

## 2 ALTERNATIVES

### 2.1 Introduction

The NPS and WSSC considered a broad range of alternatives when examining potential solutions for meeting project needs. The alternatives included source controls and inflow controls, collection sewer optimization, storage technologies, and various conveyance system improvements between the Broad Creek WWPS and the Piscataway Creek WWTP, alone and in combinations. In defined terms:

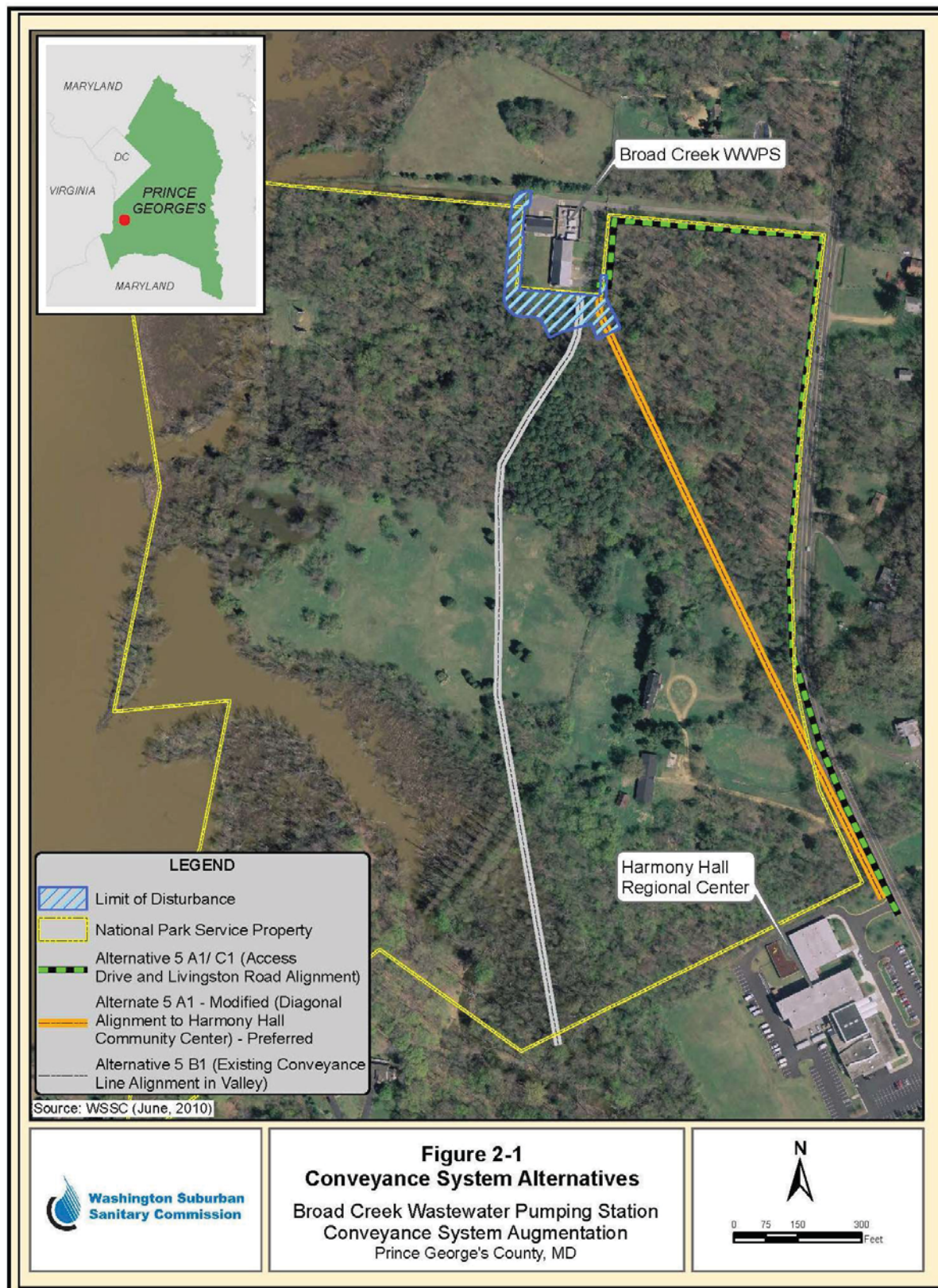
- “Source controls” are methods for reduction of the incoming sanitary waste volumes upstream of the WWPS thus reducing the amount of wastewater the pumping station must handle;
- “Inflow controls” are the reduction of extraneous groundwater/surface water volumes upstream of the WWPS, thus reducing the amount of wastewater the pumping station must handle particularly during critical peak flow events;
- “Collection sewer optimization” pertains to ways to improve the feed sewer trunks and sewer mains; these “storage technologies” can take several forms
  - “storage structure” is a tank or lagoon structure to hold an amount of wastewater when peak flows exceed the pumping capacity and then release the stored wastewater for pumping when the system flow is less than the pumping capacity;
  - “collection sewer optimization” is a type of storage technology where trunk sewer pipelines are oversized, allowing wastewater to be stored in the pipelines when peak wastewater flows exceed the pumping capacity; and
- “Conveyance systems” are the pumps and pipes delivering sewage from the WWPS to the WWTP.

The alternatives evaluated in detail in Chapter 3 of this EA are described in Section 2.2; and include the no action alternative and Alternative 5A1-modified. Alternative 5A1-modified is shown on Figure 2-1 (Conveyance System Alternatives).

### 2.2 Description of Alternatives

#### 2.2.1 No Action Alternative

In the no action alternative, WSSC would take no action to improve sewer system infrastructure in the Broad Creek sewer basin, including the vicinity of the Broad Creek WWPS, and would instead maintain existing conditions. SSOs that currently occur (often several times per year, and more so during cycle years with more rainfall than average) would continue to occur as a result of wet weather events. SSOs would continue to be discharged, with undiminished frequency, into Broad Creek near its confluence with the Potomac River. NPS land in the vicinity of the Broad Creek WWPS would remain in its current condition. Access to the existing pressure line would occur at an existing manhole on NPS property where there is presently a sidewalk or via WSSC’s existing maintenance easement corridor across the park property.



