Appendix E:

Statement of Findings

Statement of Findings for Floodplains and Wetlands

District of Columbia Water and Sewer Authority

Soapstone Valley Park
Sewer Rehabilitation

District of Columbia

Recommended: _____

Superintendent, Rock Creek Park (NPS) Date

Concurred: _____

Chief, Water Resources Division (NPS) Date

Approved: _____

Director, National Capital Region (NPS) Date

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1.0 INTRODUCTION

The proposed project, as described below, involves sewer rehabilitation on lands managed by National Park Service (NPS). As such, an Environmental Assessment (EA) has been prepared in accordance with NEPA (42 U.S.C. 4321 and 4331-4335) and implementing regulations, 40 Code of Federal Regulations (CFR) 1500-1508. In addition, this Wetland and Floodplain Statement of Findings (SOF) has been prepared to respond to NPS *Procedural Manual #77-1: Wetland Protection* and NPS *Procedural Manual 77-2: Floodplain Management.*

This SOF describes the three alternatives that were evaluated in the Environmental Assessment (EA) for the Soapstone Valley Park Sewer Rehabilitation project (proposed project); characterizes the wetland and floodplain resources that may be adversely impacted within NPS managed lands as a result of implementing the proposed project; describes adverse impacts that the proposed project would likely have on these resources; and documents the steps that would be taken to avoid, minimize and offset these impacts.

The proposed project's study area is generally located within and adjacent to Soapstone Valley Park, southeast of the intersection of Connecticut Avenue NW and Albemarle Street NW in the District of Columbia (District). The study area extends to Broad Branch Road NW, which demarcates the boundary between Soapstone Valley Park and Rock Creek Park. Soapstone Creek is the main tributary within Soapstone Valley Park and conveys flow east into Broad Branch, a tributary to Rock Creek **(see Figure 1)**. Soapstone Valley Park is about 24.6 acres (ac) and is a segment of the NPS Rock Creek Park system.

To support the evaluations presented within the EA and this SOF, wetland delineations were completed between December 2011 and January 2012; October 2014 and June 2015; and April 23, 2015 and June 23, 2015. After presenting the initial alternatives to the public, the project was delayed to reconsider project alternatives and further minimize potential project impacts. The proposed project's study area shifted accordingly, which necessitated additional field investigations.

Several construction methods and technologies were evaluated to identify acceptable approaches to meet the proposed project's purpose and need, described in greater detail below. Of these methods, the following were identified for inclusion within the EA and this SOF:

- No Action Alternative in which no repair, rehabilitation, or construction would occur;
- Trenchless Alternative, which involves repair and rehabilitation of existing assets (manholes and sewer pipes) utilizing trenchless technologies; and
- Reroute Alternative in which a portion of the sanitary sewer system components located within Soapstone Valley Park would be relocated outside of the Park.

1.1 WETLANDS

Executive Order 11990, "Protection of Wetlands", issued May 24, 1977, directs all federal agencies to avoid to the maximum extent possible the long- and short-term impacts associated with the occupancy, destruction, or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. In the absence of such

alternatives, agencies must modify actions to preserve and enhance wetland values and minimize degradation.

To comply with Executive Order 11990 within the context of the agency's mission, NPS has developed a set of policies and procedures found in *Procedural Manual #77-1: Wetland Protection* (NPS, 2016). These policies and procedures emphasize:

1) Exploring all practical alternatives to building on, or otherwise adversely affecting, wetlands;
2) Reducing impacts to wetlands whenever possible; and,
3) Providing direct compensation for any unavoidable wetland impacts by restoring degraded or destroyed wetlands on other NPS properties.

If a preferred alternative results in adverse effects to wetlands, a SOF must be prepared that documents the above steps and presents the rationale for choosing an alternative that would result in impacts to wetland resources. This SOF addresses wetlands within Soapstone Valley Park boundaries that would be affected by the proposed project.

1.2 FLOODPLAINS

Pursuant to Executive Order 11988, "Floodplain Management", and the NPS *Procedural Manual 77-2: Floodplain Management* (NPS, 2003), NPS has evaluated flooding hazards related to the proposed project. This SOF describes the No Action and Action Alternatives, project site, floodplain determination, use of floodplain, investigation of alternatives, and mitigation for the continued use of facilities within the floodplain.

1.3 PURPOSE AND NEED

The proposed project involves sewer infrastructure within Soapstone Valley Park. This infrastructure is part of a larger sewershed that extends beyond Soapstone Valley Park that collects sanitary sewer flow and eventually drains east towards Rock Creek, where it is then conveyed to the Rock Creek Pumping Station and ultimately to the Blue Plains Advanced Wastewater Treatment Plant. The existing sewer pipes were constructed with vitrified clay pipe (VCP) and reinforced concrete pipe (RCP), while the manholes were primarily made of brick. Construction of the sewer pipes was completed in 1907 and 1908, making them over 100 years old. The estimated service life of VCP is approximately 75 to 100 years, while the estimated service life of RCP is 50 years. Therefore, sewer pipes not previously rehabilitated within Soapstone Valley Park have exceeded their maximum service life.

The District of Columbia Water and Sewer Authority (DC Water) is responsible for operating and maintaining the existing sanitary sewer system serving the District. The Soapstone Valley Park sewer system improvements were identified as a Capital Improvement Program project in DC Water's Sewer System Facilities Plan (June 2009). The sewer system was assessed in the spring of 2011 using Closed Circuit Television (CCTV) cameras showing that the existing sewer pipes and manholes exhibited structural deficiencies throughout the majority of the system. Typical defects include pipe segments and manholes with cracks, fractures, holes, and root growth inside the pipe, as well as exposed pipes and manholes in natural stream beds. In addition to the sanitary

sewer deficiencies, two Municipal Separate Storm Sewer System (MS4) outfalls located in the Park are in disrepair and are contributing to water quality degradation. These two outfalls are required to be repaired and rehabilitated under the District's MS4 permit.

The Soapstone Valley Park sewer system crosses Soapstone Creek at multiple locations. Over time, portions of the buried sewer pipe crossings as well as manholes have been exposed by erosion caused by stream flows and surface runoff. The areas of exposed sewer pipes and manholes within waterways make them susceptible to structural failure abrasion, loss of joint support, and collision with objects flowing swiftly downstream during high flows.

Due to the Soapstone Valley Park sewer system's current state of disrepair, as stated above, the project purpose was then defined as follows:

- To repair, rehabilitate, improve, and/or replace aging sewer infrastructure within the Soapstone Valley sewer system while maintaining the functions of and limiting disturbance within the Soapstone Valley Park;
- To improve structural integrity of the sewer infrastructure, while maintaining adequate hydraulic capacity;
- To reduce stream and groundwater infiltration into the sewer system and reduce potential for sewer overflows;
- To eliminate exposed pipes and manholes to the greatest extent possible; and,
- To meet the regulatory requirements of the District's MS4 permit, including moderating stormwater volumes and velocities, reducing erosion, and filtering pollutants by groundwater infiltration.

Upon defining the purpose for the proposed project, the project needs were then determined. The following are required to meet the proposed project purpose:

- Repair or rehabilitate approximately 6,100 linear feet (LF) of sanitary sewer pipe (2,945 LF of which is located on NPS property);
- Repair or rehabilitate approximately 30 sanitary sewer manholes (14 of which are located on NPS property); and,
- Repair two stormwater outfalls as required in the District's MS4 permit.

2.0 ALTERNATIVES CONSIDERED

As mentioned above, three alternatives were evaluated in the Draft EA: the No Action Alternative, the Trenchless Alternative, and the Reroute Alternative. The Reroute Alternative is not discussed in this document as it was determined not to be the preferred alternative in part due to the construction and operation of a pump station, including a permanent stream crossing necessary for daily pump station access. On June 23, 2016, NPS concurred with DC Water's selection of the Trenchless Alternative as the preferred alternative for the project.

2.1 ALTERNATIVE 1: NO ACTION ALTERNATIVE

The existing sanitary sewer pipes traverse approximately 1.7 miles within Soapstone Valley Park and surrounding areas. There are four exposed stream crossings and 14 defective manholes on NPS property. The No Action Alternative (Alternative 1) assumes that no improvements would be made to the existing sewer infrastructure. This alternative represents the existing condition, which includes the Soapstone Valley Park sanitary sewer pipes and manholes in varying stages of dilapidation; exposed sewer pipes and manholes; and stormwater outfalls in need of repair and rehabilitation. Although the sewer system would continue to degrade, the No Action Alternative represents current conditions.

The No Action Alternative assumes the following:

- No right of entry would be granted to the applicant;
- No sanitary sewer pipes or stormwater facilities would be installed;
- No existing sanitary sewer pipes, manholes, or stormwater facilities would be replaced or rehabilitated; and,
- No new construction activity associated with sewer infrastructure repair or rehabilitation would take place.

The No Action Alternative would not be in compliance with the District's MS4 permit, and the aging sanitary sewer system would pose potential health and safety risks as a result of potential sewer breaks or overflows.

2.2 ALTERNATIVE 2: TRENCHLESS ALTERNATIVE (DC WATER'S PREFERRED ALTERNATIVE)

Under the Trenchless Alternative (Alternative 2), the sewer system would be rehabilitated in place and would include the following components:

- Rehabilitating existing sewer pipes using trenchless technologies;
- Repairing 14 existing manholes;
- Protecting existing assets (sewer pipes or manhole) and implementing streambank stabilization in select locations; and,
- Repairing and rehabilitating two MS4 outfalls.

The limit of disturbance (LOD) for the Trenchless Alternative is shown as the study area on **Figure 1**.

Trenchless Pipe Rehabilitation

Approximately 6,100 LF of sanitary sewer pipe infrastructure within the Soapstone Valley sewer system would be rehabilitated using trenchless technology, of which 2,945 LF are located on NPS property in Soapstone Valley Park. Cured-in-Place Pipe (CIPP) is a trenchless rehabilitation technology that involves the insertion of a resin-impregnated felt lining inside the existing, or host, pipe. This lining is then cured in place using either water or steam, becoming a monolithic structural entity on its own. CIPP would be the trenchless technology used for the Trenchless Alternative and its life expectancy is approximately 75 years. With this technology, most construction activity occurs at existing manholes. Given the site constraints in the study area, construction of access paths to certain manholes would be necessary. The anticipated construction sequence is as follows:

- Clearing along access paths
- Installation of mulch matting along access paths
- Installation of bypass pumping equipment at manholes downstream and upstream of the project area
- Sewer pipe cleaning, which requires access for water jetting and closed-circuit television trucks
- Installation and sealing of cured-in-place liner, which requires access with a refrigerated delivery truck and boiler truck
- Site restoration

Four vehicular access path entrances into the Park would provide sufficient access to rehabilitate the sewer pipes. These access paths would be identified as Heavy Equipment (HE) paths to support the trenchless pipe rehabilitation in areas where construction activities would require larger construction vehicles and/or equipment. These HE paths would be typically 16-feet wide and would employ a minimum 12-inch thick layer of wood chip mulch matting with an additional 6-inch minimum thick 3-ply hardwood construction mat above the mulch mat, which provides protection to root zones and stream buffers within NPS property. The HE paths would be bordered by super silt fencing to reduce offsite runoff and erosion. Most of the access road prisms will be in upland areas. Access path LOD shown on **Figure 1** are approximately 20 feet wide, which is wider than the actual width of HE paths. The actual HE paths must fit within the shown LOD; the LOD includes a buffer for the contractor to slightly maneuver the paths to minimize environmental impacts during construction. At some locations within the Park, the access path LOD is larger than the 20-foot corridor to allow for vehicle maneuvering and turnarounds.

One HE path between Sites 1 and 2 would cross an ephemeral tributary (WL063) but will allow for the maintenance of surface flow from the vegetated wetland (WP003) north of the path to Soapstone Creek. In addition to the HE access paths, walk-in paths would also be used to support activities that do not require vehicle access, but rather would use wheelbarrows and other walk-behind equipment. No access paths or other portions of the LOD encroach upon vegetated wetlands.

The CIPP liner must be installed with no sewer flow present within the host pipe. As a result, bypass pumping would be provided as needed to maintain uninterrupted sewer service during construction. Bypass pumping would be installed at manholes upstream of the installation, and flow would be carried to a manhole downstream of the installation via temporary hoses and/or pipes. Once construction is completed, the temporary bypass operation would be removed, and standard gravity flow would be returned to the newly rehabilitated system. The riverine wetland (stream channel) would not be disturbed by bypass pumping activities.

Manhole Repair

There are approximately 30 sanitary sewer manholes associated with the proposed project that require repair, 14 of which are located on NPS property. Most of the manhole rehabilitation work would be completed without the need for vehicle access. Most construction activities would be accomplished by walking materials to the site along the existing trails or via the walk-in paths. Those areas are identified on **Figure 1** as Walking Paths. Walking Paths would not require clearing or the installation of mulch mats and would generally follow existing Park trails.

Asset Protection and Erosion Prevention

Asset protection would be provided at six locations with exposed sewer assets (e.g., pipes and manholes), four of which are located on NPS property. These areas are identified as Asset Protection Sites 1-4 **(see Figure 1)**. The asset protection areas currently have a higher risk of structural damage and/or deformation, as well as groundwater or stormwater infiltration. Asset protection would preserve structural integrity of the sewer pipes and/or manholes. The four areas would protect five manhole exposures and five pipe exposures. Specifically, Site 1 would protect two exposed manholes and two pipe exposures, and Sites 2, 3, and 4 would protect one manhole and one pipe exposure each (see Wetland Impact Plates in **Appendix C**).

In conjunction with the asset protection measures, bank stabilization would be employed to protect the Soapstone Creek streambed (WL001) and a tributary (WL010) from scour and the stream banks from soil loss. The confluence of an additional tributary (WL005) with Soapstone Creek would be affected by the proposed bank stabilization at the downstream end of Site 4. Protection of the streambank from soil loss would further protect DC Water's sewer assets by avoiding exposure from continuing erosion and, in some locations, would stabilize Park trails. Protective methods used at each location would vary. The general asset protection methodology is as follows:

- For exposed pipes, each site would require a minimum of 12 inches of cover over the pipe to be provided by existing pipe encasement and stone used to create the constructed riffle within the stream to ensure its long-term protection. To achieve this level of cover while maintaining stream competence, it is sometimes necessary to elevate the streambed upstream.
- For exposed pipes, cascades would be located at the end of the riffle, approximately 10 feet downstream of the pipe crossing, to provide grade control. These cascades would connect the proposed stream channel invert at the pipe crossing to the existing stream channel invert. Due to their short, steep nature, rock cascades require shorter lengths of in-stream grading than other asset protection techniques.

- For exposed manholes, each site would be protected by an imbricated rip-rap wall made of large, stacked rocks to shield manholes from debris and erosion. Imbricated walls provide erosion protection within a small footprint.
- For each asset protection location, bank stabilization measures would be applied including gradually tying embankments back into existing grade to prevent downstream scour, utilizing cascades to reconnect channels, utilizing stone for stability, and vegetating disturbed banks.

Notably, in order to achieve the 12 inches of cover over the pipe at Asset Protection Site 1 that crosses Soapstone Creek while maintaining stream competence to move sediment and avoid aggradation, the grade of the streambed would be elevated beginning 250 to 300 feet upstream of Site 1. The total area of riverine wetland impact for Asset Protection Site 1 is 0.53 acre. There is no other practicable long-term engineering solution that would reduce the size of the impact area and provide the 12 inches of cover over the pipe.

The LOD of the proposed project includes areas for construction materials and equipment storage and staging for asset protection; however, no storage or staging of materials would occur within wetlands. The LOD encompasses discrete segments of riverine wetland (stream channel) where outfall repair and rehabilitation, asset protection, and streambank stabilization are proposed. Primary access to the asset protection locations would be provided via the four access paths used for the trenchless pipe rehabilitation. These paths are primarily through uplands. Additional HE access paths would be necessary to connect the primary access paths to the asset protection areas. Workers would utilize access paths to bring in necessary equipment. Temporary bypass pumping equipment required to manage the streams clear water flow would be installed and would be comprised of the following:

- Sand bag dikes (coffer dams) at the upstream and downstream limits of the work area;
- Clear water diversion pump with flexible pipe to route water around the work area; and,
- Dewatering pump with flexible pipe and filter bag used to remove water from active work areas, filtering sediment before discharging back into the stream.

The bypass would maintain the clear water flow within the creek, while creating a temporarily dry condition to install the asset protection features. Upon completion of each work day, the bypass would be removed at each location and flow would be directed back into Soapstone Creek.

MS4 Outfall Rehabilitation

In January 2012, the US EPA issued National Pollutant Discharge Elimination System (NPDES) Permit No. DC0000221, which requires the repair and rehabilitation of stormwater outfalls contributing to water quality degradation within the District's MS4 system. There are two listed outfalls within the Soapstone Valley Park, Outfall F-117 and F-140, that require repair and rehabilitation **(see Figure 1)**.

MS4 Outfall F-117

MS4 Outfall F-117 is listed in the *DC Water MS4 Permit Outfall Repair Schedule and Report* (prepared by DC Water, December 2012) and has a large fracture in the crown of the pipe, a broken security gate, and evidence of scour under the outfall spillway. In addition, extensive slope erosion

of the banks surrounding the outfall to the north and east is visible, which affects water quality at the outfall and poses public safety and natural resource degradation concerns. Three areas comprise the MS4 Outfall F-117 repair and rehabilitation, located at Site 1 **(see Figure 1)**.

- Albemarle Street Regrading Area – The existing material placed to stabilize the eroded section of the slope would be removed. A water quality catch basin would be installed on the south side of Albemarle Street NW. The existing sidewalk would be extended to provide a scenic overlook area into Soapstone Valley Park. South of the overlook, the existing slope would be regraded and reinforced with a geocell stabilization system and vegetative plantings. The grading between Albemarle Street NW and the reinforced slope would be oriented north towards Albemarle Street NW. No wetlands would be disturbed in this area.
- Soapstone Trail Regrading Area – The existing Soapstone Trail would be regraded such that stormwater would be directed to the east, away from the Park. A new swale would be constructed on the eastern side of the trail that would divert stormwater and runoff to a culvert installed under the trail. The culvert would discharge on the west side of the trail on to rock cascade channel that would replace the existing wooden stabilization structures. No wetlands would be disturbed in this area.
- MS4 Outfall F-117 Area – Fifty feet of the exposed outfall structure would be removed, eliminating the scour beneath the outfall lip by cutting the pipe back to discharge at grade **(see Appendix C)**. Any remaining fracture in the existing pipe would be repaired by placement of cementitious grout or structural epoxy. A new headwall and gate would be installed. The repaired and rehabilitated outfall would then discharge onto a proposed rock cascade structure, leading to an existing plunge pool downstream of the cascade. This proposed work would impact Soapstone Creek (WL001), which flows from the outfall structure, and a small ephemeral tributary (WL018) that converges with Soapstone Creek just west of the outfall. However, the proposed outfall work would daylight an additional 50 feet of Soapstone Creek and stabilize the lower portion of the tributary.

