



United States Department of the Interior

NATIONAL PARK SERVICE
423 Forest Resources Building
University Park, PA 16802

April 2018

Memorandum

To: Timothy Blumenschine, Resource Management Division, Petersburg National Battlefield

From: Peter Sharpe Ph.D., PWS, Hydrologist, Northeast Region

Subject: Wetland Delineation and Watershed Analysis Report for Travel, Pin Oaks and Whitehill boundary sections of Petersburg National Battlefield (PETE)

Report Summary

The objective of this investigation was to respond to a request for regional assistance for a comprehensive delineation of wetland habitats subject to jurisdiction under Section 404 of the Clean Water Act and all wetlands subject to National Park Service (NPS) procedures for implementing *Director's Order #77-1: Wetland Protection* within the Whitehill section of the Petersburg National Battlefield park boundary. A secondary objective was to provide the park with a basic watershed analysis for the Whitehill drainage area. This work utilized the U.S. Army Corps of Engineers (USACE) Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain (Version 2.0) (November 2010) as the primary methodology for making wetland determinations in the field and was conducted during non-growing season conditions. One palustrine forested wetland encompassing 22.64 acres and one riverine wetland totaling 0.08 acres were identified and delineated from 8-10 August 2017 within the 27.52 acre study area (Fig. 1). The observed palustrine wetland habitat was classified as palustrine, forested, broad leaved deciduous, seasonally flooded, partly drained (PFO1Cd) habitat. The mapped riverine system was classified as a riverine, intermittent, streambed, mud system (R4SB5). Both of the identified and mapped wetlands meet the U.S. Army Corps of Engineers criteria and the Cowardin et al. (1979) definitions of wetland and waterway habitats. A combination of desktop watershed delineations using the USGS StreamStats software coupled with field observations of anthropogenic drainage features were used to make a general determination of the contributing watershed to the study area. Based on this analysis it appears that the 12 inch diameter reinforced concrete pipe owned by the City of Petersburg which serves as the primary means of conveying water out of the study area is insufficiently sized to pass the modeled 2-year peak urban flow.