### **2.2.2 Alternative 5A1-modified: Upgrades to Pumping Station Pumps and Conveyance System Augmentation, Direct Diagonal Alignment—NPS Preferred Alternative**

Alternative 5A1-modified is a realignment within the NPS property of the original Alignment A1/C1 (which is discussed below), affecting the northernmost portion of the entire alignment (in segment 1 between the Broad Creek WWPS and Livingston Road), but tying in with the original Alternative 5A1 near the Harmony Hall Regional Center along Livingston Road, as shown on Figure 2-1 (p.22). Alternative 5A1-modified would involve (as a separate but related action) upgrades to the pumping station pumps and improvements to the conveyance system (force main under NPS property). WSSC would install a second (redundant) conveyance system line, beginning at the Broad Creek WWPS and traveling in a straight line between the Broad Creek WWPS and a proposed construction work area located at the Harmony Hall Regional Center. On the NPS Harmony Hall property, at its northern end near the Broad Creek WWPS, Alignment A1-modified follows a direct diagonal path between Alignments A1/C1 and B1; Alignment A1-modified was therefore referred to as the “diagonal” alignment during the public and agency involvement process.

WSSC would use microtunneling construction techniques from a single location to install the proposed new line, which would be installed at depths generally greater than 20 feet below the surface (except in close proximity to the drill insertion and recovery shafts). Microtunneling is proposed to minimize impacts associated with installing the 48-inch-diameter force main, as compared to cut and cover (conventional excavation) or likewise with jack-and-bore drilling, (jack and bore technique would require numerous construction pits located short distances apart). Instead, Alternative 5A1-modified would require one pit at the start of the boring, with a proposed location at the Harmony Hall Regional and Community Center, south of the Harmony Hall park property, and another pit at the end of the boring for removal of the tunnel boring machine, with a proposed location next to the WWPS facility in the Harmony Hall park property. A microtunnel boring machine (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 the line and grade for a straight bore with specified slope. As previously mentioned, designs include a tunnel drilling shaft insertion entrance in a grass lawn and parking lot at the Harmony Hall Regional Center and a drill recovery area immediately south of the Broad Creek WWPS, where a connection to a vault would be made between the Broad Creek WWPS and the conveyance system augmentation line. Construction of this segment is anticipated to require six months to complete, beginning in winter 2013. A new six-foot-wide by eight-foot-long access hatch and vault would be installed to surface grade. Also, 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. It would be a permanent impact to NPS property; and WSSC would need a permanent maintenance easement from the NPS to cross the expanse between the Broad Creek WWPS and the permanent access vault to conduct tunnel inspections and routine maintenance as discussed below.

Alternative 5A1-modified would require construction rights-of-way (ROW) from the NPS to construct a pit to allow MTBM removal and a permanent access vault. Alignment A1-modified would involve an access easement to the permanent access vault as well as a ROW agreement between WSSC and the NPS for all facilities on NPS property, including the tunnel alignment. The expected life cycle of the new 48” diameter augmentation line is 100 years (design life). Follow-up warranty inspection would be needed one year after construction is completed, and routine inspection and maintenance is anticipated on a five-year cycle. All cleaning, inspection, and



maintenance of the new line could be conducted from the access vaults; one near the WWPS and another at the Harmony Hall Regional Center connection about 1500 feet away. No excavation for repairs on the NPS property is anticipated. A twelve foot buffer around the 6x8 foot concrete pad is assumed to be kept in low-growing vegetation (mowed occasionally) in perpetuity, but otherwise the currently forested portion of the construction area would be allowed/encouraged to return to its present forest condition over time. Future maintenance would occur infrequently. Most commonly, maintenance would occur from an access point at the subsurface vault, proposed to be located approximately 60 feet south of the Broad Creek WWPS compound on NPS Harmony Hall property 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.

Stormwater runoff is a consideration, and due to increases in volume and flow velocity, would require a discharge from WSSC property and facilities to NPS property for passive treatment and infiltration of rainwater. Alternative 5 A1-modified would increase impervious area as a result of the at-grade access structures and expansion of the buildings, where there is now open lawn or forested land. Therefore the NPS and WSSC propose a rain water treatment system to discharge the stormwater gently as overland flow onto NPS property. There would be a predicted increase in "stormwater runoff from the Broad Creek WWPS compared to current runoff conditions. This increase in runoff volume from the 10-year, 24-hour storm is calculated as 161 cubic feet, which is 4.4 percent higher than that from existing conditions at the Broad Creek WWPS. The calculated increase in peak flow from the 10-year, 24-hour storm is 0.0555 cubic feet per second, which is 5.1 percent higher than that from existing conditions. A stormwater management plan developed for the project suggests the use of a 21,400-square-foot vegetated conservation area on NPS property. The plan also calls for the use of three areas totaling 2,127 square feet for sheet flow treatment of nonrooftop runoff. These land areas are currently vegetated, and NPS has no plans to change the land use or remove vegetation. NPS's acceptance of this plan may be subject to the negotiation of a mutually acceptable memorandum of understanding with WSSC.

Alternative 5A1-modified would require trimming and loss of trees west and south of the Broad Creek WWPS compound on NPS property and would impact surface water. It would not affect public roadways, such as Livingston Road, for construction of the portion of the conveyance system augmentation project on NPS property. Alternative 5A1-modified would reduce impacts to the Broad Creek Historic District and to the scenic vista along Livingston Road when compared to Alignment A1/C1. Alternative 5A1-modified would reduce environmental impacts when compared with Alignment B1 by reducing tree clearing activity and minimizing surface water impacts

## **2.3 Alternatives Considered and Dismissed**

This section discusses alternatives that were dismissed from detailed studies during the early (conceptual engineering) study phase and presents the reasons behind each alternative's dismissal from further consideration.