MS4 Outfall F-140

The second MS4 Outfall that requires repair and rehabilitation is Outfall F-140, which is an existing stormwater outfall at the south end of Linnean Avenue NW with active erosion. This area collects stormwater runoff from Linnean Avenue and conveys flow down the slope leading to Soapstone Valley Park and, ultimately, Soapstone Creek. It discharges stormwater approximately 200 feet south of the terminus of Linnean Avenue NW.

Outfall F-140 is within District Department of Transportation (DDOT) right-of-way, and given its criticality and severe erosion issues, DDOT entered into an agreement with the District Department of Energy and Environment (DOEE) to repair the outfall. This has resulted in the design and construction of a Step Pool Stormwater Conveyance (SPSC) that replaced portions of the defective stormdrains to limit the erosion potential of the slope close to the NPS property line. SPSCs are comprised of a series of shallow aquatic pools, riffle grade controls, native vegetation, and underlying sand and woodchip beds to treat, detain, and convey stormwater flow. Elements of the final design of the Soapstone Sewer Rehabilitation project (Site 4) include the design of two step pools and a cascade that connects flow from an existing SPSC designed and constructed by others to Soapstone Creek. A portion of the existing floodplain and relic channel would be left in place between the existing and proposed work. The two step pools would be located just outside of NPS property; the cascade would be the only portion of this component of the proposed project that

would take place on NPS land. The existing trail will cross this cascade with stepping stones **(see Appendix C)**. The cascade downstream of the two proposed SPSCs would impact an intermittent tributary (WL010), which flows from the outfall area to its confluence with Soapstone Creek within the proposed outfall repair and rehabilitation area. The proposed work would stabilize the streambed of the tributary and stabilize the steep streambanks. The confluence of another intermittent tributary (WL005) with Soapstone Creek also falls within the proposed work zone associated with Outfall F-140 and would primarily incur temporary impacts from construction activities, with a minor of long-term impact associated with the stabilization activities.

Primary access to the MS4 repair and rehabilitation locations would be from one of the four entrance access paths used for the trenchless pipe rehabilitation, as described above. To minimize the need for additional access paths within the Park, construction equipment access to Outfall F-117 would be provided by utilizing the LOD for Asset Protection Site 1.

3.0 SITE CONDITIONS

Soapstone Valley Park is a west to east flowing stream valley bordered to the north and south by urban terraces. The valley starts near the intersection of Albemarle Street NW and Connecticut Avenue NW at an elevation of approximately 230 feet North American Vertical Datum of 1988 (NAVD88) and descends to an elevation of approximately 75 feet at the confluence with Broad Branch about one mile to the east. The valley walls are moderately steep to steep with slopes in some places approaching 30 percent (USGS, 2011).

The *Soil Survey Geographic (SSURGO) Database for Washington, DC* (Soil Survey Staff, 2012) indicates that the soils in the study area are generally sandy, rocky, and well drained. Valleys between hillsides are well formed, allowing for rapid runoff from the surrounding steep terrain. Predominate soils in the study area are Brandywine soils which are found on steep slopes and are excessively drained. Most soil associations in the study area contain a significant urban land (Ub) component. Ub consists of areas that are occupied by buildings or infrastructure and the soil materials around these areas contain fill materials used to support structures. This fill material generally consists of parent soil material from the surrounding area that is mixed with construction and demolition debris (DDOE, 2010). None of these soil series are hydric, which are soils that are formed under wet or sufficiently wet conditions.

Dominant tree species found throughout the study area include tulip poplar (*Liriodendron tulipifera*), American beech (*Fagus grandifolia*), white oak (*Quercus alba*), and northern red oak (*Quercus rubra*), with tulip poplar as the most abundant species. Co-dominant tree species include green ash (*Fraxinus pennsylvanica*). Common understory species include boxelder (*Acer negundo*), winged burningbush (*Euonymus alatus*), Asiatic bittersweet (*Celastrus orbiculatus*), and slippery elm (*Ulmus rubra*). Common herbaceous species include fig buttercup (*Ranunculus ficaria*), English ivy (*Hedera helix*), Japanese honeysuckle (*Lonicera japonica*), Asiatic bittersweet, grass species (Poaceae spp.), raspberry species (*Rubus* spp.), and Christmas fern (*Polystichum acrostichoides*). Nonnative invasive species were found throughout the study area, occurring more heavily in the herbaceous strata. Asiatic bittersweet vines have grown into the canopy of a small percentage of dominant tree species. Evidence of mechanical efforts to control vine species infestations were observed. Nonnative species found within the understory include Asiatic bittersweet and winged burningbush. Nonnative species found within the herbaceous layer include Asiatic bittersweet, fig buttercup, English ivy, and Japanese honeysuckle.

The wetlands and waterways were delineated according to the *Corps Manual* (Environmental Laboratory, 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region Version 2.0* (USACE, 2012) and represent those areas that are within the regulatory jurisdiction of the US Army Corps of Engineers (USACE) and/or District Department of the Environment (DDOE). Also, as stipulated in *Procedural Manual #77-1: Wetland Protection* (NPS, 2012), NPS uses *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al., 1979) as the standard for defining, classifying, and inventorying wetlands. Therefore, wetlands and waterways (riverine wetlands) were also delineated in accordance with the Cowardin System. Under the Cowardin definition, a wetland must have one or more of the following three attributes, not to be misinterpreted as a one-parameter approach:

1. At least periodically, the land supports predominantly hydrophytes (wetland plants);
2. The substrate is predominantly undrained hydric soil; and,
3. The substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season.

The *National Wetland Inventory* (*NWI*; USFWS, 2002) does not identify any wetlands or waterways in the overall study area; however, the National Capital Planning Commission – District of Columbia Department of Public Works (DC DPW, 2006) identifies one waterway system (Soapstone Creek) within the study area **(see Figure 3.1)**. The *National Flood Hazard Layer* (FEMA, 2015) indicates a 100-year floodplain along both Soapstone Creek and Broad Branch within the study area **(see Figure 3.2)**.

Wetland and waterway delineations were conducted between December 2011 and January 2012; October 2014 and June 2015; and April 23, 2015 and June 23, 2015 to confirm the presence and extent of previously documented and undocumented wetlands that are located within the proposed project's study area.

Fieldwork was directed by Ms. Kate Traut, a Professional Wetland Scientist (PWS) in good standing, who has over eleven years of experience with wetland delineation and regulatory permitting. Ms. Traut received wetland delineation training from the Wetland Training Institute and from regional hydric soils and hydrophytic vegetation experts with the US EPA, United States Department of Agriculture – Natural Resource Conservation Service (USDA-NRCS), and North Carolina State University. Ms. Nikki Radke was the technical field lead for the project. She received a certificate in wetland delineation and has nine years' experience delineating wetlands.

On NPS property, one perennial riverine wetland, seven intermittent riverine wetlands, and two ephemeral channels were identified during field investigations, as well as one forested wetland **(see Figure 3.3)**. The results of the wetland investigation are documented in the *Wetland Investigation Report: Sewer Rehabilitation Projects at Soapstone Valley and Glover Archbold Foundry Branch Parks Washington, DC* (Straughan Environmental, 2015). These systems are part of the larger complex of Rock Creek Park, an extensive forested area that extends from the outer reaches of Northwest DC, south to the Potomac River.

4.0 DESCRIPTION OF WETLANDS & FLOODPLAINS WITHIN THE STUDY AREA

Descriptions of the vegetated and riverine wetlands and associated floodplains identified during the field investigations are presented below. **Figure 3.3** depicts the delineated wetlands.

4.1 WETLANDS

Riverine Wetland WL001 (Soapstone Creek) is a riverine, upper perennial, rock bottom, bedrock (R3RB1) waterway that measures 3,160 LF on NPS property and is located in Soapstone Valley Park. This system is on average approximately 30-feet wide and was flowing during the field investigation. As the primary system within the project area, WL001 receives hydrology from all other riverine wetlands and ephemeral channels delineated within the Park and is a tributary to WL006 (Broad Branch).

Vegetated Wetland WP003 is a palustrine, forested, broad-leaved deciduous, temporarily flooded (PFO1A) wetland that is located just outside of the Trenchless Alternative LOD. Wetland WP003 is in the western portion of Soapstone Valley Park, approximately 168 feet southwest of the western terminus of Audubon Terrace NW. The wetland receives flow from Waterway WL017, which forms a small pool at the base of the slope of the waterway. Wetland WP003 drains to Waterway WL001 via Waterway WL063. During the drier seasons, flow infiltrates into the soil approximately 30 feet before connecting with Waterway WL001. The wetland is bounded on all sides by forested land. **Table 4.1-1** provides a more detailed summary of Wetland WP003.

TABLE 4.1-1
CHARACTERISTICS OF VEGETATED WETLAND WP003

Indicator	Status
Classification	Palustrine, forested, broadleaf deciduous, temporarily flooded (PFO1A)
Hydrology	Surface water, high water table, saturation, water-stained leaves
Hydrophytic Vegetation [Dominant Species]	Prevalence Index = 2.9 [tulip tree, American beech, boxelder, northern spicebush (*Lindera benzoin*), tussock sedge (*Carex stricta*), and garlic mustard (*Alliaria petiolata*)]
Hydric Soils	Problematic hydric soils protocol for seasonally ponded soils

Riverine Wetland WL005 is a 13-LF segment of riverine, intermittent, rock bottom, bedrock (R4RB1) waterway that is located in the eastern portion of Soapstone Valley Park, approximately 230 feet southeast of Linnean Avenue NW. WL005 is approximately 3 feet wide and was flowing at the time of the investigation.

Riverine Wetland WL010 is a riverine, intermittent, rock bottom, bedrock (R4RB1) waterway that is located in the eastern portion of Soapstone Valley Park, south of Linnean Avenue NW. Approximately 34 LF of WL010 occurs on Park property. The system is on average approximately 18-feet wide and was flowing at the time of the investigation.

Riverine Wetland WL015 is a 44-LF segment of riverine, intermittent, rock bottom, bedrock (R4RB1) waterway that is located in the central portion of Soapstone Valley Park, approximately

222 feet southeast of the intersection of Audubon Terrace NW and 29th Street NW. WL015 is on average approximately 8 feet wide and was flowing at the time of the investigation.

Riverine Wetland WL016 is a 75-LF segment of riverine, intermittent, rock bottom, rubble (R4RB2) waterway that is located in the central portion of Soapstone Valley Park, approximately 300 feet west of the intersection of Audubon Terrace NW and 29th Street NW. WL016 is on average approximately 6 feet wide and was flowing at the time of the investigation.

Riverine Wetland WL017 is a 148-LF segment of riverine, intermittent, rock bottom, bedrock (R4RB1) waterway that is located in the western portion of Soapstone Valley Park, approximately 60 feet west of the west terminus of Audubon Terrace NW. WL017 is on average approximately 3 feet wide and was flowing at the time of the investigation.

Riverine Wetland WL018 is an ephemeral channel that measures 85 LF and is in the western portion of Soapstone Valley Park, approximately 85 feet south of the intersection of Albemarle Street NW and 32nd Street NW. WL018 is on average approximately 6 feet wide and was not flowing at the time of the investigation.

Riverine Wetland WL063 is an ephemeral channel that measures 70 LF and is located at the west end of Soapstone Valley Park, approximately 264 feet southwest of west end of Audubon Terrace NW. WL063 is approximately 2 feet wide and was flowing at the time of the investigation; however, previous investigations and informal comments from a regular trail user suggest this flow pattern may be atypical.

Riverine Wetland WL064 is a 73-LF segment of riverine, intermittent, rock bottom, rubble (R4RB2) waterway that is located at the west end of Soapstone Valley Park, approximately 400 feet southwest of Audubon Terrace NW/29th Street NW intersection. The waterway is approximately 6 feet wide and receives flow from upland runoff and seasonal groundwater. The waterway was flowing at the time of the investigation.

Riverine Wetland WL065 is a 4-LF segment of riverine, intermittent, rock bottom, bedrock (R4RB1) waterway that is located at the east end of Soapstone Valley Park, approximately 420 feet northeast of the Linnean Ave NW/Lenore Lane NW intersection. WL065 is approximately 5 feet wide and receives flow from upland runoff and seasonal groundwater. The waterway was flowing at the time of the investigation.

4.1.1 WETLAND FUNCTIONS AND VALUES

An assessment of wetland functions and values was conducted as described in the September 1999 supplement to *The Highway Methodology* Workbook (Supplement) by the New England Division of the USACE (USACE, 1999). This methodology is commonly referred to as the "New England (NE) Method." The NE Method is an expansion of the Highway Methodology (developed by the New England USACE District) and is geared towards linear projects to determine acceptable wetland mitigation. The NE Method uses a descriptive approach to characterize functions and values of wetlands and is typically used for projects that must comply with the National Environmental Policy Act of 1969. This method was therefore considered appropriate for Soapstone Valley Park. The data requirements for the NE Method are minimal and require general

descriptions of the wetlands. Quantitative techniques for this method are primarily based upon best professional judgement by a consensus of an interdisciplinary team.

Riverine Wetland WL001 (Soapstone Creek) and its perennial and intermittent tributaries within the LOD (WL005, WL010, WL015, WL016, WL017, WL064, and WL065) receive hydrology from upstream flow, upland runoff, and groundwater. The ephemeral tributaries (WL018 and WL063) receive hydrology from upstream flow and/or upland runoff. The principal function for these riverine wetlands and ephemeral channels is conveyance of surface water, with groundwater discharge as an additional principal function for the perennial and intermittent systems. Wildlife habitat, uniqueness/heritage, and visual quality/aesthetics are identified as primary values.

Vegetated Wetland WP003, a forested wetland, receives hydrology from an intermittent waterway (WL017) that may, in turn, receive stormwater runoff from a nearby road. Its principal function is to retain sediments and/or toxicants, with uniqueness/heritage as its primary value.

A more detailed Functions and Values assessment of the wetlands delineated within the Trenchless Alternative can be found in **Table 4.1-3**. Wetland functions and values datasheets can be found in **Appendix A**.

TABLE 4.1-3
FUNCTIONS AND VALUES OF WETLANDS

	Vegetated Wetland WP003	Riverine Wetland WL001 and Tributaries
Functions		
Groundwater Recharge/discharge		X*
Flood Flow Alteration	X	
Fish and Shellfish Habitat**		
Sediment/Toxicant Retention	X	
Nutrient Removal	X	
Production Export		X
Sediment/Shoreline Stabilization		
Values		
Wildlife Habitat		X
Recreation		X
Educational/Scientific Value		X
Uniqueness/Heritage	X	X
Visual Quality/Aesthetics		X
Endangered Species Habitat		
Other		X (Function: Conveyance of surface water)

* Not applicable to ephemeral channels
** NPS has previously confirmed that no fish have been observed in WL001.

4.1.2 RIVERINE WETLAND FUNCTIONAL ASSESSMENT

A functional uplift assessment was conducted for the segments of Riverine Wetland WL001 (Soapstone Creek) that are proposed for asset protection, bank stabilization, and outfall repair and rehabilitation as part of the Trenchless Alternative. These areas are identified as Sites 1 through 4 **(see Figure 1)**. Each site is a segment of Soapstone Creek (WL001). Sites 1 and 4 also include tributaries to Soapstone Creek. Sites that are proposed for MS4 Outfall repair or asset protection and the associated affected wetlands and waterways are as follows:

- Site 1 (including MS4 Outfall F-117): WL001 and WL018;
- Site 2: WL001;
- Site 3: WL001; and
- Site 4 (including a portion of MS4 Outfall F-140): WL001, WL005, and WL010.

The functional uplift assessment is adapted from the *FINAL DRAFT Function-Based Rapid Field Stream Assessment Methodology* (Starr et al., 2015). This approach involves the comparison of existing stream functions with potential functions following stabilization efforts, based on the five levels of the Stream Functions Pyramid (see **Figure 4.1**, Harman et al., 2012).

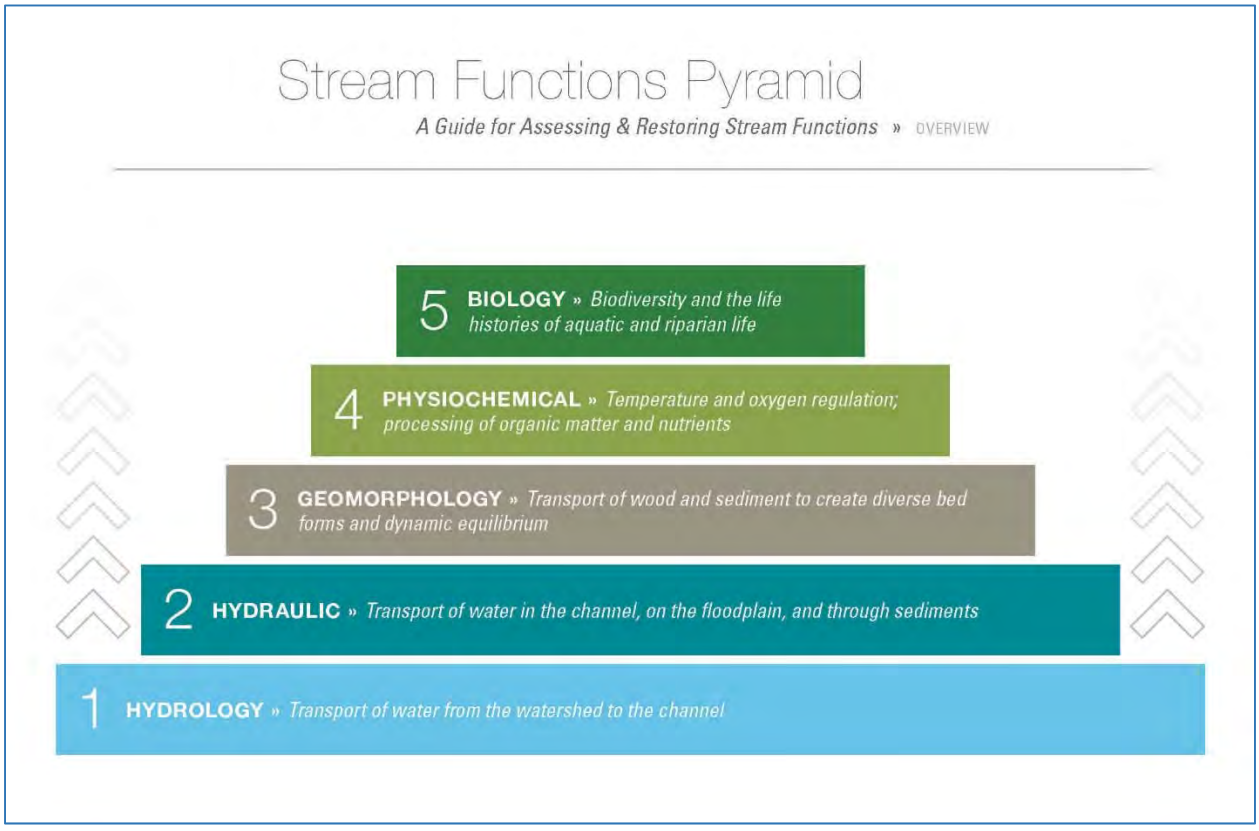

Figure 4.1: Stream Functions Pyramid (Harman et al., 2012)

Riverine wetland functions were assessed using applicable standard qualitative and quantitative measures. For example, bank height ratio is a measure of floodplain connectivity used to assess hydraulic function (Level 2 of the Stream Functions Pyramid). Each measure is given a rating of "functioning," "functioning at risk," or "not functioning" based on defined ranges. Existing

conditions for Levels 1 through 3 of the Stream Functions Pyramid are summarized below for each site. Level 4 Physiochemical and Level 5 Biology were not directly evaluated for this assessment; rather, published data were used to assess existing and proposed function. The Functional Uplift Table in **Appendix B** provides the level, parameter, and measurement method assessed for Sites 1 through 4 as well as a side-by-side comparison of existing and proposed conditions for each Site. Refer to Section 5.0 for the discussion of the proposed conditions for each site and **Table 5.2-3** for a summary of the assessment results.

