as cars, trucks, motorcycles, buses, airplanes, and locomotives.
National Register of Historic Places	The official list of the Nation's historic places worthy of preservation. Authorized by the *National Historic Preservation Act of 1966*, the National Park Service's National Register of Historic Places is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources.
nonnative invasive	A type of plant, animal, or other organism that does not historically

species	inhabit a certain area but has been introduced there, often by people. An invasive species can spread quickly, hurt native species, disrupt ecosystems, and be difficult to eradicate.
nonpoint source	Pollution sources that are diffuse and do not have a single point of origin or specific outlet. The pollutants are generally carried off the land by water runoff during storms.
Nonpoint Source Management Program	Program under which states can receive funding to control nonpoint sources of pollution to protect surface and groundwater.
nontidal	Refers to areas where the water level is not influenced by tidal fluctuation.
odor control system	Devices in the collection system (such as scrubbers or media filters), biofilters, chemicals, or enzymes to control unpleasant sewer gas smells.
Open Space	In Prince George's County, this zoning category provides for areas of low-intensity residential (five-acre lot) development; promotes the economic use and conservation of land for agriculture, natural resource use, large-lot residential estates, and nonintensive recreational use.
passive treatment system	A series of measures used instead of a direct discharge pipe from roof drains and drainage swales from hard surfaces. See Section 2.2 of this EA for a description of the passive treatment system proposed.
PCBs (polychlorinated biphenyls)	A class of chemical contaminants that were once used as flame retardants in electrical equipment and as lubricants in gas pipeline valves. Though their production has been banned since 1977, PCBs still pose a risk to humans and wildlife because they persist in the environment.
peak flow	Maximum instantaneous stream flow during periods of high water runoff; or in sanitary engineering, the maximum instantaneous wastewater flow.
permeability	The extent to which porous rock, sediment, or soil can transmit a fluid.
physiographic province	A landform region; an area delineated according to similar terrain that has been shaped by a common geologic history.
physiographic resources	A landform region; an area delineated according to similar terrain that has been shaped by a common geologic history.
pioneer forest stand	Forest composed of colony, or early successional, species of trees such as red maple or tulip poplar, which are often first to inhabit marginal land or open, scrub- or shrub-dominated lands (but are replaced in later successional stages by other taller-growing species of trees).

plowzone	(Geology term.) Topsoil layer, typically containing higher organic matter than underlying mineral soil; and typically historically subjected to farming activity, including disking and plowing.
point source	A stationery location or fixed facility from which pollutants are discharged or emitted. Point sources are single identifiable sources of pollution, such as a pipe, ditch, ship, ore pit, or factory smokestack.
pressure line	Sewer line, under gravity pressure that conveys raw, untreated sewage through a pipeline from a gravity line (i.e., uphill under the head pressure from the downhill gravity sewer).
rain water treatment system	A series of measures used instead of a direct discharge pipe from roof drains and drainage swales from hard surfaces. See Section 2.2 of this EA for a description of the passive treatment system proposed.
rainfall-dependent inflow and infiltration	The share of rainfall that enters the collection system due to precipitation once runoff begins.
redevelopment	Development that takes place on previously developed land.
Reserved Open Space	In Prince George's County, this zoning category (1) provides for the permanent maintenance of certain areas of land in an undeveloped state, with the consent of the property owners; (2) encourages preservation of large areas of trees and open space; (3) is designed to protect scenic and environmentally sensitive areas and ensure retention of land for nonintensive active or passive recreational uses; and (4) provides for very low-density residential development and a limited range of public, recreational, and agricultural uses.
Residential-Estate	In Prince George's County, this zoning category permits large-lot estate subdivisions containing lots approximately one acre or larger.
riparian	Refers to areas (e.g., wetland and upland zones) that border streams, lakes, rivers, and other waterways. These areas have high water tables and support plants that require saturated soils during all or part of the year.
sandy	A type of soil containing a predominance (generally greater than 50 percent) of mineral granular material with particle sizes ranging from 0.00246 inch (one-sixteenth of a mm) to 0.0787 inch (two mm) in diameter, exhibiting gritty tendencies at moist consistency.
sanitary sewer overflow	Untreated or partially treated sewage unintentionally discharged from a sanitary sewer collection system, pumping station or treatment plant.
scrubber	A device for removing and collecting impurities or pollutants from a gas or the air.
sediment control	Management practices designed to mitigate the environmental impacts