### **2.3.1 Reduction of Infiltration and Inflow**

During rain events, groundwater pressure and surface water flow contribute volume to the sanitary sewer collection system; this is called Rainfall Dependent Infiltration and Inflow (RDII). RDII occur within the Broad Creek sewer basin into the collection system that delivers wastewater flows to the Broad Creek WWPS. Infiltration and inflow occur underground, where perched groundwater infiltrates into the sewer mains, as well as above ground, where surface flow during rain events or flood waters inundates and enters manholes that lack functional seals. WSSC examined the

possibility of conducting a comprehensive analysis and program to address Reduction of RDII, Alternative 1 in this EA.

In Alternative 1, RDII Reduction, WSSC would repair or replace about 55,000 linear feet of pipes in problem infiltration areas and replace about 448 manholes subject to inflow with sealed covers (off-vented above frequent flooding levels). NPS land in the vicinity of the Broad Creek WWPS would remain in its current condition, except if sewer main repair or replacement involved sections of pipe in close proximity to the Broad Creek WWPS, in which case there could be impacts during construction activity within the existing collection system right-of-way.

WSSC determined that this Alternative, RDII Reduction would remove only 1.5 million gallons per day if implemented. To comply with the consent decree, 16.3 million gallons per day would need to be mitigated through RDII. In addition, implementation of a full-scale study and program to address RDII at its sources would not be possible within the time constraints of the consent decree. Furthermore, total reduction in RDII would not be possible in some areas where flooding occurs because inundation causes manholes to experience unpreventable inflow. In short, reducing RDII sufficiently to prevent incoming sanitary waste volumes from exceeding the existing capacity of the Broad Creek WWPS is not feasible. Alternative 1 would not preclude SSOs.

Due to its failure to achieve the critical flow capacity (55 million gallons per day; 16.5 million gallons per day greater than the existing WWPS and conveyance system), WSSC and the NPS determined that this Alternative would not meet the requirements of the consent decree. In addition, Alternative 1 would not provide redundancy in the conveyance system between the Broad Creek WWPS and the Piscataway Creek WWTP. Therefore, this Alternative, RDII Reduction, would not meet project needs as a stand-alone alternative. However, WSSC plans to carry forward elements of this Alternative as a separate but related action.

**Reduction of Infiltration and Inflow  
Alternatives Not a Stand-Alone  
Solution (Advanced Separately)**

Sewer Repair, rehabilitation, and replacement (SR3), would alone reduce the volume of sanitary sewage at Broad Creek WWPS by about 1.5 million gallons per day. RDII alone would not nearly meet the order of the consent decree, precluding SSOs. However, great savings would be realized by eliminating inflow and infiltration volumes on a daily basis. Therefore, RDII upgrades will be advanced independently, as a separate but related action, and are programmed for completion, several years after conveyance system augmentation alternatives would occur. These actions would occur along the collection system north and east of the Harmony Hall site and would have negligible effects (as explained in text of subsection 2.3.2) on the park property.

Source: WSSC, 2010

### **2.3.2 Storage Technology at Broad Creek WWPS**

WSSC studied the possibility of using a storage reservoir or underground tank located at the Broad Creek WWPS to accommodate wet weather events that exceed peak capacity. WSSC determined that a storage reservoir or tank would not meet the project needs because it may not have the capacity to handle sustained flows in excess of moderately wet conditions over time. Therefore, SSOs would not be precluded during sustained periods of wet weather. Due to its failure to achieve the necessary flow capacity, WSSC and the NPS determined that Alternative 2A would not meet the requirements of the consent decree. Further, engineers did not believe that ground anchors could fully protect the tank from buoyancy failure problems that could occur when the tank is empty.

In addition, the on-site storage Alternative would require a large amount of land from the NPS property. The land downgradient from the Broad Creek WWPS contains extensive floodplains and pockets of wetlands. Because of the floodplains and wetland habitat near the Broad Creek WWPS, impacts greater than a half acre to both floodplains and wetlands were anticipated. This alternative would have also potentially resulted in an adverse impact on cultural resources.

Because Alternative 2A would not preclude SSOs or provide redundancy between the Broad Creek WWPS and the Piscataway Creek WWTP, it would not meet the established project needs. Furthermore, the environmental impacts would likely exceed those of other alternatives considered. Therefore, WSSC and the NPS dismissed this Alternative, Storage Technology at Broad Creek WWPS, from further consideration.

### **2.3.3 Storage Technology at Another Location**

WSSC considered installing a storage reservoir or underground tank located elsewhere in the Broad Creek basin for alleviating events exceeding peak capacity. However, WSSC determined that Alternative 2B, Storage Technology at Another Location, would not meet the project needs. Because its capacity could not achieve the critical flow capacity necessary to achieve the volumes stipulated by the consent decree, WSSC and the NPS determined that Alternative 2B would not meet the requirements of the consent decree. This option would require a force main, with associated impacts and costs, and would not meet the project need to preclude SSOs and provide redundancy for wastewater conveyance to the Piscataway Creek WWTP. In addition, Alternative 2B would introduce the need for air quality controls (scrubbers and odor control structures) and could therefore involve additional costs. WSSC and the NPS therefore dismissed this Alternative, Storage Technology at Another Location, from further consideration.

### **2.3.4 In-Line Storage Volume Addition**

Currently, the sanitary sewer pipes upgradient from the Broad Creek WWPS are at full capacity during wet weather events. WSSC studied the option of increasing the diameter of existing collection system sewers to provide increased capacity. However, WSSC determined that increasing the capacity of the piping would be costly and impractical. Additionally, it would not preclude SSOs during extreme storm events because the system flows by gravity to the Broad Creek WWPS. Adding volume to the piping would not significantly reduce the sustained rate of flow into the system during the sustained periods of wet weather that typically cause SSOs. Thus, Alternative 3, In-Line Storage Volume Addition, would not be able to preclude SSOs. Due to its failure to achieve the necessary flow capacity, WSSC and the NPS determined that Alternative 3 would not meet the requirements of the consent decree. WSSC and the NPS dismissed this Alternative, In-Line Storage Volume Addition, from further consideration because it would not meet the project needs of precluding SSO events and increasing redundancy to the Piscataway Creek WWTP.