Level 1: Existing Hydrology

Hydrology in the Soapstone Valley is primarily driven by surrounding land use. The 512-acre watershed of Soapstone Creek (WL001) contains densely populated residential and commercial property. Approximately 15 percent of the watershed in the lower reaches of the Creek is parkland and/or forest. Soapstone Valley Park contains a heavily forested, confined valley with scattered exposed bedrock outcrops. The channel has incised over time exposing some sewer assets. Exposed bedrock has prevented additional lateral and vertical migration in much of the Creek. The floodplain is largely inaccessible during bankfull flow condition. Runoff was assessed for all four sites, as measured by concentrated flow and flashiness. All four sites along Soapstone Creek within NPS property exhibit concentrated, flashy flows. Existing hydrology was therefore given a rating of "not functioning."

Level 2: Existing Hydraulics

At each site, bankfull velocity, entrenchment ratio (ER), and bank height ratio (BHR) were measured or calculated to assess velocity and floodplain connectivity.

At **Site 1**, the initial 50 feet of Soapstone Creek flows within a failing outfall pipe. The velocities of flow exiting the pipe are high, but the average velocity decreases as it moves to the downstream channel; therefore, this site as a whole was rated as "functioning" based on bankfull velocity. The piped segment of stream is also disconnected from the floodplain; the high BHR calculated for the area downstream of the pipe resulted in a floodplain connectivity rating of "functioning at risk." The remainder of the channel has a moderate ER resulting in a floodplain connectivity rating in the "functioning at risk" range.

At **Site 2**, the Soapstone Creek bankfull velocity was rated as "functioning at risk." The existing ER was low and BHR was high resulting in a floodplain connectivity rating of "not functioning." The existing BHR fell within the "functioning at risk" range, with field observations showing deposition on the floodplain.

At **Site 3**, bankfull velocity was rated as "not functioning." The existing ER was low and BHR was high resulting in a floodplain connectivity rating of "not functioning" for both measurement methods (ER and BHR).

At **Site 4**, the bankfull velocity, ER, and BHR values resulted in the velocity and floodplain connection functional parameters rated as "not functioning."

Level 3: Existing Geomorphology

At each site, riparian vegetation and bedform diversity were assessed, as measured by riparian vegetation zone (left and right banks), plant species diversity and composition, dominant erosion potential, fish passage, macro-benthic and fish shelter, and pool depth.

At **Site 1**, riparian vegetation along the left bank was rated as "functioning" with a width greater than 100 feet but it was rated as "functioning at risk" along the right bank, where it is limited to 25 feet wide in some areas. Although vegetation in this area is dominated by invasive species, there are at least three prevalent native species, and all three forest strata are present. Therefore, the existing plant species diversity and composition parameters were rated as "functioning at risk." This site exhibits a high erosion potential with exposed roots, active areas of erosion, and undercut banks. Therefore, dominant erosion potential for this site was rated as "not functioning." Site 1 was also rated as "not functioning" for fish passage and macro-benthic and fish shelter elements of bedform diversity. This segment of Soapstone Creek has a drop of greater than one foot, which presents a fish passage barrier. Less than 20 percent of the streambed provides stable benthic or fish habitat. The pool at the outfall of the failed pipe is greater than 1.5 feet deep resulting in a pool depth rating of "functioning."

At **Site 2**, riparian vegetation along both banks was rated as "functioning" with a width greater than 100 feet. Vegetation included established invasive species that are altering the plant community, at least four prevalent native species, and two forest strata. Therefore, the existing plant species diversity and composition was rated as "functioning at risk." This site exhibits a high erosion potential with exposed roots, active areas of erosion, and undercut banks. Therefore, dominant erosion potential for this site was rated as "not functioning." This section of Soapstone Creek exhibits "functioning" fish passage and greater than 70 percent stable streambed habitat and was rated as "functioning" for faunal shelter. Average pool depth at Site 2 is between 0.5 and 1.5 feet deep, a rating of "functioning at risk."

At **Site 3**, riparian vegetation along both banks was rated as functional with a width greater than 100 feet. Vegetation included established invasive species that are altering the plant community, at least four prevalent native species, and two forest strata. Therefore, the existing plant species diversity and composition was rated as "functioning at risk." Site 3 had a high erosion potential with exposed roots, active areas of erosion, and undercut banks. Therefore, dominant erosion potential for this site was rated as "not functioning." This section of Soapstone Creek exhibits "functioning" fish passage and greater than 70 percent stable streambed habitat and rated as "functioning" for faunal shelter. Average pool depth at this site is between 0.5 and 1.5 feet deep, with a rating of "functioning at risk."

At **Site 4**, riparian vegetation along both banks was rated as "functioning" with a width greater than 100 feet. Vegetation in this area was dominated by invasive species. There are at least three prevalent native species, and all three forest strata are present. Therefore, the existing plant species diversity and composition was rated as "functioning at risk." This site exhibits a medium erosion potential with bedrock and boulders variably armoring the banks, with some exposed roots and active areas of erosion. Therefore, the dominant erosion potential for this site was rated as "functioning at risk." This section of Soapstone Creek exhibits "functioning" fish passage, greater than 70 percent stable streambed habitat, and was rated as "functioning" for faunal shelter. Average pool depth is 1.5 feet deep and rated as "functioning."

Level 4: Existing Physiochemical

The 2016 Integrated Report, prepared by DOEE (DOEE, 2016) to document water quality within the District, provides an assessment of physiochemical conditions along the entire length (0.8 mile) of Soapstone Creek based on survey data collected between 2003 and 2015. Evaluation of ambient water quality data using a statistical analysis of data collected between 2011 and 2015 for Soapstone Creek revealed levels of *E. coli*, pH, turbidity, dissolved oxygen, and temperature that are out of compliance with District water quality standards. The DOEE report stated that, based on a 2003 stream survey and conventional pollutant data, Soapstone exhibited "a fairly significant organic pollution problem." A waterbody's designated use is classified as not supported if greater than 10% exceedances of the conventional pollutant and bacteria measurements taken within the data period of study. The levels in Soapstone Creek were determined not to support primary contact (swimmable) use, though these levels do support secondary contact (recreation and aesthetics) use and navigation use. Based on these published data evaluations, the existing physiochemical condition of Soapstone Creek across all four sites is identified as "functioning at risk" due to compliance with water quality standards suitable for secondary contact.

Level 5: Existing Biology

The 2016 Integrated Report used the following approaches and methodologies to evaluate the data collected between 2011-2015:

- **Biological / Habitat**: Biological/ habitat data for small streams was evaluated using the US EPA stressor identification guidance.
- **Aquatic Life Use**: reference condition data from the Maryland Biological Stream Survey, 2014, was used to compare observed stream biological conditions to the conditions of reference streams in Montgomery and Prince George's Counties, Maryland, to produce a percent of reference stream biological condition, which translates into impaired or not impaired determinations.

While biological conditions, such as benthic macroinvertebrate and fish communities, were not directly assessed as part of the proposed designs, the 2016 Integrated Report (DOEE, 2016), provides documentation of analyses that characterize temperature, pH, dissolved oxygen, and turbidity levels that exceed water quality standards necessary to support aquatic life use. The report further states that (1) aquatic habitats are "moderately impaired" by organic and toxic pollutants, (2) the dominant macroinvertebrate taxa consists of *Chironomidae*, which are known to be tolerant generalists, and (3) only 27 organisms were found in the entire sample. Survey data included documentation of algae on rocks, raw sewerage odor, and high specific conductivity readings. The 2009 DC Water Quality Assessment habitat assessment reported no fish within the 0.8-mile length of Soapstone Creek (DOEE, 2010), a finding that is congruent with local NPS staff observations of no fish in the Creek. Based on these published data evaluations, the existing biological condition of Soapstone Creek across all four sites is identified as "not functioning" due to noncompliance with standards supporting aquatic life use.

4.2 FLOODPLAINS

The Soapstone Creek watershed drains about 512 ac (0.8 square mile) (DOH, 2003) and discharges into Broad Branch shortly before the confluence of Broad Branch with Rock Creek. The upper watershed, which comprises about 80 percent of the total watershed area, is highly urbanized with stormwater conveyance primarily contained in stormwater sewer pipes. The lower watershed, which comprises about 20 percent of the total watershed area, consists of open channel streams within parkland in a natural forested environment. Overall, the watershed is about 39 percent impervious (DOH, 2003). Over its total length of about 4,600 feet, the natural channel of Soapstone Creek drops from about 175 feet above mean sea level (amsl) at the storm drain outfall under Albemarle Street NW, to about 75 feet amsl at its confluence with Broad Branch. The creek channel has an average width of 15 feet with average baseflow of about 3 cubic feet per second (DOH, 2004).

As indicated on the FEMA Flood Insurance Rate Map for the study area **(see Figure 3.2)**, Panels 1100010 0004 C and 1100010 0008 C, effective September 27, 2010, Soapstone Creek has an associated 'A Zone' floodplain for its entire length, from the storm drain outfall under Albemarle Street NW to its confluence with Broad Branch (FEMA, 2010). 'A Zones' are areas within the 100-year floodplain with no flood elevations determined.

The Soapstone Creek floodplain is a narrow riverine floodplain contained by a steep-sloped valley, and is comprised of NPS-managed natural, forested, and open space. Improved property in the floodplain consists of dirt surface trails and sanitary and storm sewer pipes. The Soapstone Creek floodplain is estimated to be about 9.5 ac. The floodplain ranges between about 50 and 150 feet in total width. Based on detailed topographic maps of the project area, it is estimated that 100-year flood elevations are between 6 and 8 feet above baseflow.

5.0 PROPOSED IMPACTS TO WETLANDS AND FLOODPLAINS

As mentioned above, of the three alternatives evaluated in the Draft EA, only the No Action Alternative and the Trenchless Alternative are discussed in this document because the Reroute Alternative was determined not to be the preferred alternative.

Alternative 1: No Action Alternative

Under Alternative 1, there would be no construction within riverine or vegetated wetlands resulting in 0 ac and square feet (SF) of impacts. Existing conditions and functions would remain unchanged, including hydraulic and geomorphic elements identified as not functioning or functioning at risk (see the Functional Assessment Spreadsheet, **Appendix B).**

Alternative 2: Trenchless Alternative (DC Water's Preferred Alternative)

The Trenchless Alternative LOD was overlaid with the delineated wetland boundaries in GIS. This effort revealed that five riverine wetlands and no vegetated wetlands would be impacted by the Trenchless Alternative **(see Table 5.0-1, Figure 3.3,** and Wetland Impact Plates in **Appendix C)**.

TABLE 5.0-1
WETLANDS LOCATED IN LOD

Wetland	Cowardin Classification	Trenchless Alternative LOD
WL001 (Soapstone Creek)	R3RB1	**X**
WP003	PFO1A	N/A
WL005	R4RB1	**X**
WL010	R4RB1	**X**
WL015	R4RB1	N/A
WL016	R4RB2	N/A
WL017	R4RB1	N/A
WL018*	Ephemeral	**X**
WL063*	Ephemeral	**X**
WL064	R4RB2	N/A
WL065	R4RB1	N/A

Notes:
PFO1A = Palustrine, forested, broad-leaved deciduous, temporarily flooded
R3RB1 = Riverine, upper perennial, rock bottom, bedrock
R4RB1 = Riverine, intermittent, rock bottom, bedrock
R4RB2 = Riverine, intermittent, rock bottom, rubble
* Waterways determined to be ephemeral are not classified under the Cowardin System.

5.1 IMPACTS TO VEGETATED WETLANDS

The Trenchless Alternative would not directly impact vegetated wetlands **(see Figure 3.3** and Wetland Impact Plates in **Appendix C)**. Design alterations were made to avoid all direct impacts to Wetland WP003, which is adjacent to the Trenchless Alternative LOD. However, proximity to this LOD may result in indirect impacts due to construction activities. Specifically, this vegetated

wetland is situated immediately upslope of the proposed HE access path between Sites 1 and 2, which follows the existing Soapstone Valley Park trail. Proposed access near this wetland may result in removal of a narrow swath of vegetation adjacent to, but not within, Wetland WP003. The removal of trees around forested wetland areas may increase the amount of open canopy. Canopy gaps can result in a change in vegetative community, including a shift from more shade-tolerant to more sun-tolerant species and the potential to facilitate the spread of nonnative invasive plants into wetland areas. This small wetland, although classified as a forested wetland, is located close to a relatively open canopy area. Therefore, tree removal in this area may not alter canopy coverage enough to increase the system's existing vulnerability to the growth and spread of nonnative invasive pants.

Vegetation removal and regrading activities near wetlands has the potential to alter hydrologic patterns, such as increasing or decreasing wetland water sources. No grading is proposed within the LOD in the vicinity of Wetland WP003, and temporary access matting would allow for maintenance of hydrologic connectivity between the wetland and the ephemeral channel (WL063) that conveys flow to Soapstone Creek south of the HE access path LOD **(see Figure 3.3)**. The proposed project would not alter the wetland's sources of hydrology, namely groundwater and surface flow from the intermittent channel upslope (WL017). Therefore, proposed activities are not expected to result in short- or long-term changes to wetland hydrology.

5.2 IMPACTS TO RIVERINE WETLANDS

The Wetland Impact Plates in **Appendix C** depict impacts to riverine wetlands associated with the Trenchless Alternative. Short-term impacts to riverine wetlands would be negligible and would include placement of access paths, temporary stream diversions for asset protection and MS4 Outfall areas, and temporary construction activities within the riverine wetland, resulting in temporary occupation of these systems. To reduce short-term impacts, wood chip mulch matting would be used where feasible. The Trenchless Alternative would result in approximately 368 LF and 9,337 SF (0.21 ac) of short-term impacts to riverine wetlands **(see Table 5.2-1)**.

Long-term minor beneficial impacts would result from the repair and rehabilitation of MS4 Outfalls F-117 and F-140 and installation of structures (e.g., riffle-cascades) within asset protection areas, resulting in pool creation and riffles, as well as bank stabilization using imbricated riprap walls. These structures would provide overall functional maintenance (i.e., minor impact) and/or uplift (i.e., beneficial impact) of the hydraulics, geomorphology, physiochemistry, and biology of the affected systems, as described in subsequent sections and presented in the Functional Assessment Spreadsheet in **Appendix B**. The Trenchless Alternative would result in approximately 833 LF and 33,449 SF (0.77 ac) of long-term impacts to riverine wetlands **(see Table 5.2-1)**.

TABLE 5.2-1 TRENCHLESS ALTERNATIVE RIVERINE WETLAND IMPACTS		
	Short-term Impact	**Long-term Impact** (negligible/beneficial)
WL001 (Soapstone Creek)	320 LF / 9,053 sf (0.21 ac)	755 LF / 32,246 sf (0.74 ac)
WL005	14 LF / 225 sf (<0.01 ac)	6 LF / 37 sf (<0.01 ac)
WL010	N/A	43 LF / 784 sf (0.02 ac)
WL018	N/A	29 LF / 382 sf (0.01 ac)
WL063	34 LF / 59 sf (<0.01 ac)	N/A
TOTAL	**368 LF / 9,337 sf (0.21 ac)**	**833 LF / 33,449 sf (0.77 ac)**

Proposed Riverine Wetland Functions and Values

Impacts associated with the Trenchless Alternative as described above would result in maintenance of principal functions (i.e., conveyance of surface water and groundwater discharge) and primary values (i.e., wildlife habitat, uniqueness/heritage, and visual quality/aesthetics) for riverine wetlands within the LOD. Construction would include the re-use of select stream channel material and importation of natural materials, such as riffle stone and imbricated rock that closely match the existing visual elements. Placed rock would augment streambed macroinvertebrate habitat. Likewise, post-construction plantings would include species native to Piedmont/Coastal Plain region of the Chesapeake Bay, specifically Rock Creek Park to ensure contiguous habitat and suppression of invasive species.

Proposed Riverine Functional Wetland Functional Assessment

As presented in Section 4.1.2 and in the Functional Assessment Spreadsheet in **Appendix B**, the four areas of proposed asset and outfall stabilization (Sites 1-4) were assessed according to the functional levels of the Stream Functions Pyramid. The following discussion presents the proposed functional conditions at each site, and **Table 5.2-2** provides a summary of the assessment.

Level 1: Proposed Hydrology

Under proposed conditions, hydrology for **all four sites** would remain unchanged (not functioning) due to highly impervious watershed conditions resulting in continued concentrated flows and overall flashy flow regime.

Level 2: Proposed Hydraulics

At each site, floodplain connectivity for the proposed design was assessed using ER and BHR. Preliminary hydraulic modeling revealed that proposed bankfull velocities are expected to remain the same or be reduced within the proposed riffle sections.

At **Site 1**, the proposed design would daylight the initial 50 feet of Soapstone Creek within the outfall pipe and would reconnect this portion of the stream to its floodplain. The ER for the proposed design would improve the ER rating to "functioning." Similarly, the current BHR rating would improve to

"functioning." Therefore, this section of Soapstone Creek would undergo an overall functional uplift in floodplain connectivity.

At **Sites 2 and 3**, the proposed work would not negatively affect ER or BHR ratings, but there will be no substantial positive change to these parameters. This section of stream would continue to be "functioning at risk" for Site 2 and "not functioning" for Site 3 in terms of floodplain connectivity.