practices	associated with accelerated erosion due to construction.
sewer basin	The area served by a sewer system.
side-cast spoils	Excavation material (soils, shattered rock, etc.) piled alongside trenching activity.
silt fence	A low, mesh fencing designed to prevent sediment from reaching storm drain systems and waterways.
silty	A type of soil containing a predominance (generally greater than 50 percent) of mineral granular material with particle sizes ranging larger than 0.00015 inch (0.004 mm) to smaller than 0.00246 inch (one-sixteenth of a mm) in diameter, exhibiting flowery tendencies at dry consistency.
site piping	Piping within a pumping station or treatment plant site.
soil boring	The use of a tool or drill rig to sample soil for analysis.
source controls	A method of abating storm-generated or combined sewer outfall pollution at the upstream, upland source where the pollutants originate and/or accumulate.
steep slopes	According to U.S. Department of Agriculture standards for soil loss from erosion, areas with a slope of eight to 15 percent are somewhat to moderately steep; those with a slope in excess of 15 percent are considered steep.
stormwater overflow channel	A manmade ditch that removes sanitary sewage overflows from the wastewater pumping station.
substrate	The rock underlying surface soils or bottom sediment material in a stream or other natural water system.
subwatershed	Topographic perimeter of the catchment drainage area of a stream tributary.
sump pit	A pit or depression in which liquids drain, collect, or are stored.
surface waters	Water on the land's surface.
temporal constraints	Time restrictions.
terrestrial	Pertaining to land. Terrestrial habitats include forests, grasslands, deserts, and rainforests.
threatened species	An animal or plant species likely to become endangered within the foreseeable future throughout all or a significant portion of its range

	that has been listed as such under the *Endangered Species Act*.
tidal marsh land	Low, flat marsh lands traversed by channels and tidal hollows, subject to tidal inundation; normally, the only vegetation present is salt-tolerant bushes and grasses.
topographic contours	Lines that connect points of equal elevation on a map—the closer the contour lines, the steeper the slope.
topography	The relative positions and elevations of the landscape that describe the configuration of its surface.
total suspended solids	A water quality measurement listed as a conventional pollutant in the U.S. *Clean Water Act*.
trenching activities	Construction activities that involve digging a trench or trenches in the ground.
tributary	A stream that flows into or connects with a larger waterway or body of water.
Tunnel receiving shaft	A pit for extraction of a tunnel boring machine at its terminal point of operation following pipeline/tunnel installation. Synonymous with drill recovery area.
upgradient	Uphill; upstream.
variable-speed pumps	Devices for moving fluids driven by a motor whose rotating speed can be varied to control the pumped rate of flow.
vector for nonnative invasive species colonization	Activities or actions of man, animals, or nature that disperse species from one portion of the landscape to another.
viewshed	All environmental features that are visible to the human eye from a fixed vantage point.
wastewater pumping station	A facility that collects sewage effluent in a low-lying area, and moves the water through hydrostatic pressure, to a high-point where gravity sewers can convey the effluent towards the wastewater treatment plant.
wastewater treatment plant	A facility that removes pollutants and other contaminants from water before releasing it back into the environment.
wetlands	A transitional zone between land and water that is periodically saturated or flooded. Wetlands perform many functions including the provision of wildlife and fish habitat, storage and conveyance of flood waters, sediment and pollution control, and recreation.

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9 LIST OF ACRONYMS, INITIALISMS, AND ABBREVIATIONS

AAFB	Andrews Air Force Base
AHPA	Archeological and Historic Preservation Act
amsl	above mean sea level
APE	area of potential effect
BFE	base flood elevation
BGPA	Bald and Golden Eagle Protection Act
BMP	best management practice
BOD	biogeochemical oxygen demand
CAA	Clean Air Act
CAC	(Chesapeake Bay) Critical Area Commission
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CO	carbon monoxide
COMAR	*Code of Maryland Regulations*
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DM	*Departmental Manual*
DNR (MDNR)	Maryland Department of Natural Resources
DO	director's order
EA	Environmental Assessment
EO	executive order
EPA	U.S. Environmental Protection Agency
E&SC	Erosion and Sedimentation Control measures (often synonymous

	with Best Management Practices)
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FIDS	forest interior dwelling species
FIRM	flood insurance rate map
GWMP	George Washington Memorial Parkway
LOD	limit of disturbance
MBTA	Migratory Bird Treaty Act
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MERLIN	Maryland Environmental Resources and Land Information Network
M-NCPPC	Maryland-National Capital Parks and Planning Commission
MHT	Maryland Historical Trust
MTBM	microtunnel boring machine
NAAQS	National Ambient Air Quality Standards
NACE	National Capital Parks – East
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
O_3	Ozone
PCB	polychlorinated biphenyl
PEPC	Planning, Environment and Public Comment

PGC DER	Prince George's County Department of Environmental Resources
PGC DPW&T	Prince George's County Department of Public Works and Transportation
$PM_{2.5}$	fine particulate matter (less than 2.5 micrometers in diameter)
PM_{10}	particulate matter (less than 10 micrometers in diameter)
PRG	Policy Review Group
RDII	rainfall-dependent infiltration and inflow
RTE	rare, threatened, and endangered
SHA	Maryland State Highway Administration
SHPO	State Historic Preservation Office
SSO	sanitary system overflow
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USC	*U.S. Code*
USDA-NRCS	U.S. Department of Agriculture, Natural Resources Conservation Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WSSC	Washington Suburban Sanitary Commission
WWPS	wastewater pumping station
WWTP	wastewater treatment plant

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