### **2.3.5 Exclusive Pumping Station Pump Upgrades**

The existing 42-inch pressure line from the Broad Creek WWPS is sized to accommodate 38.3 million gallons per day; no appreciably greater flow volumes could be accommodated. Pumps beyond this capacity would be restricted by the friction loss in the narrow pipe at the pressures created by increased pump capacity, so the required flow volumes could not be achieved. Alternative 4, upgrades to the pumping station pumps, exclusive of improvements to the conveyance system, would not allow an appreciable capacity increase beyond its present 38.3 million gallons per day. Alternative 4 therefore would not meet the project needs of alleviating SSO

occurrences, adhering to the order of the consent decree, and providing redundancy in the conveyance system from the Broad Creek WWPS to the Piscataway Creek WWTP. Therefore, WSSC and the NPS dismissed this Alternative, only upgrading the pumping station, from further consideration during conceptual analysis as a stand-alone solution.

However, WSSC and the NPS determined that upgrades to the pumping station pumps, combined with improvements to the conveyance system, would serve as related components of a means to achieve the project needs.

### **2.3.6 Summary of Preliminary Conveyance System Augmentation Alternatives Dismissed from Consideration**

WSSC and the NPS determined that the no action alternative would not meet the project needs, because it would not eliminate SSOs, achieve the orders of the Consent Decree, or provide redundancy in the conveyance system. In addition, WSSC and the NPS determined that Alternatives 1 through 4 would not meet the project needs as stand-alone solutions. They were dismissed from consideration as stand-alone alternatives due to their inability to achieve project purposes and to meet project needs.

However, WSSC is moving forward to complete two components that were initially advanced as independent projects—RDII Reduction (Alternative 1) and Pumping Station Pump Upgrades (Alternative 4)—because these components have independent utility. Neither of these components, however, would meet the project needs alone, so WSSC and the NPS examined augmentation (expansion, additions, or other improvements) to the conveyance system from the Broad Creek WWPS to the Piscataway Creek WWTP as an alternative (Alternative 5). Several alignments and associated construction techniques were evaluated.

The redundant sewage conveyance system could follow a number of possible alignments or routes. Therefore, WSSC and the NPS conducted an analysis, aided by input received during public scoping meetings, to determine which route would reduce the impacts to natural, community, and cultural resources. The alignment of Alternative 5A1-modified is described above (Subsection 2.2.2) as the Preferred Alternative; the other alignments considered (and subsequently dismissed from further consideration) are described below.

### **2.3.7 Alternative 5A1/C1: Upgrades to Pumping Station Pumps and Conveyance System Augmentation (Access Driveway/Livingston Road) Eastern Alignment**

Force main Alignments A1 and C1 are identical on the NPS Harmony Hall property, but diverge about 0.2 miles south of the NPS property, at the Livingston Road/Fort Washington Road intersection. Force main Alignment A1 or C1 follows along the southern side of the access driveway from the Broad Creek WWPS to Livingston Road, then follows Livingston Road south (Figure 2-1, p. 22). Alternative 5A1/C1 would impact the historic scenic roadway (Livingston Road), and would

#### **Pump Upgrades Dismissed as a Stand-Alone Alternative, but Combined with Conveyance Augmentation Alternatives**

Upgrades to the pumping station pumps, along with improvements to the conveyance system would together allow a combined increase of effective capacity to 55.0 million gallons per day. This combination would meet the order of the consent decree, precluding SSOs, and would provide a redundant line to the Piscataway Creek WWTP. Therefore, pump upgrades were advanced independently, as a separate but related action, and are programmed for completion. But, without the conveyance system augmentation, the higher-capacity pumps would not achieve greater flows.

Source: WSSC, 2010

require the clearing of trees on NPS property within access easements along both the access driveway and Livingston Road for construction. Construction methods would include open trench, jack-and-bore, and microtunneling. Although it was compared to other alternatives during advanced preliminary analysis stages, this Alternative would impact scenic resources along a historic section of Livingston Road. Livingston Road is a scenic road, as defined by Prince George's County and therefore important to the cultural landscape of the Broad Creek Historic District including Harmony Hall. Livingston Road is also the primary roadway through the district, which is the county's first and oldest designated historic district, and therefore important to planned tourism. Investments in traffic calming measures have already taken place, including speed humps (Prince George's County DPW&T, 1995), which are intended to preserve the scenic country appeal of the road for the same reasons. Impacts by Alternative 5A1/C1 to the Broad Creek Historic District, and to lengthy and highly-visible naturally wooded portions of the cultural landscape along Livingston Road would have occurred. These impacts to the viewshed and cultural landscape would have been opposed by the county as well as the historic district commission, and could have an adverse effect that would have required Section 106 NHPA consultation with the State Historic Preservation Officer (SHPO). Section 106 of the NHPA requires consideration of alternatives to minimize impacts upon historic districts and structures, and cultural landscapes.

Engineering challenges were also posed by the eastern alignment. Horizontal drilling (known as jack-and-bore) would have required frequent construction pits along Livingston Road due to limitations on drilling distances imposed by the equipment, as well as the turn at the entrance driveway. Additionally, it was discovered that multiple buried utilities along Livingston Road might have contributed to requirements for additional clearing of roadside trees for relocation of those utilities. In addition, microtunneling would have been required at greater depths compared to Alternative 5A1-modified, due to topography. All of these challenges would have increased the cost of construction substantially, and resulted in additional environmental impacts.

WSSC and the NPS designed Alternative 5A1-modified as an avoidance alternative—that is, an alternative that would avoid the impacts to scenic Livingston Road and minimize impacts to Section 106 NHPA resources. Therefore, WSSC and the NPS dismissed this Alternative, the eastern alignment, from further consideration, in favor of Alternative 5A1-modified, which represented a minimization alternative for historic districts and structures, and an avoidance alternative for the cultural landscape.