At **Site 4**, the proposed work would not negatively affect ER or BHR ratings, but there will be no substantial positive change these parameters. This section of stream would continue to be "not functioning" in terms of floodplain connection.

Level 3: Proposed Geomorphology

At **all four sites**, riparian vegetation along the left and right banks would be reestablished using tree, shrub, and herbaceous species native to the Soapstone Valley. In doing so, the proposed riparian vegetation zones for all four sites would maintain their pre-construction widths, with no change in riparian vegetation zone function.

Clearing associated with construction activities would remove invasive species, and replanting of native herbaceous, shrub, and trees species would reestablish a three-strata vegetation community dominated by native species. As a result, the proposed rating of "functioning" would result in an overall uplift of function across **all four sites** for plant species diversity and composition.

Proposed design elements specifically target stabilizing stream banks, which would reduce erosion. Therefore, the proposed rating of "functioning" for dominant erosion potential would result in an overall uplift of function across **all four sites**.

At **Site 1**, the proposed design would lessen the fish barrier drop to less than one foot, thereby allowing for this rating to be improved to "functioning at risk." The proposed design would also greatly increase stable habitat in the streambed to greater than 70 percent, including the section of daylighted pipe, resulting in a rating of "functioning" for macro-benthic and fish shelter. The pool depth rating would remain "functioning." As a result, the proposed rating of "functioning" would result in an overall maintenance and uplift of function for bedform diversity.

At **Sites 2 and 3**, the proposed design would maintain existing function across all bedform diversity measurement methods.

At **Site 4**, the proposed design would maintain a "functioning" rating across all bedform diversity measurement methods.

Level 4: Proposed Physiochemical

Under proposed conditions, physiochemical conditions for **all four sites** would remain unchanged (functioning at risk). Proposed asset protection efforts would not provide functional uplift beyond reducing the risk of sewage spilling into Soapstone Creek, thereby avoiding potential water quality degradation and excess nutrients. Likewise, proposed MS4 Outfall stabilization efforts would somewhat reduce sediment and nutrient loads entering Soapstone Valley. Therefore, construction

of the asset protection and MS4 outfall elements is expected to maintain existing compliance with DOEE standards supporting secondary (recreational and aesthetic) contact.

Level 5: Proposed Biology

Under proposed conditions, biological conditions for **all four sites** would remain unchanged (not functioning). Proposed asset protection efforts and MS4 Outfall stabilization efforts would possibly enhance streambed habitat complexity and reduce fish passage barriers. It is possible that post-construction conditions, over time and in conjunction with modest physiochemical improvements, would result in a more diverse benthic macro-invertebrate community. However, for the purpose of this SOF, it is assumed that biological uplift would be limited by the low function of physiochemical conditions typical of urban watersheds. Therefore, construction of the asset protection and MS4 outfall elements of the proposed project across all four sites is expected to maintain existing conditions that are noncompliant with DOEE aquatic life use standards.

TABLE 5.2-2
TRENCHLESS ALTERNATIVE FUNCTIONAL ASSESSMENT SUMMARY

			Site 1		Site 2		Site 3		Site 4	
			Existing	Proposed	Existing	Proposed	Existing	Proposed	Existing	Proposed
Level & Category	**Parameter**	**Measurement Method**	*Rating*	*Rating*	*Rating*	*Rating*	*Rating*	*Rating*	*Rating*	*Rating*
1-HYDROLOGY	Runoff	Concentrated Flow	NF	NF	NF	NF	NF	NF	NF	NF
		Flashiness	NF	NF	NF	NF	NF	NF	NF	NF
2 - HYDRAULICS	Velocity	Bankfull Velocity	FUNCT	FUNCT	FAR	FAR	NF	FAR	NF	NF
	Floodplain Connectivity	Entrenchment Ratio	FAR	FUNCT	NF	NF	NF	NF	NF	NF
		Bank Height Ratio	FAR	FUNCT	FAR	FAR	NF	NF	NF	NF
3 - GEOMORPHOLOGY	Riparian Vegetation	Riparian Vegetation Zone (L)	FUNCT	FUNCT	FUNCT	FUNCT	FUNCT	FUNCT	FUNCT	FUNCT
		Riparian Vegetation Zone (R)	FAR	FAR	FUNCT	FUNCT	FUNCT	FUNCT	FUNCT	FUNCT
		Plant Species Diversity and Composition	FAR	FUNCT	FAR	FUNCT	FAR	FUNCT	FAR	FUNCT
		Dominant Erosion Potential	NF	FUNCT	NF	FUNCT	NF	FUNCT	FAR	FUNCT
	Bedform Diversity	Fish Passage	NF	FAR	FUNCT	FUNCT	FUNCT	FUNCT	FUNCT	FUNCT
		Macro and Fish Shelter	NF	FUNCT	FUNCT	FUNCT	FUNCT	FUNCT	FUNCT	FUNCT
		Pool Depth	FUNCT	FUNCT	FAR	FAR	FAR	FAR	FUNCT	FUNCT
4 - PHYSIO-CHEMICAL	Water Quality	DOEE Standards (pH, Turbidity, DO, Temp.)	FAR	FAR	FAR	FAR	FAR	FAR	FAR	FAR
	Nutrients	DOEE Standards (*E. coli*)	FAR	FAR	FAR	FAR	FAR	FAR	FAR	FAR
5 - BIOLOGICAL	Macro-benthic Communities	DOEE Standards (Biological/ Habitat, Aquatic Use data)	NF	NF	NF	NF	NF	NF	NF	NF
	Fish	DOEE Standards (Biological/ Habitat, Aquatic Use data)	NF	NF	NF	NF	NF	NF	NF	NF

FUNCT FUNCTIONING
FAR FUNCTIONING AT RISK
NF NOT FUNCTIONING

Summary of Riverine Wetland Impacts

The proposed project would impact of 0.98 acres of riverine wetlands (stream channels). Rehabilitation to the Soapstone Valley Park sewer system would result in both short-term and long-term impacts to riverine wetlands. However, the proposed asset protection for Sites 1-4 would result in long-term **maintenance and/or uplift of ecological function** for Levels 1 through 5 of the Stream Functions Pyramid. The Trenchless Alternative would result in maintenance or increases in functional parameters such as floodplain connectivity, riparian vegetation, and bedform diversity. The most notable uplift would occur across all four sites for plant species diversity and composition and dominant erosion potential. The proposed project would result in maintenance of existing function for the hydrology, physiochemical, and biological levels of the Stream Functions Pyramid. The proposed project would also have an overall negligible/beneficial long-term impact to the ecological functions of Soapstone Creek (WL001) and its associated tributaries by providing protection from bacteria and nutrients associated with asset failure.

5.3 IMPACTS TO THE FLOODPLAIN

Alternative 1: No Action Alternative

Under Alternative 1, there would be no construction within the floodplain. Of the 9.5 ac of floodplain in the project area, the No Action Alternative would impact 0 ac and SF of floodplain.

Alternative 2: Trenchless Alternative (DC Water's Preferred Alternative)

The Wetland Impact Plates in **Appendix C** depict impacts to the floodplain associated with the Trenchless Alternative. Short-term impacts to floodplains would include construction of access paths to manholes, work zones, and other staging areas, as described in Section 2.2, resulting in removal of forest and soil compaction within the floodplain. On land, the access paths would be constructed of mulch mats that are a minimum 12-inch thick layer of wood chip mulch matting with an additional 6-inch minimum thick 3-ply hardwood construction mat above the mulch mat with silt fencing on either side. These access paths would serve to clearly delineate contractor access, contain work to specific areas to eliminate disturbance outside permitted work areas, lessen soil compaction, and to protect root zones of surrounding trees. The access paths and staging areas would be removed at the completion of construction. Of the 9.5 ac of floodplain in the project area, the Trenchless Alternative would have a short-term impact to the floodplain of approximately 5,110 SF (0.12 ac) **(see Table 5.3-1)**.

Long-term impacts to the floodplain from this alternative would include repair and rehabilitation of MS4 Outfall F-117 and installation of structures and regrading within asset protection areas, resulting in a permanent change to existing floodplain elevations. Permanent structures would include pools, riffle-cascades, and imbricated riprap walls. Of the 9.5 ac of floodplain in the project area, the Trenchless Alternative would have a long-term impact to the floodplain of about 9,039 SF (0.21 ac) **(see Table 5.3-1)**.

TABLE 5.3-1 TRENCHLESS ALTERNATIVE FLOODPLAIN IMPACTS	
	Trenchless Alternative
Total Long-term Impacts	0.21 ac / 9,039 sf
Total Short-term Impacts	0.12 ac / 5,110 sf
TOTAL	**0.33 ac / 14,149 sf**

Summary of Floodplain Impacts

Rehabilitation of the Soapstone Valley Park sewer system would result in both short-term and long-term impacts to the floodplain due to the proposed asset protection and outfall repair and rehabilitation occurring predominantly within the floodplain **(see Table 5.3-1)**. However, proposed designs for Sites 1-4 would result in maintenance or uplift of floodplain function, specifically related to floodplain connectivity.

6.0 COMPLIANCE

In addition to compliance with NPS Director's Order 77-1, *Wetland Protection*, and 77-2, *Floodplain Management*, as discussed in Sections 1.1 and 1.2, respectively, the proposed project is subject to the following regulations.

Clean Water Act Section 404 and 401

The proposed actions impact waters of the U.S., as defined by the Clean Water Act (CWA), and are therefore subject to review by USACE. Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the U.S.

National Environmental Policy Act

The Environmental Assessment, Section 106 Compliance Review, this Statement of Findings for E.O. 11990 and E.O. 11988, and the Findings of No Significant Impact would complete the requirements for the National Environmental Policy Act for this project.

7.0 MITIGATION OF WETLAND IMPACTS

DC Water has worked collaboratively with NPS to identify sensitive resources and priorities within the Soapstone Valley and have engaged in an iterative design process to avoid and minimize impacts to Park wetlands, forest, and character, while satisfying the proposed project's purpose and need. The team has worked to achieve a minimal LOD that incorporates only the necessary areas of outfall repair and rehabilitation, asset protection and streambank stabilization, and access required for repair and rehabilitation of manholes and pipes, while maintaining a positive visitor experience.

The Trenchless Alternative LOD avoid vegetated wetlands, results in less than one acre of total riverine wetland impacts, and less than a half-acre of total floodplain impacts. Impacts associated with the Trenchless Alternative would result in maintenance of principal functions (i.e., conveyance of surface water and groundwater discharge) and primary values (i.e., wildlife habitat, uniqueness/heritage, and visual quality/aesthetics) for riverine wetlands within the LOD.

Short-term impacts associated with construction of the Trenchless Alternative would be minimized through the following best management practices:

- Placement of storage areas outside of wetland boundaries;
- Use of HE access paths that would circumscribe potential impacts and allow minor adjustment in the field to avoid resources;
- Avoidance of vehicular access for most of the manhole repairs;
- Use of existing trails and designated walking paths to transport materials into the site, where possible, thus avoiding clearing larger vehicular access paths;
- Placement of wood chip mulch matting and super silt fencing along access paths;
- Use of protective matting for access across smaller (ephemeral) systems;
- Removal and restoration of all storage and staging areas and access paths to pre-construction (or better) conditions;
- Use of daily, temporary bypass pumping equipment for ensuring clear water flow around dry stream work areas (including coffer dams, clear water diversion pumps, dewatering pumps with filter bags);
- Avoidance of riverine wetland disturbance during temporary sewer bypass pumping; and,
- Use of erosion and sediment control practices.

Long-term impacts associated with the proposed project would be minimized through the following best management practices:

- Minimization of fill used in outfall repair, asset protection, and streambank stabilization to only what is necessary to maintain appropriate flow velocities and manage storm surges;
- Installation of site-specific streambank stabilization elements (including live stakes, permanent seeding, imbricated riprap walls, and adjustment of eroding streambank slopes) to provide functional uplift to Soapstone Creek and its tributaries by reducing soil loss and scour protection;

- Re-use of select stream channel material and importation of natural materials that closely match the existing visual elements and augment streambed macroinvertebrate habitat;
- Installation of post-construction plantings including species native to Rock Creek Park to ensure contiguous habitat and suppression of invasive species; and,
- Implementation of stormwater management along Albemarle Street NW and along the right-of-way to reduce erosion and stormwater impacts in the Park.

According to the *NPS Procedural Manual #77-1: Wetland Protection*, no compensatory mitigation is required for this project because the total impact of 0.98 ac is less than the one-acre threshold above which compensation is required.

8.0 CONCLUSION

The Soapstone Valley Park Sewer Rehabilitation project seeks to repair, replace, or rehabilitate 6,100 LF of sewer pipe (2,945 LF on NPS property) and 30 manholes (14 on NPS property) that have exceeded their designed lifespan.

The Trenchless Alternative would repair and rehabilitate existing sewer infrastructure via cured-in-place trenchless construction methods and associated asset protection, erosion prevention, and MS4 outfall stabilization efforts. This alternative proposes to incur 0.98 ac of impacts to riverine wetlands. This Alternative would not directly impact vegetated wetlands; however, indirect impacts may occur due to their proximity to the LOD. A functional assessment of Soapstone Creek (WL001) was conducted at each of the four proposed asset protection and bank stabilization. The assessment revealed that the proposed work would result in overall maintenance and/or ecological uplift of riverine function. Under this alternative, short-term floodplain impacts would total 0.12 ac, and long-term floodplain impacts would total 0.21 ac.

9.0 REFERENCES

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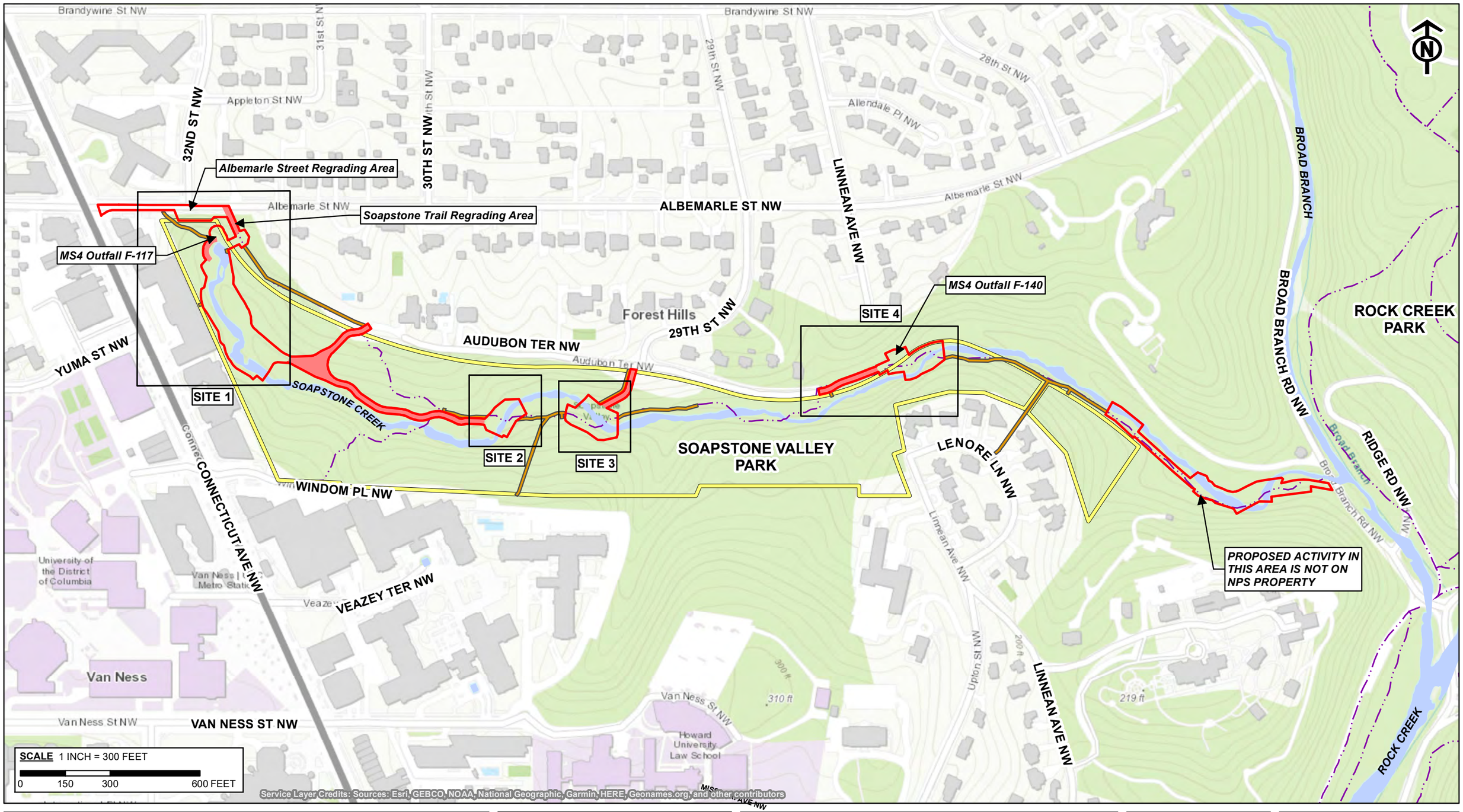
STATEMENT OF FINDINGS

FIGURES



LEGEND

- LIMITS OF DISTURBANCE
- HEAVY EQUIPMENT PATH
- WALKING PATH
- NPS PROPERTY BOUNDARY
- NPS TRAILS
- DISTRICT OF COLUMBIA WATERWAY

NOTES

1. MAPPING DISPLAYS THE TRENCHLESS ALTERNATIVE LOD AS OF APRIL 2018.

SOURCES Design, Limits of Disturbance, and Trail provided by Hazen and Sawyer NCPC-DPW. 2006. *WaterPly*. Washington, DC.