### **2.3.8 Alternative 5B1: Upgrades to Pumping Station Pumps and Conveyance System Augmentation (Existing Conveyance Line) Valley Alignment**

As shown on Figure 2-1 (P. 23), Alignment B1 follows directly alongside the existing pressure line (force main) across the NPS property, and then follows the existing conveyance line through a stream valley beyond the NPS property, traveling south for some distance before following the existing conveyance line along Indian Head Highway (Md. 210) to the Piscataway Creek WWTP. The construction method would be open trench (cut and cover), because this is the only method available to follow the meandering alignment of the original (existing) conveyance line.

WSSC and the NPS dismissed this Alternative, the valley alignment, because of potential environmental impacts (construction within the Chesapeake Bay Critical Area, and along a forested stream valley) and constructability concerns.



## 2.4 Mitigation

Because any build alternative would not entirely avoid impacts to environmental resources, the NPS and WSSC have investigated both short-term and long-term measures to minimize and/or mitigate impacts to various resources. Table 2-1 in this section below lists the proposed mitigation actions to lessen the unavoidable impacts on regulated resources, specific to the Preferred Alternative, Alternative 5A1-modified. Identical, or in some cases similar, strategies would be used for other build alternatives, if another alternative other than Alternative 5A1-modified is selected.

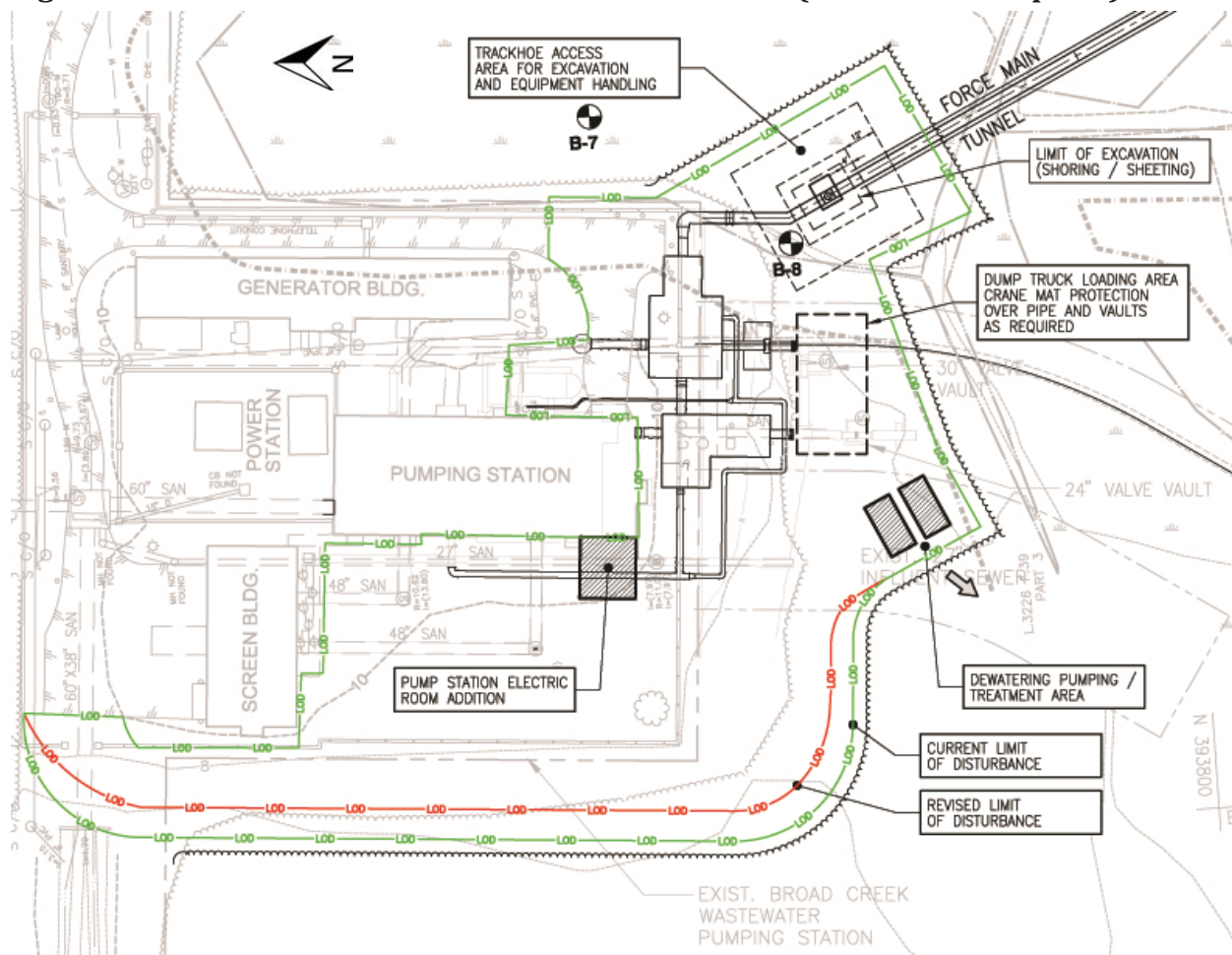
By building the tunnel using microtunneling technology, and by using the mitigation measures listed in Table 2-1, the environmental impacts of Alternative 5A1-modified would be minimized and generally limited to a relatively small limit of disturbance (LOD) when compared to other conveyance system alternative alignments.

During the environmental decision-making process, two minimization measures were studied in an effort to reduce impacts to trees (originally, 184 trees two inches and larger in diameter were identified in the LOD). One option was to examine possible use of the existing main entrance north-south driveway lane through the Broad Creek WWPS compound. This was investigated in an effort to determine if a majority of tree clearing west of and southwest of the compound might be avoided during construction – and would involve a more direct access route to the MTBM removal pit and permanent access vault. This option was found to not be feasible or practicable. The engineering reasons to begin with included the inability for truck turning movements and the lack of an adequate staging area on WSSC land in proximity to the construction work area. Furthermore, there would be concrete vaults on the south end of the compound (for both the existing and the proposed pressure mains) which are not capable of handling the loads imposed by heavy equipment such as loaded dump trucks and a crane needed to extract the MTBM. In addition, use of this option would not allow continuous access to the pump station building if construction vehicles were using or staged within the single lane that provides access to the pumping station building main entrance, which must be kept open at all times for operations and maintenance and emergency access. The lack of continuous access would create a risk of overflows in certain emergency situations if equipment were unable to use the main entrance to the pump station building (at the southeast portion of the compound; current end of the driveway), which was deemed unacceptable according to WSSC standards.

Therefore a second option, minimizing the impacts with a reduced LOD was studied. This measure involves reduction in the width needed for construction access between the north facility entry road, west of the Broad Creek WWPS. The original LOD concept called for two lanes; one for ingress and one for egress of construction equipment. The original plan was to have dedicated ingress and egress lanes, which would provide a clear path at all times for two-way traffic and would avoid any possibility of disruption in construction sequencing due to unloading/staged vehicles in the path of the haul truck sequencing. As a result of detailed study of this minimization option, it was determined that, although it could complicate construction and cause some minor delays, a single lane west access path would be sufficient. The reduced LOD would require a staging area for empty trucks within the LOD, and a turn-around area in the open land in the southwest portion of the WSSC compound (necessitating removal of a wall and fence). However, it is possible to reduce the construction access road to one lane using these techniques. This measure would reduce the initially assessed impact to trees by 55. Therefore, instead of impacts to trees being 184 trees required to be removed or trimmed, the minimized impact using the reduced LOD would be 129 trees impacted. Construction drawings would be modified to allow the reduced LOD to be implemented, during final design activities. Therefore, minimization measures will be implemented

for the Preferred Alternative to include reduction of the LOD to reduce the number of trees otherwise impacted. The following graphic illustration shows the conceptual reduction in portions of the LOD, with “revised LOD” being the new proposed extent of disturbance instead of “current LOD” lines which were previously proposed.

**Figure 2-2 Limit of Disturbance Reduction Illustration (Minimization Option)**



**Table 2-1: Mitigation**

Environmental Resource	Proposed Mitigation Action
Soils	<p>Best Management Practices (BMPs) including Erosion and Sedimentation Control (E&amp;SC) Measures to control erosion.</p> <p><b>For trenchless pipeline installation:</b></p> <ul style="list-style-type: none"> <li>- Minimize bare soil exposure.</li> <li>- Install silt fences on the downgradient side of any soil stockpiles.</li> <li>- Side-cast spoils on the upgradient side of trenches.</li> <li>- Control runoff and direct water away from stockpiles and earth disturbance.</li> <li>- Dewater excavations using standard sump pits and portable</li> </ul>

**Table 2-1: Mitigation**

Environmental Resource	Proposed Mitigation Action
	sediment tanks. - Temporarily stabilize disturbed soil surfaces with mulch within 14 days; and establish permanent stabilization soon after completion.
Water Quality	- Institute construction BMPs, such as E&SC measures mentioned above in Soils topic, but in this case to minimize sedimentation impacts to surface waters; and keeping spill prevention kits available at the construction site.
Hydrology	- Restore waterways to preconstruction conditions prior to concluding construction. Institute construction BMPs, such as erosion and sediment control (E&SC) measures to preclude sedimentation impacts to hydraulic stream conditions.
Topography	- Use standard WSSC sediment and erosion control practices to reduce erosion and prevent impacts.
Air Quality	- Mitigate fugitive dust by following construction BMPs (including E&SC measures), such as wetting construction areas during dry periods to prevent fugitive dust from entering the air.
Wetlands	- Provide appropriate mitigation of impacts to wetlands including applicable sections of the US Army Corps of Engineers umbrella permit conditions (dated May 8, 2012), Maryland Department of the Environment / Water Management Administration umbrella permit conditions (Permit # 11-NT-0366 / 201161493, dated May 7, 2012 and June 8, 2012), and other pending permit conditions as appropriate. - Compensation for wetlands on NPS Harmony Hall property as described in more detail in the attached Wetland Statement of Findings (Appendix D). - Use appropriate erosion and siltation controls during construction, including stabilization of all exposed soil or fill material at the earliest practicable date. - Waterways: Restore the stream (intermittent tributary to Broad Creek) to preconstruction conditions.
Floodplains	- See attached Floodplains Statement of Finding provided to the NPS Water Resource Division for review (Appendix D). WSSC would also consider the following National Flood Insurance Program construction criteria for minimizing flood damage: <ul style="list-style-type: none"> <li>○ Elevate critical functions above base flood elevation (not possible).</li> <li>○ Flood-proof facilities that would remain below base flood elevation (conveyance system and access vault would be watertight).</li> <li>○ Potentially anchor facilities at risk of movement during flood (conveyance system not at risk).</li> </ul> - Coastal zone management: No mitigation warranted.
Wildlife and Wildlife Habitat	- Terrestrial and aquatic habitat: Replant equal area of forest on-