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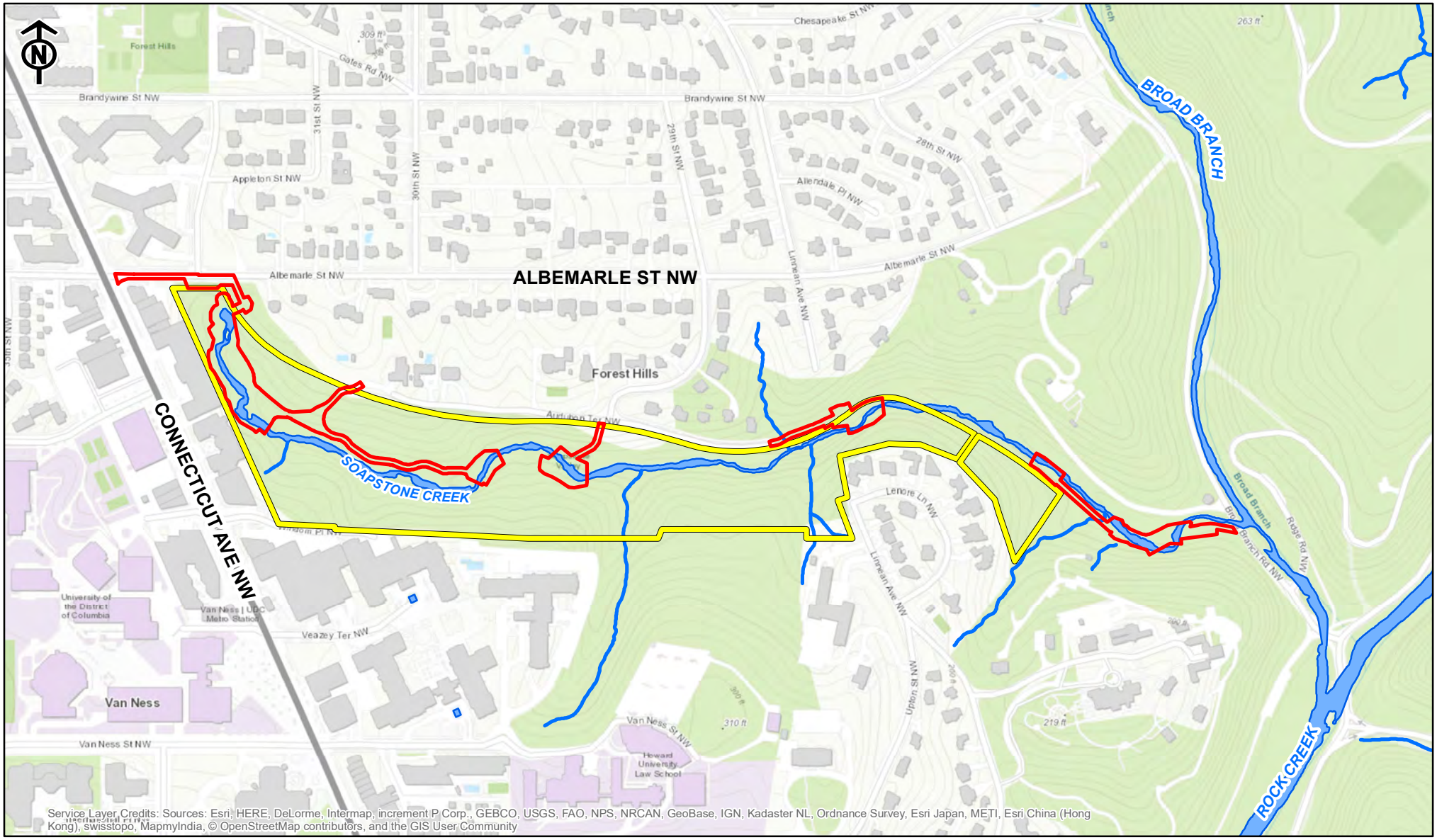
FIGURE 1

STUDY AREA

SOAPSTONE VALLEY PARK
SEWER REHABILITATION

WASHINGTON, D.C.



LEGEND

- TRENCHLESS ALTERNATIVE LOD
- NPS BOUNDARY
- NWI WETLAND
- DISTRICT OF COLUMBIA WATERWAY
- DISTRICT OF COLUMBIA HYDRO LINE

SCALE 1 INCH = 500 FEET

0 250 500 1,000 FEET

SOURCES

NCPC-DPW. 2013. *HydroLn*. Washington, DC.
NCPC-DPW. 2006. *WaterPly*. Washington, DC.
USFWS. 2002. *National Wetlands Inventory Map for Washington, District of Columbia*. Washington, D.C.

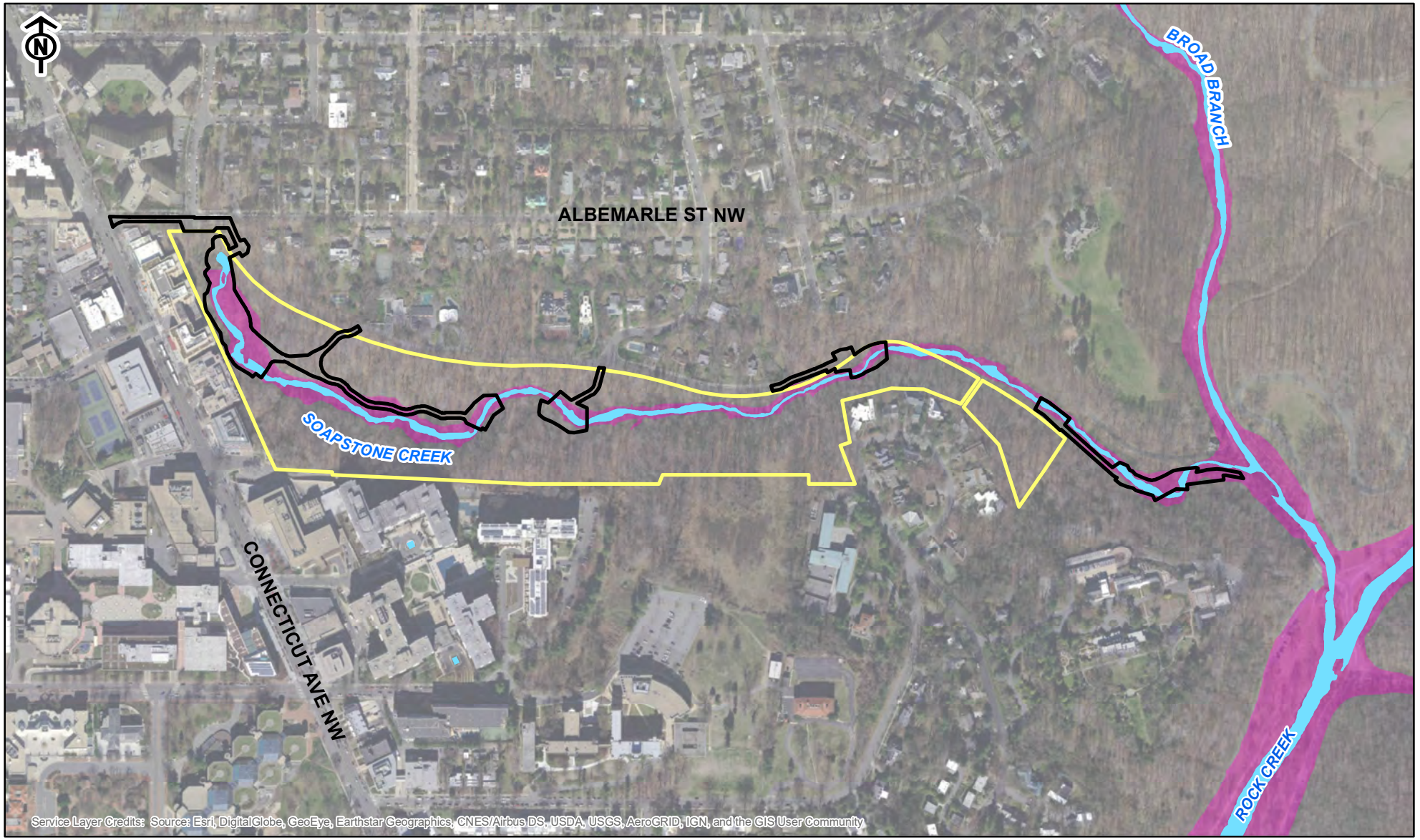
NOTES

1. THERE ARE NO NWI WETLANDS WITHIN MAP EXTENTS.
2. MAPPING DISPLAYS THE TRENCHLESS ALTERNATIVE LOD AS OF APRIL 2018.

FIGURE 3.1
NATIONAL WETLANDS INVENTORY MAP

SOAPSTONE VALLEY PARK
SEWER REHABILITATION

WASHINGTON, D.C.



LEGEND

- TRENCHLESS ALTERNATIVE LOD
- NPS BOUNDARY
- FEMA 100-YR FLOODPLAIN
- DISTRICT OF COLUMBIA WATERWAY

SCALE 1 INCH = 500 FEET

0 500 1,000 FEET

SOURCES

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NCPC-DPW. 2006. *WaterPly*. Washington, DC.

NOTES

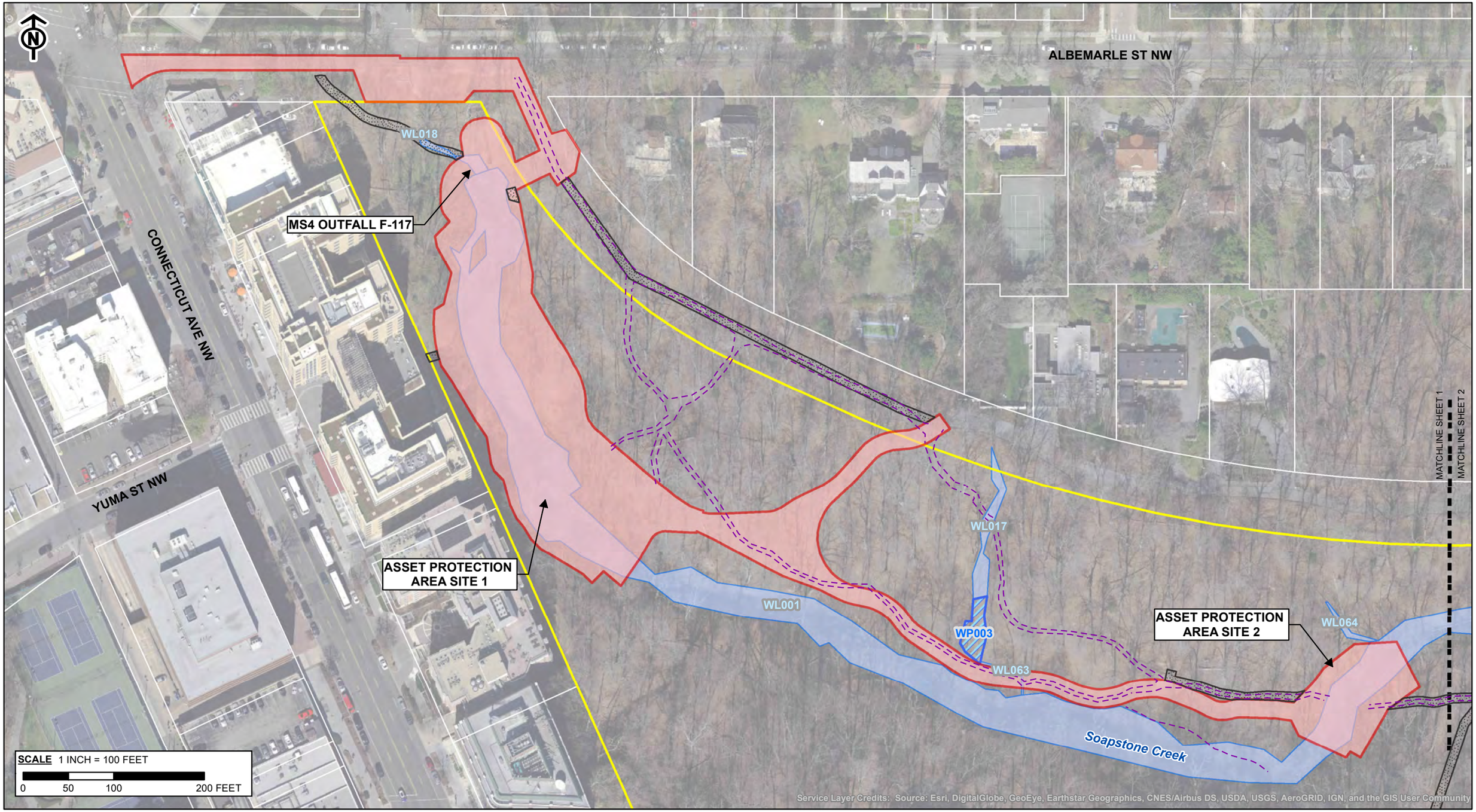
1. MAPPING DISPLAYS THE TRENCHLESS ALTERNATIVE LOD AS OF APRIL 2018.

FIGURE 3.2

FLOOD INSURANCE RATE MAP

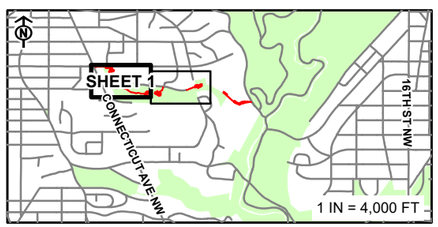
SOAPSTONE VALLEY PARK
SEWER REHABILITATION

WASHINGTON, D.C.



LEGEND

- TRENCHLESS ALTERNATIVE LOD
- TRENCHLESS WALKING PATH
- DELINEATED VEGETATED WETLAND
- DELINEATED RIVERINE WETLAND
- NPS PROPERTY BOUNDARY
- PROPERTY BOUNDARY
- TRAIL
- MATCHLINE



NOTES

1. RIVERINE WETLAND AND VEGETATED WETLAND BOUNDARIES WERE SURVEYED USING MAPPING GRADE GPS EQUIPMENT AND THEREFORE SLIGHT VARIATIONS OF ACTUAL BOUNDARIES CAN OCCUR.
2. MAPPING DISPLAYS THE TRENCHLESS ALTERNATIVE LOD AS OF APRIL 2018.

SOURCES All design and infrastructure files provided by Hazen and Sawyer
Wetlands and Waterways delineated by Straughan Environmental, Inc. (2011, updated 2015)

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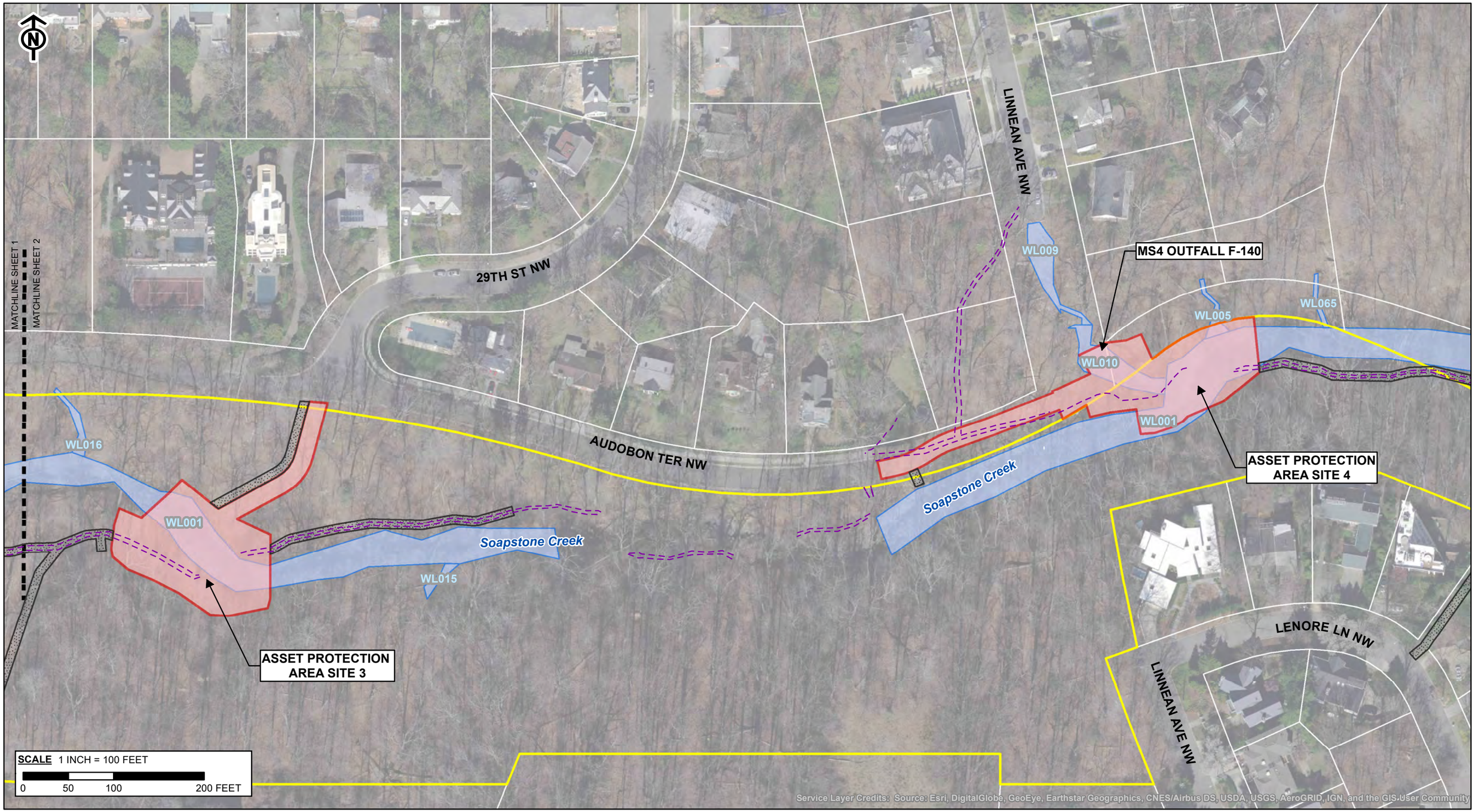
FIGURE 3.3

WETLAND LOCATION MAP

SOAPSTONE VALLEY PARK
SEWER REHABILITATION

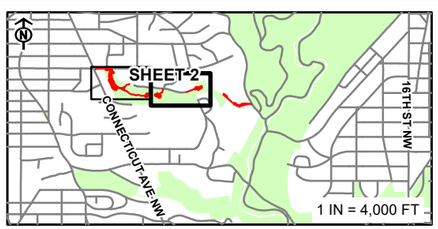
SHEET 1 OF 2

WASHINGTON, D.C.



LEGEND

- TRENCHLESS ALTERNATIVE LOD
- TRENCHLESS WALKING PATH
- DELINEATED VEGETATED WETLAND
- DELINEATED RIVERINE WETLAND
- NPS PROPERTY BOUNDARY
- PROPERTY BOUNDARY
- TRAIL
- MATCHLINE



NOTES

1. RIVERINE WETLAND AND VEGETATED WETLAND BOUNDARIES WERE SURVEYED USING MAPPING GRADE GPS EQUIPMENT AND THEREFORE SLIGHT VARIATIONS OF ACTUAL BOUNDARIES CAN OCCUR.
2. MAPPING DISPLAYS THE TRENCHLESS ALTERNATIVE LOD AS OF APRIL 2018.

SOURCES All design and infrastructure files provided by Hazen and Sawyer
Wetlands and Waterways delineated by Straughan Environmental, Inc. (2011, updated 2015)

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FIGURE 3.3

WETLAND LOCATION MAP

SOAPSTONE VALLEY PARK
SEWER REHABILITATION

SHEET 2 OF 2

WASHINGTON, D.C.