**Table 2-1: Mitigation**

Environmental Resource	Proposed Mitigation Action
	<p>and off-site (see vegetation mitigation, below).</p> <ul style="list-style-type: none"> <li>- Forest: Determine appropriate mitigation for removal of 129 trees or less [67 trees or less (27.40-square-foot basal area) on NPS park property, excluding existing WSSC Right of Way] with input from the NPS Biological Resource Management Division (BRMD) and US Department of the Interior, including the following strategies as appropriate: <ul style="list-style-type: none"> <li>o Replanting onsite where archeology is not a concern and long-term access easement is not needed (as illustrated in Appendix D, page D16) except for a 12-foot buffer around the permanent access vault and sidewalk and currently mowed lawn areas, and/or</li> <li>o WSSC providing compensation payments to a designated account for restoration of natural landscapes and cultural landscapes. Compensation payments will be agreed to as a condition of the Right-of-Way permit requested by the WSSC from the NPS.</li> </ul> </li> <li>- Invasive species: Seed disturbed area with turf grass in areas to be maintained or with native wetland species certified free of nonnative invasive species.</li> </ul>
Vegetation	<ul style="list-style-type: none"> <li>- Minimize cutting trees whenever possible. This includes a reduced limit of disturbance discussed above as a minimization measure, when compared to the original LOD developed earlier in the design process.</li> <li>- Clearly note vegetation clearing limits on construction documents and mark them in the field to minimize disturbance and alteration of vegetation and wildlife habitat.</li> <li>- WSSC will pursue one or both of the following options to compensate the NPS for removal of a maximum of 67 trees (27.40-square-foot basal area maximum): <ul style="list-style-type: none"> <li>o Mitigate by planting trees on NPS NACE property</li> <li>o Mitigate with full compensation payments to allow NPS to restore natural and cultural landscapes. This will be calculated in an equitable and agreed-upon method stated in the separate correspondence as part of the Right-of-Way permit agreement issued by the NPS to the WSSC</li> </ul> </li> <li>- See also wetland mitigation; which includes an invasive species management plan within a forested wetland area as illustrated on page D16 in Appendix D of this EA.</li> </ul>
Protected Species and Habitat	<ul style="list-style-type: none"> <li>- Schedule tree clearing in late winter, when bird migration and breeding are not at their peak.</li> </ul>
Cultural Resources	<ul style="list-style-type: none"> <li>- Archeology: Protect soil from compaction by use of geotextile and rock blankets in construction work area and access road.</li> <li>- Follow these guidelines: If during construction, archeological resources are discovered, all work in the immediate vicinity of the discovery would be halted until the resources can be identified</li> </ul>



**Table 2-1: Mitigation**

Environmental Resource	Proposed Mitigation Action
	<p>and documented and an appropriate mitigation strategy developed. If necessary, consultation with the Maryland Historic Preservation Officer, NPS, and/or the NPS Regional Archeologist would be coordinated to ensure that the protection of resources is addressed. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlined in the <i>Native American Graves Protection and Repatriation Act of 1990</i> (25 USC 3001) would be followed.</p> <p>- Historic sites and districts, and cultural landscapes: No mitigation warranted.</p>
Visitor Use and Experience	<p>- Replant removed park trees in conjunction with NPS procedures and consultation between WSSC and NPS.</p> <p>- Conduct all construction activities (including hauling) during daylight hours to avoid loud and disruptive work at night.</p>
Human Health and Safety	<p>- Provide traffic control measures during construction.</p> <p>- Use proper handling procedures for the handling of hazardous materials during construction.</p>
Land Use	<p>- No mitigation outside of the parkland. Some wooded land on NPS Harmony Hall historic property must remain vegetated to allow stormwater to be passively distributed from areas of increased impervious surfaces—this is consistent with NPS plans for the area, which would be maintained in vegetation to allow the clean stormwater to infiltrate at the surface of the woodlands and transpire naturally.</p>

### 2.4.1 Environmentally Preferable Alternative

The NPS is required to identify the environmentally preferable alternative in its NEPA documents for public review and comment. The NPS—in accordance with U.S. Department of the Interior policies contained in the *Departmental Manual* (516 DM 4.10) and CEQ’s memorandum, *NEPA’s Forty Most Asked Questions* (CEQ, March 1981)—defines the environmentally preferable alternative (or alternatives) as the alternative that best promotes the national environmental policy expressed in NEPA Section 101(b) (see 516 DM 4.10). In its *NEPA’s Forty Most Asked Questions*, CEQ (1981, Question 6a) further clarifies the identification of the environmentally preferable alternative, stating “Ordinarily, this means the alternative that causes the least damage to the biological and physical environment; it also means the alternative which best protects, preserves, and enhances historic, cultural, and natural resources” (Q6a).

The environmentally preferable alternative is the alternative that causes the least damaging impacts to the biological and physical environment, and best protects, preserves, and enhances historic, cultural, and natural resources. WSSC and the NPS selected Alternative 5A1-modified, described above, as the environmentally preferable alternative because it best meets the definition established by CEQ. This action would supplement the Broad Creek WWPS improvements related to infiltration and inflow reduction and pump station upgrades, which alone cannot achieve the project needs. As a result of its long-term, beneficial impacts, and its minimization of adverse

impacts to historic resources and the natural environs compared to other conveyance system alignments, Alternative 5A1-modified, with the LOD reduction (minimization option for construction access) is the environmentally preferable alternative.

## 2.5 Summary of Impacts by Alternative

For the purpose of this Draft EA, two alternatives remain for consideration: (1) the no action or baseline alternative and (2) the environmentally preferable alternative which is also the Preferred Alternative, Alternative 5A1-modified. Table 2-2 provides a summary for comparison of these alternatives.

**Table 2-2: Summary of Impacts**

<b>Affected Resource</b>	<b>Impacts of No Action Alternative</b>	<b>Impacts of Preferred Alternative (Alternative 5A1-modified)</b>
Soils	No impact.	Minor, short-term adverse impacts to soils: compaction from heavy machinery, amount of soil disturbance and the potential for soil erosion resulting from the proposed actions.  Negligible, long-term adverse impact: 1% increase in impervious area (cumulative 4.4% increase in impervious surface runoff volumes when building expansion is taken into consideration).
Water Quality	Moderate, short- and long-term adverse impacts: occasional diluted SSOs.	Minor, short-term adverse impacts (during construction). Long-term beneficial impacts: elimination of diluted SSOs.
Hydrology	Negligible to minor, short- and long-term adverse impacts: occasional SSO flows.	Negligible short-term adverse impacts to waterway hydraulics and hydrology (during construction). Long-term beneficial impacts due to reduced solids and debris to overflow channel and the Broad Creek inlet.
Wetlands	Minor to moderate, short- and long-term adverse impacts to wetlands due to organic materials and debris associated with SSOs.  Minor to moderate, short- and long-term adverse impacts to wetland habitat due to occasional biochemical pollution (excess nutrients and debris) from SSOs which occur one	Minor, short- and long-term adverse impacts to wetlands: approximately 0.1 acre of wetland impacted by construction of the receiving shaft and access vault. Long-term beneficial impact by eliminating SSOs (excess nutrients and debris) to wetlands in the area of Broad Creek WWPS.  Minor, short-term adverse impacts to surface water: the construction of the receiving shaft and permanent access vault would disturb 11 linear feet of streambank and 124 square feet of streambed in the unnamed intermittent tributary of Broad Creek