STATEMENT OF FINDINGS

APPENDIX A

WETLANDS FUNCTIONS AND VALUES WORKSHEETS

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made?_____ Is wetland part of a wildlife corridor?_____ or a "habitat island"?_____

Adjacent land use_____ Distance to nearest roadway or other development_____

Dominant wetland systems present_____ Contiguous undeveloped buffer zone present_____

Is the wetland a separate hydraulic system?_____ If not, where does the wetland lie in the drainage basin?_____

How many tributaries contribute to the wetland?_____Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D._____

Latitude_____ Longitude_____

Prepared by:_____ Date_____

Wetland Impact:
Type_____Area_____

Evaluation based on:
Office_____ Field_____

Corps manual wetland delineation completed? Y_____ N_____

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge					
Floodflow Alteration					
Fish and Shellfish Habitat					
Sediment/Toxicant Retention					
Nutrient Removal					
Production Export					
Sediment/Shoreline Stabilization					
Wildlife Habitat					
Recreation					
Educational/Scientific Value					
Uniqueness/Heritage					
Visual Quality/Aesthetics					
ES Endangered Species Habitat					
Other					

Notes:

* Refer to backup list of numbered considerations.

Soapstone Valley

Wetland Function-Value Evaluation Form

Total area of wetland_____ Human made? N Is wetland part of a wildlife corridor? Y or a "habitat island"? N

Adjacent land use NPS Parkland, residential Distance to nearest roadway or other development 30 ft+

Dominant wetland systems present riverine Contiguous undeveloped buffer zone present Y

Is the wetland a separate hydraulic system? N If not, where does the wetland lie in the drainage basin? conveys flow to Rock Creek

How many tributaries contribute to the wetland? 2 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Soapstone Creek + Perm. + Int. tribs

Latitude_____ Longitude_____

Prepared by: KT Date 2015-2017

Wetland Impact:
Type sewer rehab. / MS4 compliance Area_____

Evaluation based on:
Office Y Field X

Corps manual wetland delineation completed? Y X N_____

Function/Value	Suitability Y	Suitability N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
Groundwater Recharge/Discharge	X			(X)	perennial, groundwater-fed waterway
Floodflow Alteration		X			no floodstorage beyond banks
Fish and Shellfish Habitat		X			NPS/agency cooresp. state fish not present
Sediment/Toxicant Retention		X			transporting sediment, not retaining
Nutrient Removal		X			transporting nutrients, not retaining
Production Export	X				likely food source (amphib, invert) for predators
Sediment/Shoreline Stabilization		X			some degrading streambanks
Wildlife Habitat	X			X	important wildlife habitat island
Recreation	X			X	heavily used trails/park
Educational/Scientific Value	X				likely educ. use by visitors/NPS staff
Uniqueness/Heritage	X			X	NPS property
Visual Quality/Aesthetics	X				Running water, forest, birdwatching
ES Endangered Species Habitat		X			RTE coord - no spp of concern in waterway
Other	X			(X)	Conveyance of Surface water

Notes:

* Refer to backup list of numbered considerations.

STATEMENT OF FINDINGS

APPENDIX B

FUNCTIONAL ASSESSMENT SPREADSHEET (SITES 1-4)

FUNCTIONAL ASSESSMENT SPREADSHEET
SOAPSTONE VALLEY PARK SEWER REHABILITATION

			Site 1				Site 2				Site 3				Site 4			
			Rosgen B3/1				Rosgen F3/1b				Rosgen F3/1b				Rosgen F3/1b			
			Existing Conditions		Proposed Conditions		Existing Conditions		Proposed Conditions		Existing Conditions		Proposed Conditions		Existing Conditions		Proposed Conditions	
Level and Category	**Parameter**	**Measurement Method**	*Value*	*Rating*	*Value*	*Rating*	*Value*	*Rating*	*Value*	*Rating*	*Value*	*Rating*	*Value*	*Rating*	*Value*	*Rating*	*Value*	*Rating*
1-HYDROLOGY	Runoff	Concentrated Flow	Concentrated flows present	NF	Concentrated flows present	NF	Concentrated flows present	NF	Concentrated flows present	NF	Concentrated flows present	NF	Concentrated flows present	NF	Concentrated flows present	NF	Concentrated flows present	NF
		Flashiness	Flashy flow regime (>15% imperv.)	NF	Flashy flow regime (>15% imperv.)	NF	Flashy flow regime (>15% imperv.)	NF	Flashy flow regime (>15% imperv.)	NF	Flashy flow regime (>15% imperv.)	NF	Flashy flow regime (>15% imperv.)	NF	Flashy flow regime (>15% imperv.)	NF	Flashy flow regime (>15% imperv.)	NF
2 - HYDRAULICS	Velocity	Bankfull Velocity (u/u*)[a,b]	velocity < 5.5 fps	FUNCT	velocity < 5.5 fps	FUNCT	5.5 fps <velocity<7.0 fps	FAR	5.5 fps <velocity<7.0 fps	FAR	velocity > 7.0 fps	NF	5.5 fps <velocity<7.0 fps	FAR	velocity > 7.0 fps	NF	velocity > 7.0 fps	NF
	Floodplain Connectivity	Entrenchment Ratio[c]	1.4<ER<2.2	FAR	ER>2.2	FUNCT	ER<1.4	NF	ER<1.4	NF	ER<1.4	NF	ER<1.4	NF	ER<1.4	NF	ER<1.4	NF
		Bank Height Ratio[d]	50 LF is piped with BHR >1.5; remainder is functional	FAR	<1.1 (50 LF of pipe daylighted)	FUNCT	BHR>1.5; per field observation, there is deposition on the floodplain	FAR	BHR>1.5	FAR	BHR>1.5	NF	BHR>1.5	NF	BHR>1.5	NF	BHR>1.5	NF
3 - GEOMORPHOLOGY	Riparian Vegetation	Riparian Vegetation Zone (LEFT)[e]	>100' riparian zone	FUNCT	>100' riparian zone	FUNCT	>100' riparian zone	FUNCT	>100' riparian zone	FUNCT	>100' riparian zone	FUNCT	>100' riparian zone	FUNCT	>100' riparian zone	FUNCT	>100' riparian zone	FUNCT
		Riparian Vegetation Zone (RIGHT)[e]	25'-100' riparian zone	FAR	25'-100' riparian zone	FAR	>100' riparian zone	FUNCT	>100' riparian zone	FUNCT	>100' riparian zone	FUNCT	>100' riparian zone	FUNCT	>100' riparian zone	FUNCT	>100' riparian zone	FUNCT
		Plant Species Diversity and Composition[f]	Dominated by invasive spp.; 3 native spp. prevalent; 3 strata present	FAR	Low-no invasive spp.;dominated by native spp.; 3 strata present	FUNCT	Invasive spp. altering community; 4 native spp. prevalent; 2 strata present	FAR	Low-no invasive spp.;dominated by native spp.; 3 strata present	FUNCT	Invasive spp. altering community; 4 native spp. prevalent; 2 strata present	FAR	Low-no invasive spp.;dominated by native spp.; 3 strata present	FUNCT	Dominated by invasive spp.; 3 native spp. prevalent; 3 strata present	FAR	Low-no invasive spp.;dominated by native spp.; 3 strata present	FUNCT
		Dominant Erosion Potential[g]	High: exposed roots, active erosion, undercut banks	NF	Low	FUNCT	High: exposed roots, active erosion, undercut banks	NF	Low	FUNCT	High: exposed roots, active erosion, undercut banks	NF	Low	FUNCT	Medium	FAR	low	FUNCT
	Bedform Diversity	Fish Passage[h]	drop > 1.0'	NF	drop < 1.0'	FAR	drop < 0.5'	FUNCT	drop < 0.5'	FUNCT	drop < 0.5'	FUNCT	drop < 0.5'	FUNCT	drop < 0.5'	FUNCT	drop < 0.5'	FUNCT
		Macro and Fish Shelter[i]	<20% of stable habitat, large pool, 50 lf is piped	NF	>70% mix of stable habitat (including 50 LF of daylighted stream)	FUNCT	>70% of subgrade stable, D84 is cobble	FUNCT	>70% of subgrade stable, D50 will be LARGE cobble/small boulder	FUNCT	>70% of subgrade stable, D84 is bedrock	FUNCT	>70% of subgrade stable, D50 will be LARGE cobble/small boulder	FUNCT	>70% of subgrade stable, D84 is large cobble	FUNCT	>70% of subgrade stable, D50 will be LARGE cobble/small boulder	FUNCT
		Pool Depth[j]	pool > 1.5' deep	FUNCT	pool > 1.5' deep	FUNCT	0.5' < pool < 1.5'	FAR	0.5' < pool < 1.5'	FAR	0.5' < pool < 1.5'	FAR	0.5' < pool < 1.5'	FAR	pool ave 1.5' deep, multiple pools	FUNCT	pool ave 1.5' deep, multiple pools	FUNCT
4 - PHYSIOCHEMICAL	Water Quality	DOEE Standards[k] (pH, Turbidity, DO, Temperature)	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR
	Nutrients	DOEE Standards[k] (*E. coli*)	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR	Compliant with Secondary Contact Criteria	FAR
5 - BIOLOGY	Macro-benthic Communities	DOEE Standards[k] (Biological/ Habitat, Aquatic Use data)	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF
	Fish	DOEE Standards[k] (Biological/ Habitat, Aquatic Use data)	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF	Noncompliant with Aquatic Life Use	NF

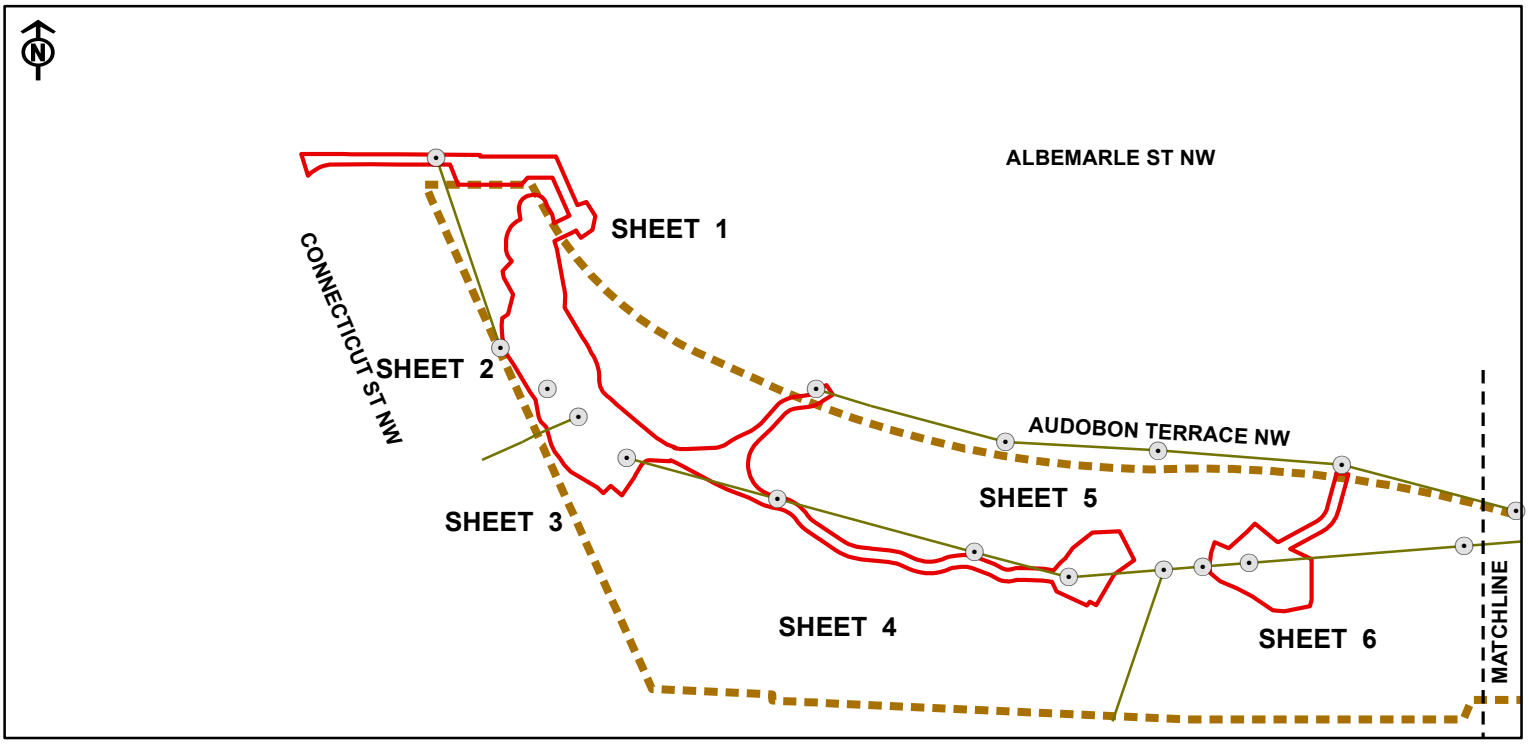
FUNCT	FUNCTIONING
FAR	FUNCTIONING AT RISK
NF	NOT FUNCTIONING

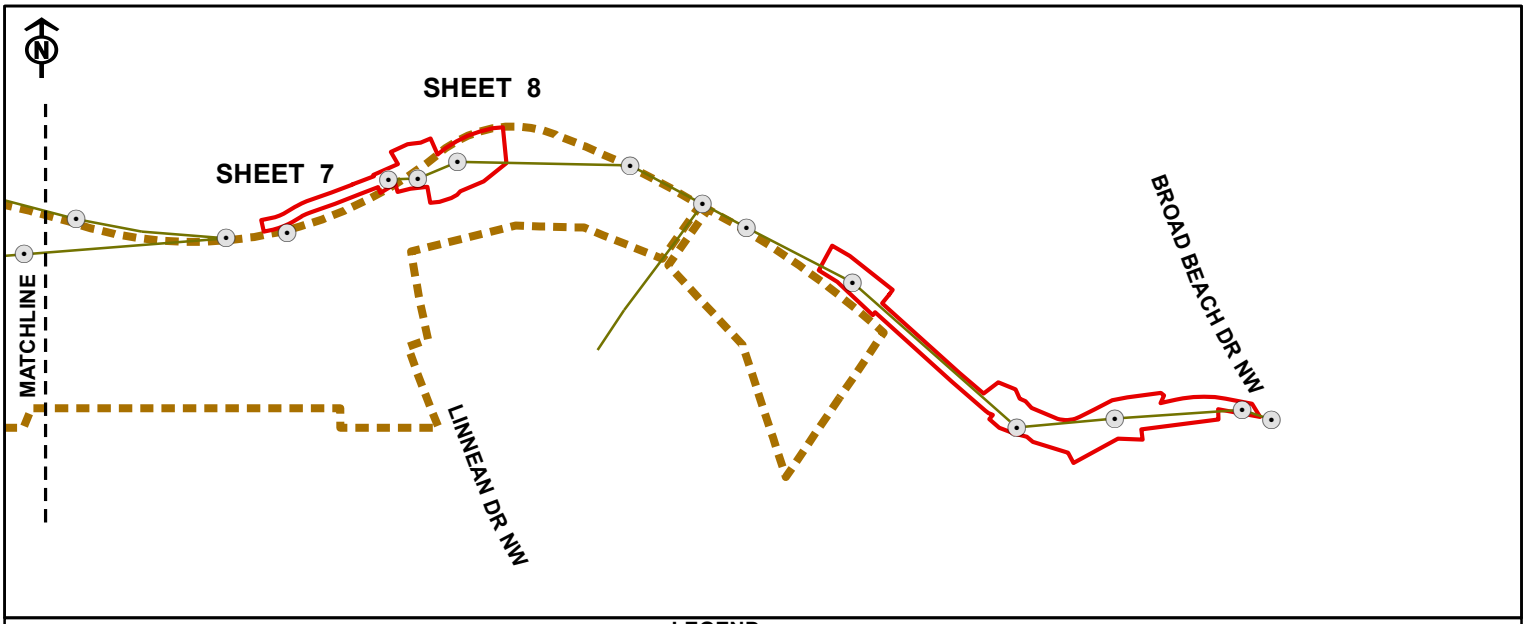
[a] u/u* velocity values taken from May, 2015 Soapstone 50% Design Memo
[b] Velocity ranges assumed based on B type stream system with bedrock outcrops (<5.5 fps is FUNCT, < 7.0 fps is FAR, >7 pfs is NF)
[c] ER ranges based on B - C stream type (<1.4 is NF, < 2.2 is FAR, >2.2 is FUNCT)
[d] BHR estimated from 2015 Technical Memo (Straughan) cross-sections used for classification (<1.1 is FUNCT, <1.5 is FAR, >1.5 is NF)
[e] Riparian buffer <25' is NF, < 100' is FAR, > 100' is FUNCT
[f] <2 native spp. prevalent, 1 strata present, dominated by invasive spp. is NF; 2-3 native spp. prevalent, 2 strata present, invasive spp. altering community is FAR; >3 native spp. prevalent, 3 strata present, no/sparse invasive spp. is FUNCT
[g] Low is FUNCT, Medium is FAR, High is NF
[h] <0.5' is FUNCT, <1' is FAR, >1 if NF
[i] <20% stable habitat/substrate is NF, 20 to 70% is FAR, > 70% is FUNCT
[j] No pools or pools < 6 inches deep is NF, pools < 1.5' deep is FAR, pools > 1.5' is FUNCT

STATEMENT OF FINDINGS

APPENDIX C

WETLAND IMPACT PLATES
TRENCHLESS ALTERNATIVE





LEGEND

- LIMITS OF DISTURBANCE
- DELINEATED WETLAND
- REHAB MANHOLE
- WALKING PATH
- NPS PROPERTY BOUNDARY
- SEWER
- PROPERTY BOUNDARY
- ROADWAY

RIVERINE WETLAND IMPACTS

- SHORT-TERM IMPACTS = 0.21 AC / 9,337 SF
- LONG-TERM IMPACTS = 0.77 AC / 33,448 SF

TOTAL FLOODPLAIN IMPACTS

- SHORT-TERM IMPACTS = 0.12 AC / 5,110 SF
- LONG-TERM IMPACTS = 0.21 AC / 8,976 SF

NOTES

1. ALL WETLAND IMPACTS OCCUR WITHIN RIVERINE (STREAM CHANNEL) WETLANDS. NO VEGETATED WETLANDS OCCUR WITHIN THE LOD.
2. WALKING PATHS WILL NOT RESULT IN IMPACTS TO RESOURCES.