**Table 2-2: Summary of Impacts**

<b>Affected Resource</b>	<b>Impacts of No Action Alternative</b>	<b>Impacts of Preferred Alternative (Alternative 5A1-modified)</b>
	<p>or more times per year, on average.</p> <p>No impacts to wetlands due to construction.</p>	<p>south of the Broad Creek WWPS.</p> <p>Long-term beneficial impacts to surface waters (Waters of the U.S.) due to elimination of SSOs.</p>
Floodplains	Negligible short- and long-term, adverse impacts due to continued SSOs.	Negligible to minor, adverse short- and long-term impacts to floodplains due to alterations of topography. Long-term beneficial impacts due to elimination of diluted SSOs during storm events.
Wildlife, and Wildlife Habitat	<p>Coastal Zones: Negligible short- and long-term, adverse impacts to coastal zones due to continued SSOs.</p> <p>Terrestrial Habitat: Negligible short- and long-term, adverse impacts to terrestrial habitat due to debris and excess nutrients from continued SSOs.</p> <p>Aquatic Habitat: Negligible short- and long-term, adverse impacts to aquatic habitat due to debris and excess nutrients from continued SSOs.</p>	<p>Coastal Zones: Short- and long-term, beneficial impacts to coastal zones.</p> <p>Terrestrial Habitat: Minor short- and long-term, adverse impacts to vegetation and terrestrial habitat; 0.4 acre of forest removed; 0.2 acre of mowed grasses disturbed.</p> <p>Aquatic Habitat: Short- and long-term, beneficial impacts to aquatic habitat; elimination of nutrients and debris from SSO events.</p>
Vegetation	<p>Vegetation: Negligible short- and long-term, adverse impacts to vegetation due to debris and excess nutrients from continued SSOs.</p> <p>Invasive Species: No impacts from invasive species.</p>	<p>Vegetation: Minor short- and long-term, adverse impacts to vegetation and terrestrial habitat; 0.4 acre of forest removed; 0.2 acre of mowed grasses disturbed.</p> <p>Invasive Species: Minor short-term impacts to indigenous species: potential for nonnative invasive species to re-colonize disturbed areas that would not be maintained into the future (adverse impact on indigenous species).</p>

**Table 2-2: Summary of Impacts**

<b>Affected Resource</b>	<b>Impacts of No Action Alternative</b>	<b>Impacts of Preferred Alternative (Alternative 5A1-modified)</b>
Protected Species and Habitat	<p>Golden and Bald Eagles: Negligible short- and long-term, adverse impacts due to continued SSOs within bald eagle sensitivity areas.</p> <p>Migratory Birds: Negligible short- and long-term, adverse impacts due to continued SSOs, with no likelihood of impacts to migratory bird species.</p>	<p>Golden and Bald Eagles: No impacts to bald eagle nesting sensitivity areas due to construction activities; and long-term beneficial impacts to bald eagles due to elimination of SSOs.</p> <p>Migratory Birds: Negligible short- and long-term, adverse impacts due to tree removal. Negligible short- and long-term, beneficial impacts due to elimination of SSOs.</p>
Cultural Resources	<p>Archeology: No short- and long-term impacts. Short- and long-term, beneficial impacts due to no disturbance of soil profiles in the proximity of the LOD.</p> <p>Historic Sites and Districts: Negligible short- and long-term, adverse impacts due to continued SSOs, which detract from the setting.</p> <p>Cultural Landscapes: Negligible short- and long-term, adverse impacts due to continued SSOs, which detract from the setting.</p>	<p>Archeology: Negligible long-term impacts to archeological resources. Minor cumulative, adverse impacts to archeological resources (potential for future construction) within the NPS property. Note that archeology would be addressed separately for Section 106 purposes for the balance of the alignment (outside of the NPS property) in other project segments between the Harmony Hall Regional Center construction work area and the Piscataway WWTP.</p> <p>Historic Sites and Districts: Negligible short-term, adverse impacts to historic resources: construction impacts to visual and auditory character. Negligible long-term, adverse impacts to historic cultural resources: permanent concrete pad and manhole cover (alteration of visual environment).</p> <p>Cultural Landscapes: Negligible short-term, adverse impacts to cultural landscape: construction impacts to visual and auditory character. Negligible long-term, adverse impacts: permanent concrete pad and manhole cover (alteration of visual environment of cultural landscape in immediate vicinity).</p>
Visitor Use and Experience	<p>Minor to moderate short- and long- term, adverse impacts due to SSOs.</p>	<p>Minor short-term, adverse impacts to visitor use and experience: construction activities and tree removal.</p> <p>Long-term, beneficial impacts to visitor use and experience: elimination of SSOs. Negligible to minor long-term, adverse impacts to visitor use and</p>



**Table 2-2: Summary of Impacts**

<b>Affected Resource</b>	<b>Impacts of No Action Alternative</b>	<b>Impacts of Preferred Alternative (Alternative 5A1-modified)</b>
		experience because of changed visual experience due to tree removal.  No impairment of park resources in any environmental resource category.
Human Health and Safety	Moderate adverse, short- and long-term impacts: no reduction in health risks associated with SSOs.	Beneficial, long-term impact to human health and safety: decrease in SSOs.  Beneficial, short-term impacts to human health and safety: construction activities.

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