WETLAND IMPACT PLATE

INDEX SHEET

SCALE

1 INCH = 330 FEET

0 165 330 660 FEET

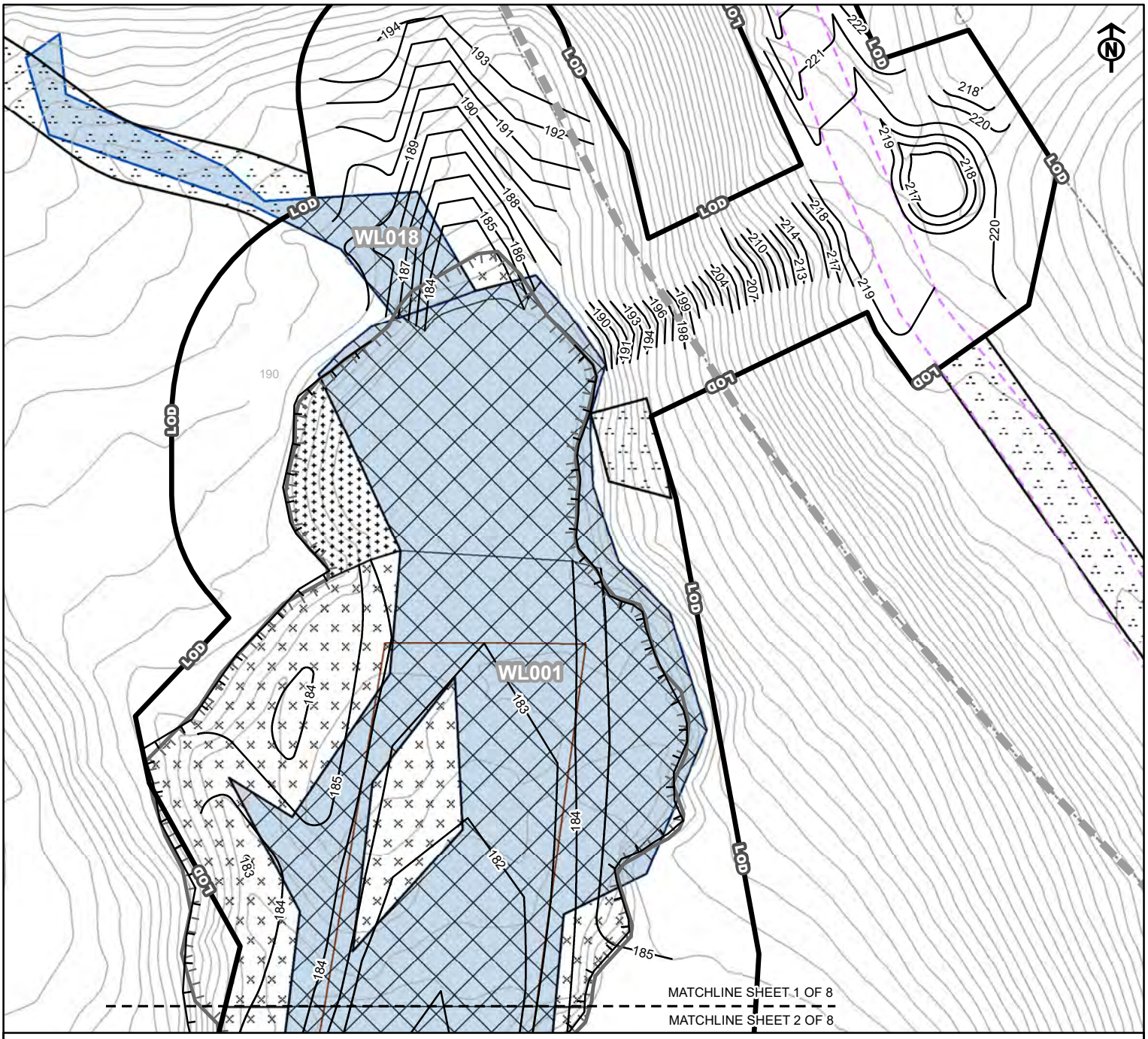
DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY

SOAPSTONE VALLEY PARK SEWER REHABILITATION

TRENCHLESS ALTERNATIVE

APPLICATION BY: DC WATER AND SEWER AUTHORITY

MAY 2018



LEGEND

- LIMITS OF DISTURBANCE
- NPS PROPERTY BOUNDARY
- CIPP SEWER
- WETLAND
- PROP. ROCK STRUCTURE
- EXISTING 1-FT CONTOUR
- PROPOSED 1-FT CONTOUR
- REHAB MANHOLE
- EXISTING 100-YR FLOODPLAIN
- PROPOSED FLOODPLAIN
- TRAIL
- WALKING PATH
- STAGING AREA

RIVERINE WETLAND IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = 0.00 AC / 0 SF
- LONG-TERM IMPACTS = 0.14 AC / 6,023 SF

FLOODPLAIN IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = <0.01 AC / 367 SF
- LONG-TERM IMPACTS = 0.05 AC / 2,150 SF

NOTES

1. ALL WETLAND IMPACTS OCCUR WITHIN RIVERINE (STREAM CHANNEL) WETLANDS. NO VEGETATED WETLANDS OCCUR WITHIN THE LOD.
2. WALKING PATHS WILL NOT RESULT IN IMPACTS TO RESOURCES.

WETLAND IMPACT PLATE

SHEET 1 OF 8

SCALE

1 INCH = 25 FEET

0 12.5 25 50 FEET

dc water is life

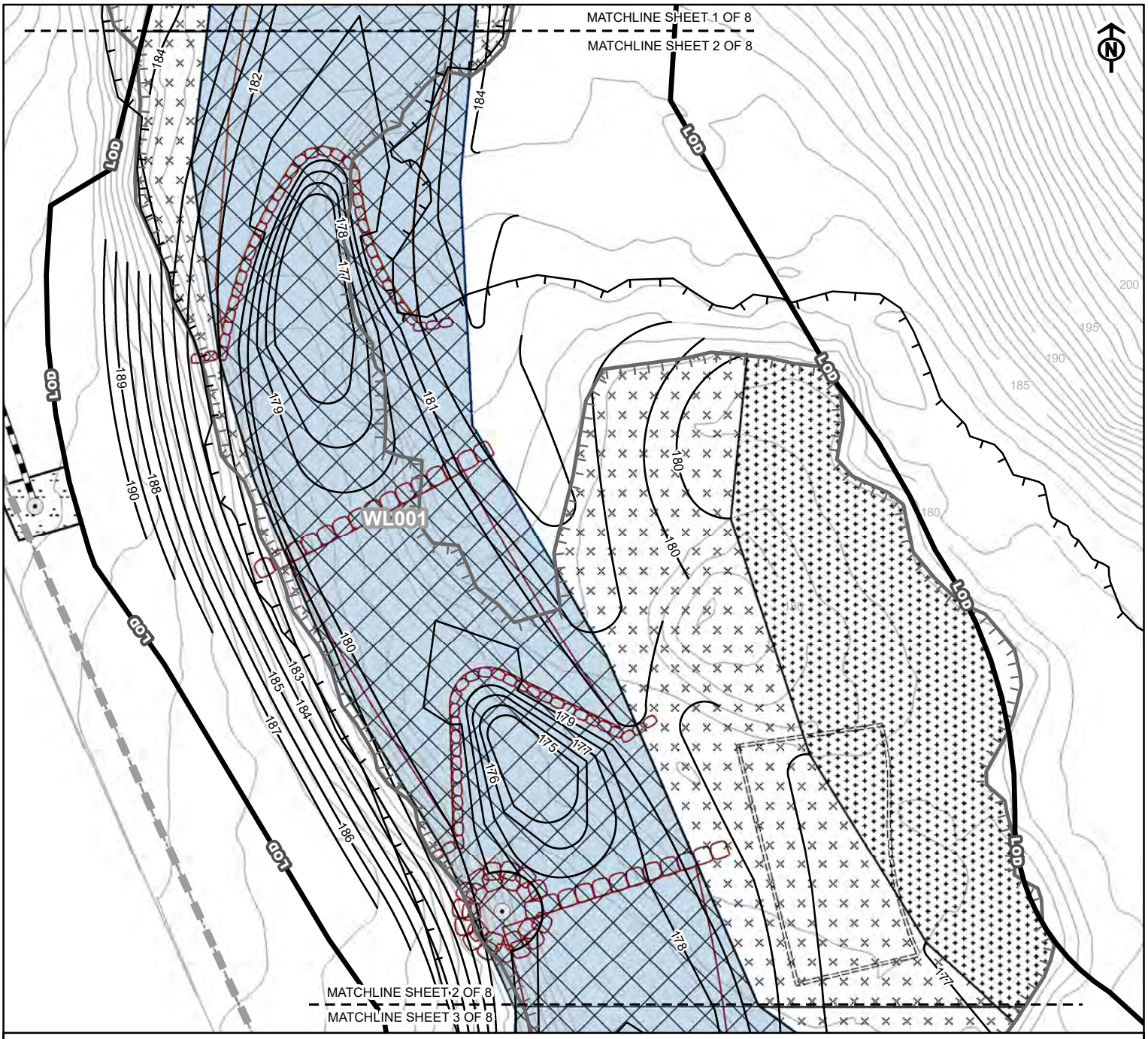
DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY

SOAPSTONE VALLEY PARK SEWER REHABILITATION

TRENCHLESS ALTERNATIVE

APPLICATION BY: DC WATER AND SEWER AUTHORITY

MAY 2018



LEGEND

- LIMITS OF DISTURBANCE
- NPS PROPERTY BOUNDARY
- CIPP SEWER
- WETLAND
- PROP. ROCK STRUCTURE
- EXISTING 1-FT CONTOUR
- PROPOSED 1-FT CONTOUR
- REHAB MANHOLE
- EXISTING 100-YR FLOODPLAIN
- PROPOSED FLOODPLAIN
- TRAIL
- WALKING PATH
- STAGING AREA

RIVERINE WETLAND IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = 0.00 AC / 0 SF
- LONG-TERM IMPACTS = 0.17 AC / 7,544 SF

FLOODPLAIN IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = 0.07 AC / 2,934 SF
- LONG-TERM IMPACTS = 0.10 AC / 4,149 SF

NOTES

1. ALL WETLAND IMPACTS OCCUR WITHIN RIVERINE (STREAM CHANNEL) WETLANDS. NO VEGETATED WETLANDS OCCUR WITHIN THE LOD.
2. WALKING PATHS WILL NOT RESULT IN IMPACTS TO RESOURCES.

WETLAND IMPACT PLATE

SHEET 2 OF 8

SCALE

1 INCH = 25 FEET

0 12.5 25 50 FEET

dc water is life

DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY

SOAPSTONE VALLEY PARK SEWER REHABILITATION

TRENCHLESS ALTERNATIVE

APPLICATION BY: DC WATER AND SEWER AUTHORITY

MAY 2018

LEGEND

- LIMITS OF DISTURBANCE
- NPS PROPERTY BOUNDARY
- CIPP SEWER
- WETLAND
- PROP. ROCK STRUCTURE
- EXISTING 1-FT CONTOUR
- PROPOSED 1-FT CONTOUR
- REHAB MANHOLE
- EXISTING 100-YR FLOODPLAIN
- PROPOSED FLOODPLAIN
- TRAIL
- WALKING PATH
- STAGING AREA

RIVERINE WETLAND IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = 0.04 AC / 1,760 SF
- LONG-TERM IMPACTS = 0.18 AC / 7,884 SF

FLOODPLAIN IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = 0.01 AC / 444 SF
- LONG-TERM IMPACTS = 0.03 AC / 1,176 SF

NOTES

1. ALL WETLAND IMPACTS OCCUR WITHIN RIVERINE (STREAM CHANNEL) WETLANDS. NO VEGETATED WETLANDS OCCUR WITHIN THE LOD.
2. WALKING PATHS WILL NOT RESULT IN IMPACTS TO RESOURCES.

WETLAND IMPACT PLATE

SHEET 3 OF 8

SCALE

1 INCH = 25 FEET

0 12.5 25 50 FEET

dc water is life

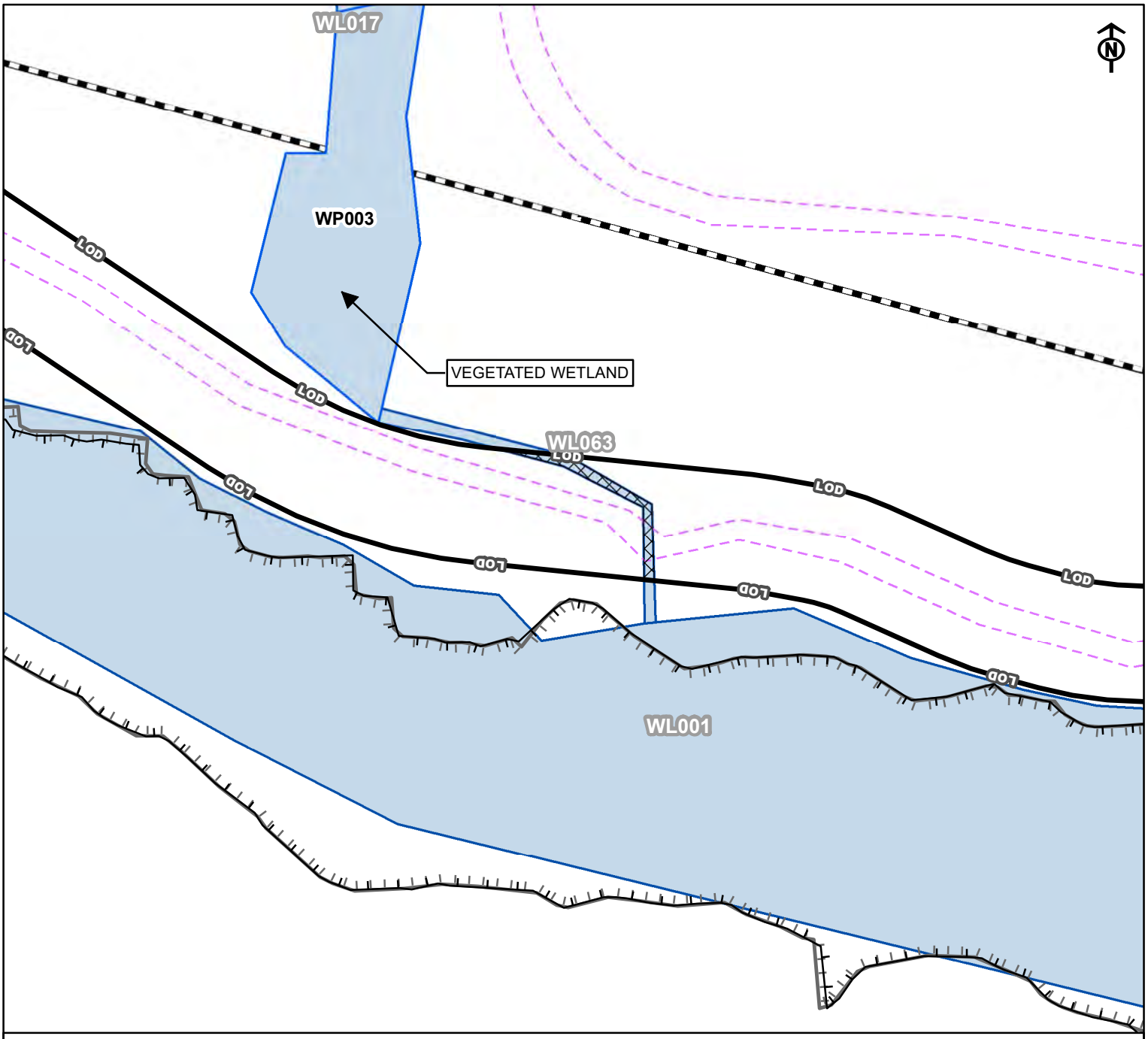
DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY

SOAPSTONE VALLEY PARK SEWER REHABILITATION

TRENCHLESS ALTERNATIVE

APPLICATION BY: DC WATER AND SEWER AUTHORITY

MAY 2018



LEGEND

- LIMITS OF DISTURBANCE
- NPS PROPERTY BOUNDARY
- CIPP SEWER
- WETLAND
- PROP. ROCK STRUCTURE
- EXISTING 1-FT CONTOUR
- PROPOSED 1-FT CONTOUR
- REHAB MANHOLE
- EXISTING 100-YR FLOODPLAIN
- PROPOSED FLOODPLAIN
- TRAIL
- WALKING PATH
- STAGING AREA

RIVERINE WETLAND IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = <0.01 AC / 59 SF
- LONG-TERM IMPACTS = 0.00 AC / 0 SF

FLOODPLAIN IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = 0.00 AC / 0 SF
- LONG-TERM IMPACTS = 0.00 AC / 0 SF

NOTES

1. ALL WETLAND IMPACTS OCCUR WITHIN RIVERINE (STREAM CHANNEL) WETLANDS. NO VEGETATED WETLANDS OCCUR WITHIN THE LOD.
2. WALKING PATHS WILL NOT RESULT IN IMPACTS TO RESOURCES.

WETLAND IMPACT PLATE

SHEET 4 OF 8

SCALE

1 INCH = 25 FEET

0 12.5 25 50 FEET

dc water is life

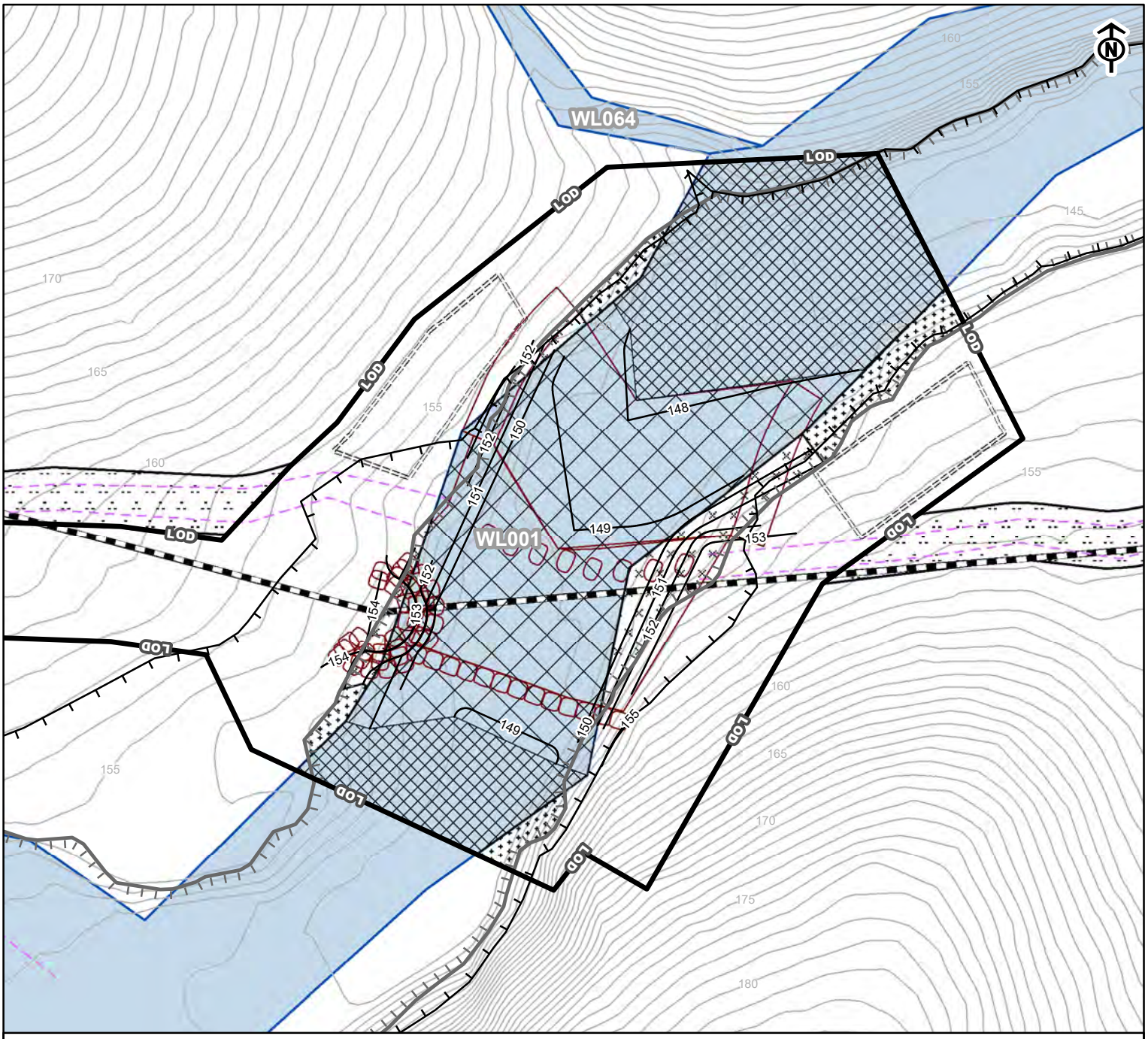
DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY

SOAPSTONE VALLEY PARK SEWER REHABILITATION

TRENCHLESS ALTERNATIVE

APPLICATION BY: DC WATER AND SEWER AUTHORITY

MAY 2018



LEGEND

- LIMITS OF DISTURBANCE
- NPS PROPERTY BOUNDARY
- CIPP SEWER
- WETLAND
- PROP. ROCK STRUCTURE
- EXISTING 1-FT CONTOUR
- PROPOSED 1-FT CONTOUR
- REHAB MANHOLE
- EXISTING 100-YR FLOODPLAIN
- PROPOSED FLOODPLAIN
- TRAIL
- WALKING PATH
- STAGING AREA

RIVERINE WETLAND IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = 0.05 AC / 2,390 SF
- LONG-TERM IMPACTS = 0.07 AC / 2,945 SF

FLOODPLAIN IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = 0.01 AC / 382 SF
- LONG-TERM IMPACTS = 0.01 AC / 519 SF

NOTES

1. ALL WETLAND IMPACTS OCCUR WITHIN RIVERINE (STREAM CHANNEL) WETLANDS. NO VEGETATED WETLANDS OCCUR WITHIN THE LOD.
2. WALKING PATHS WILL NOT RESULT IN IMPACTS TO RESOURCES.

WETLAND IMPACT PLATE

SHEET 5 OF 8

SCALE

1 INCH = 25 FEET

0 12.5 25 50 FEET

dc water is life

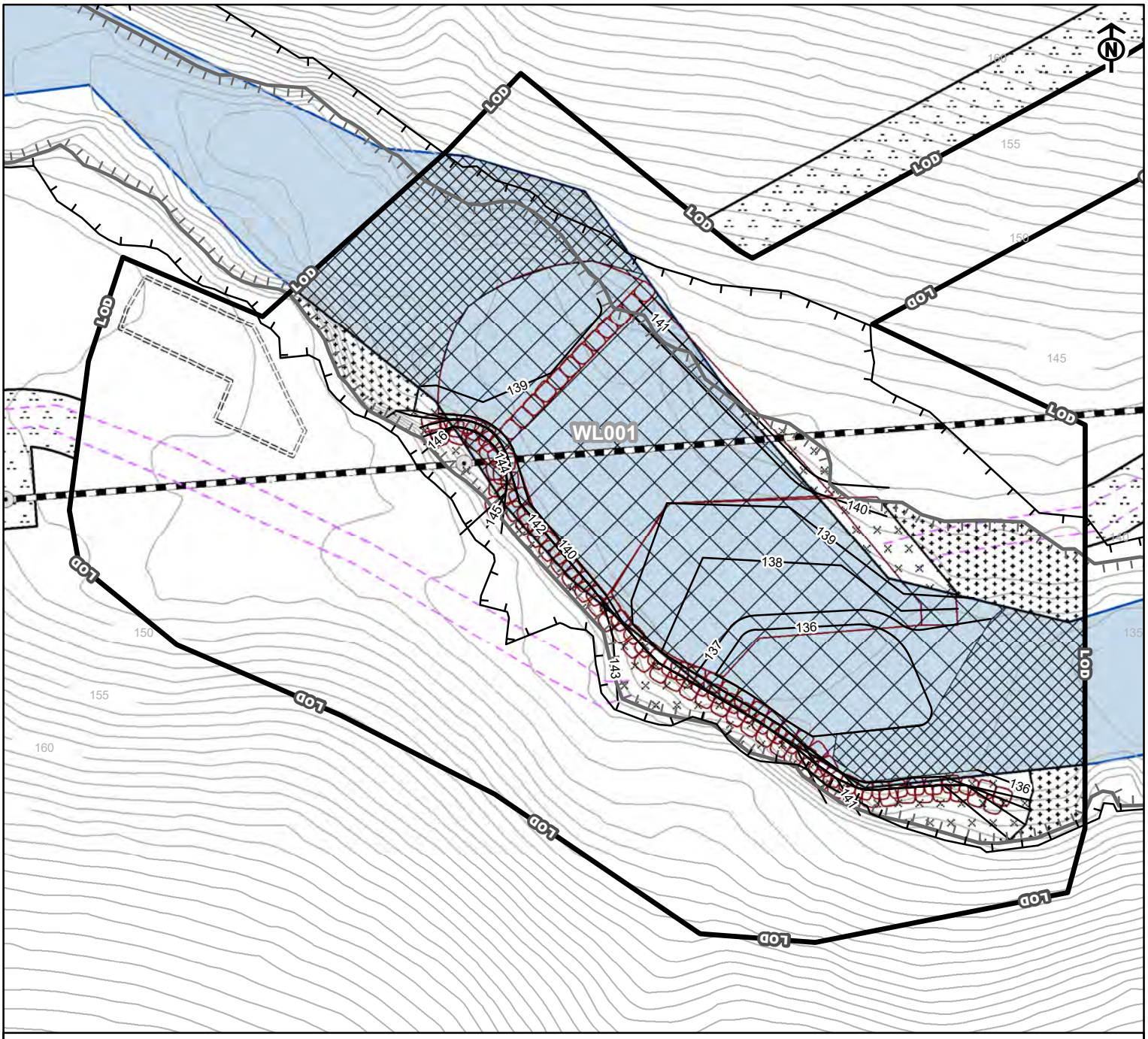
DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY

SOAPSTONE VALLEY PARK SEWER REHABILITATION

TRENCHLESS ALTERNATIVE

APPLICATION BY: DC WATER AND SEWER AUTHORITY

MAY 2018



LEGEND

LIMITS OF DISTURBANCE	CIPP SEWER	EXISTING 1-FT CONTOUR	REHAB MANHOLE	TRAIL
NPS PROPERTY BOUNDARY	WETLAND	PROPOSED 1-FT CONTOUR	EXISTING 100-YR FLOODPLAIN	WALKING PATH
	PROP. ROCK STRUCTURE		PROPOSED FLOODPLAIN	STAGING AREA

RIVERINE WETLAND IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = 0.04 AC / 1,864 SF
- LONG-TERM IMPACTS = 0.09 AC / 3,976 SF

FLOODPLAIN IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = 0.01 AC / 648 SF
- LONG-TERM IMPACTS = 0.02 AC / 980 SF

NOTES

1. ALL WETLAND IMPACTS OCCUR WITHIN RIVERINE (STREAM CHANNEL) WETLANDS. NO VEGETATED WETLANDS OCCUR WITHIN THE LOD.
2. WALKING PATHS WILL NOT RESULT IN IMPACTS TO RESOURCES.

WETLAND IMPACT PLATE

SHEET 6 OF 8

SCALE

1 INCH = 25 FEET

0 12.5 25 50 FEET

dc water is life

DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY

SOAPSTONE VALLEY PARK SEWER REHABILITATION

TRENCHLESS ALTERNATIVE

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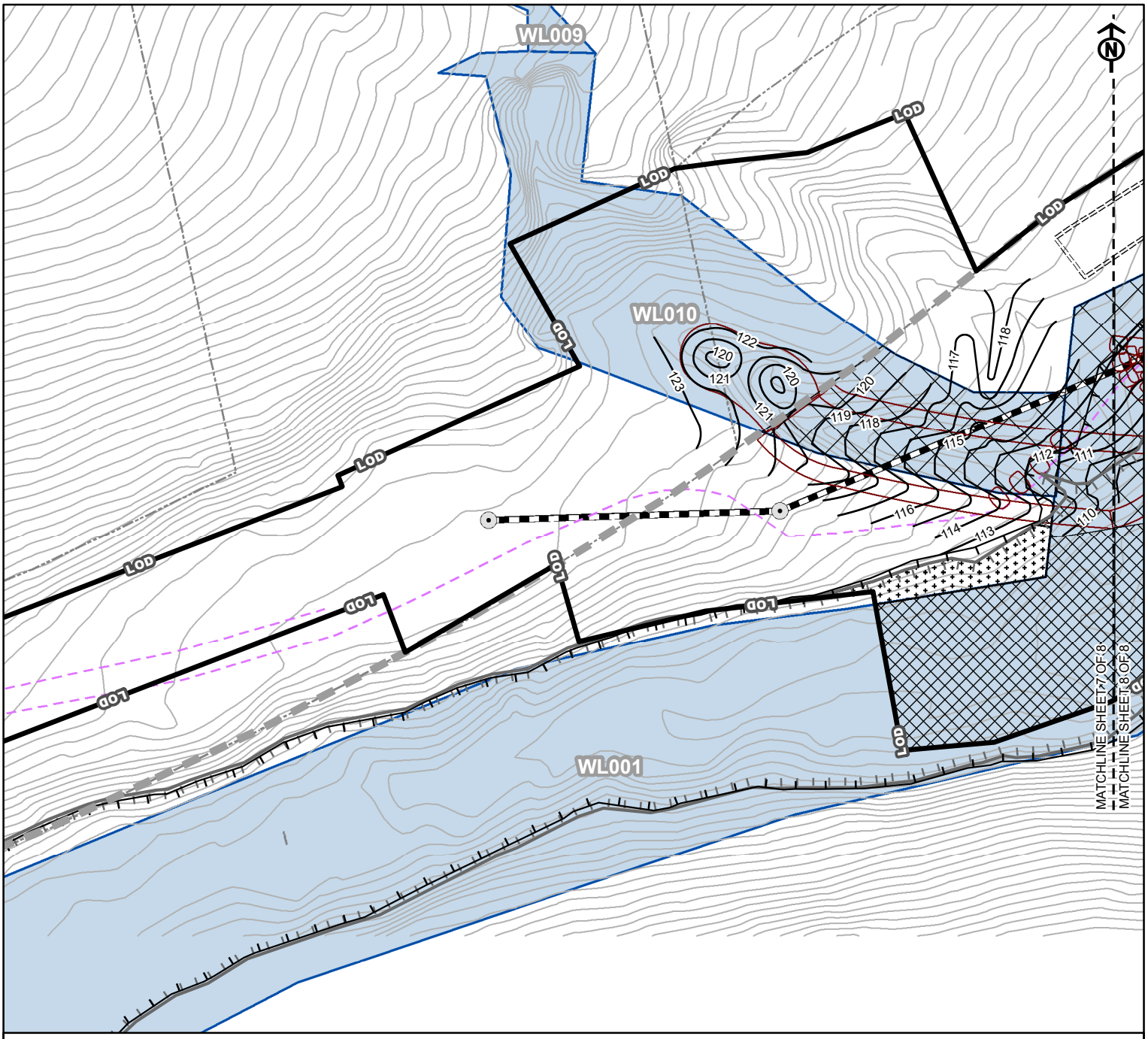

LEGEND

- LOD — LIMITS OF DISTURBANCE
- NPS PROPERTY BOUNDARY
- CIPP SEWER
- WETLAND
- PROP. ROCK STRUCTURE
- EXISTING 1-FT CONTOUR
- PROPOSED 1-FT CONTOUR
- REHAB MANHOLE
- EXISTING 100-YR FLOODPLAIN
- PROPOSED FLOODPLAIN
- TRAIL
- WALKING PATH
- STAGING AREA

RIVERINE WETLAND IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = 0.03 AC / 1,092 SF
- LONG-TERM IMPACTS = 0.03 AC / 1,150 SF

FLOODPLAIN IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = <0.01 AC / 194 SF
- LONG-TERM IMPACTS = <0.01 AC / 2 SF

NOTES

1. ALL WETLAND IMPACTS OCCUR WITHIN RIVERINE (STREAM CHANNEL) WETLANDS. NO VEGETATED WETLANDS OCCUR WITHIN THE LOD.
2. WALKING PATHS WILL NOT RESULT IN IMPACTS TO RESOURCES.

WETLAND IMPACT PLATE

SHEET 7 OF 8

SCALE

1 INCH = 25 FEET

0 12.5 25 50 FEET

dc water is life

DISTRICT OF COLUMBIA WATER AND SEWER AUTHORITY

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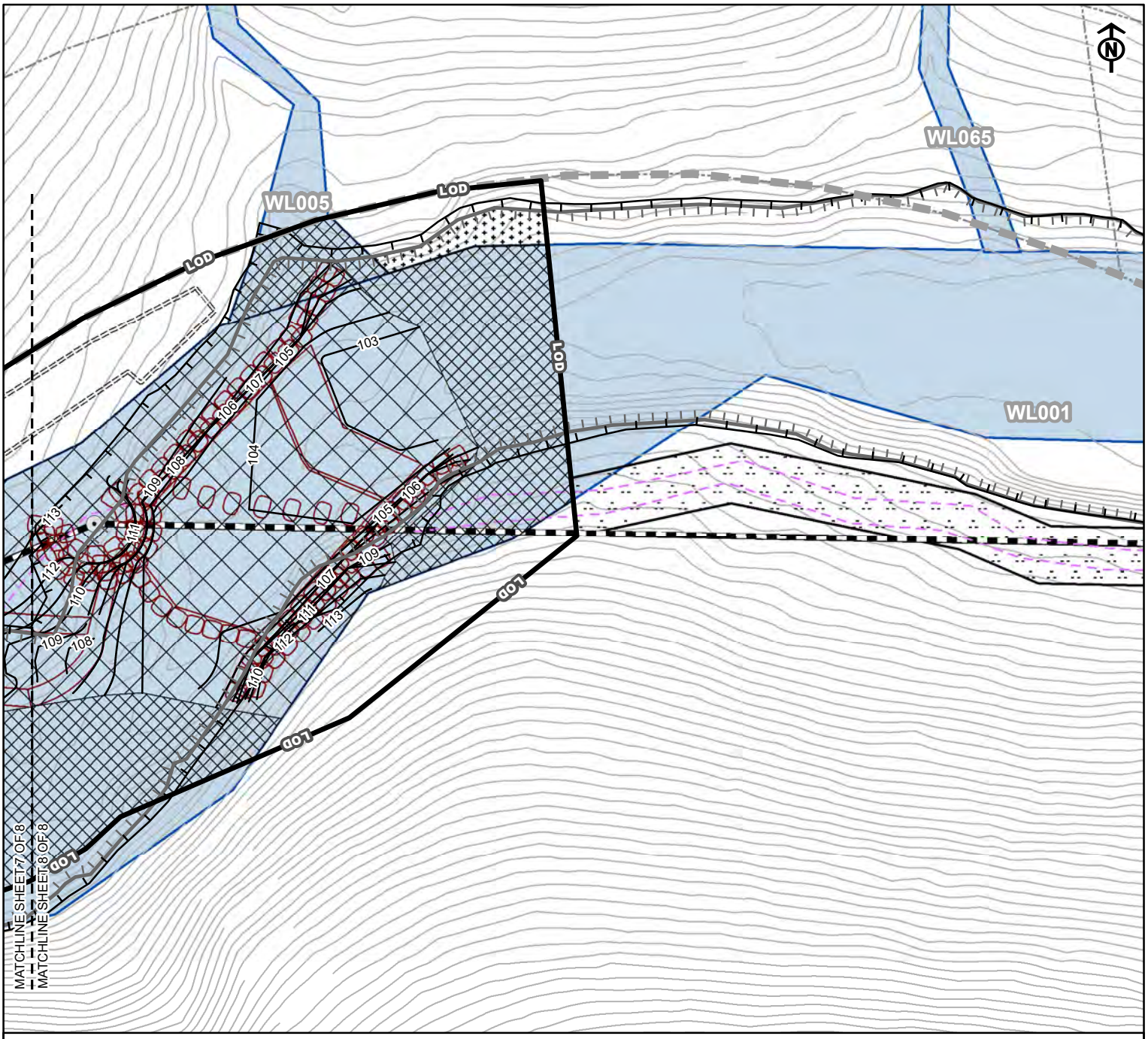

LEGEND

- LIMITS OF DISTURBANCE
- NPS PROPERTY BOUNDARY
- CIPP SEWER
- WETLAND
- PROP. ROCK STRUCTURE
- EXISTING 1-FT CONTOUR
- PROPOSED 1-FT CONTOUR
- REHAB MANHOLE
- EXISTING 100-YR FLOODPLAIN
- PROPOSED FLOODPLAIN
- TRAIL
- WALKING PATH
- STAGING AREA

RIVERINE WETLAND IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = 0.05 AC / 2,172 SF
- LONG-TERM IMPACTS = 0.09 AC / 3,926 SF

FLOODPLAIN IMPACTS - (THIS SHEET ONLY)

- SHORT-TERM IMPACTS = <0.01 AC / 141 SF
- LONG-TERM IMPACTS = 0.00 AC / 0 SF

NOTES

1. ALL WETLAND IMPACTS OCCUR WITHIN RIVERINE (STREAM CHANNEL) WETLANDS. NO VEGETATED WETLANDS OCCUR WITHIN THE LOD.
2. WALKING PATHS WILL NOT RESULT IN IMPACTS TO RESOURCES.

WETLAND IMPACT PLATE

SHEET 8 OF 8

SCALE

1 INCH = 25 FEET

0 12.5 25 50 FEET

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