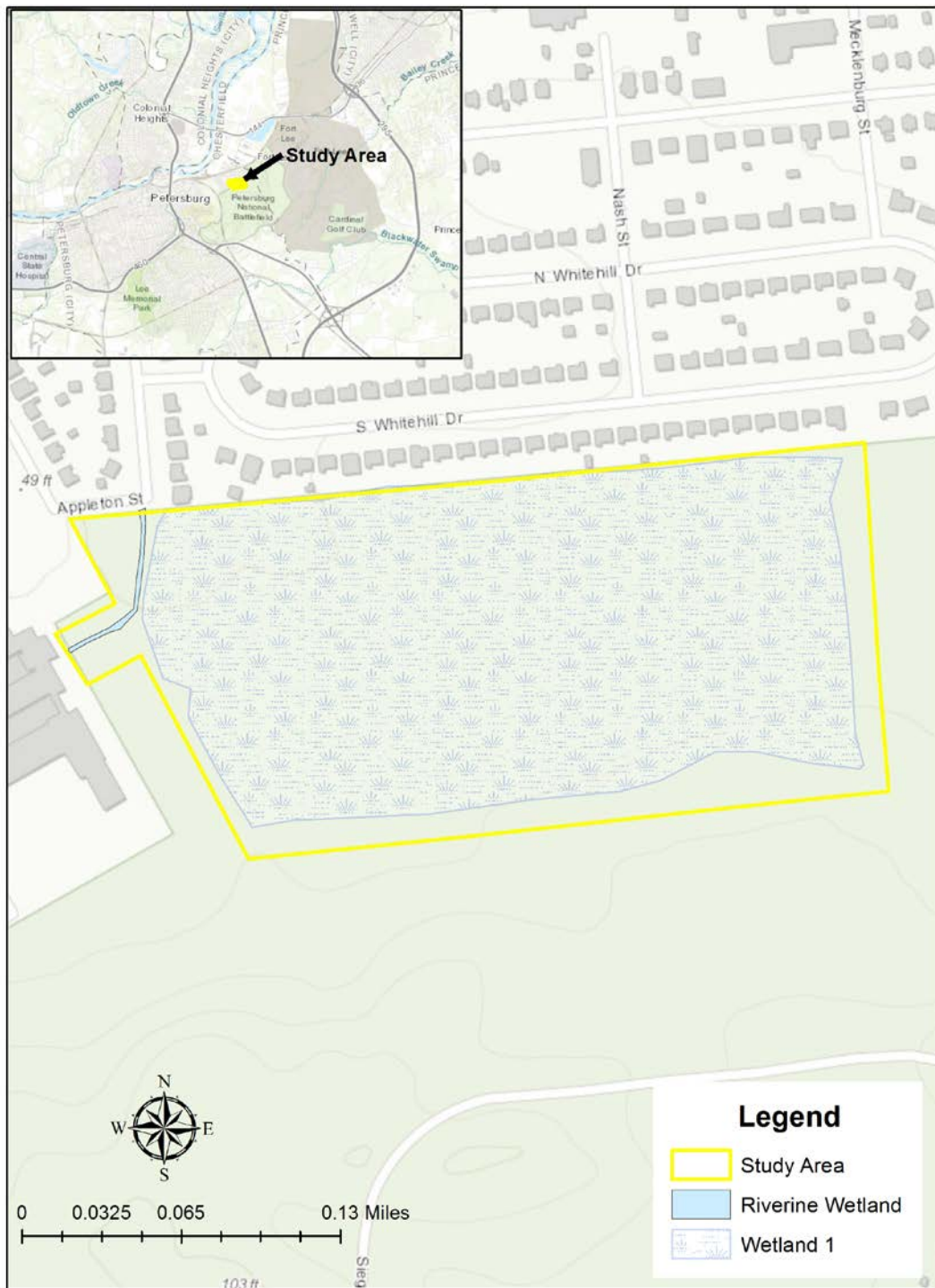


Figure 1. Whitehill development study area map and palustrine/riverine wetland features overview.

Study Objectives

The purpose of this investigation was to provide detailed wetland/aquatic resource identification and boundary information in support of a flooding abatement technical assistance request within PETE (see Fig. 1). A second objective of this effort was to provide NPS staff at the park with a basic watershed assessment for the subject area in an effort to better understand the surface flow dynamics behind the flooding experienced within this area of the park and the adjacent Whitehill neighborhood (Fig. 1). The information obtained from this effort may be utilized for park compliance and planning purposes for potential flooding remediation alternatives and any future hydrologic investigations within this section of the park (Fig. 1).



Photograph 1 (P1). Photo looking Northeast at Wetland 1 and a few of the CCC era drainage features which bisect the habitat within the study area boundary at PETE. August 2018

Field Participants

Peter J. Sharpe, NPS

Timothy Blumenschine, NPS

Introduction

It is the mission of the National Park Service to preserve and maintain the natural and cultural resources of Petersburg National Battlefield and to interpret those same resources to the visiting public and the scientific and scholarly community. Following a traverse of the 27.52 ac study area, wetlands and associated aquatic resources were delineated in the field by the NPS staff listed within this report and located using a GPS system capable of obtaining sub-meter accurate readings (Trimble Geo 7X) for purposes of accurately mapping these aquatic resources. The information contained here-in can be used for external (Section 404 Clean Water Act, and NEPA Compliance), as well as, internal D.O. #77.1 wetlands protection compliance.

The NPS through Director's Order #77-1 requires mapping of wetlands and all other "waters of the United States" via a slightly different criteria than the USACE 1987 manual and associated regional supplements, thus the two types of wetland determination methods employed at PETE were: (1) Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0) and (2) the 1979 USFWS *Classification of Wetlands and Deepwater Habitats of the United States*.

The NPS recognizes that most wetlands on NPS lands will have all three parameters required by the 1987 Corps Manual and its associated regional supplement. Therefore, D.O. #77-1 provides procedures for field biologists to follow so that that wetland delineation and mapping projects on NPS lands will satisfy both the Clean Water Act wetland definition (1987 Corps Manual) and the NPS standard for identifying wetlands (Cowardin et al. 1979), for brevity, only the standard applicable for PETE is described below for a more detailed treatment of the other standards the reader is directed to D.O #77-1:

1. For sites with vegetation and soils, use the most recent version (and any approved Regional supplements) of the 1987 Corps Manual, including "problem area" and "atypical situation" procedures (this procedure was utilized at PETE)

Methods - Interim Regional Supplement USACE Method (1987 Corps Manual) (Routine Onsite Determination, 3-Parameter Approach)

The USACE method for identifying the wetland / upland boundary uses the definition as outlined in the U.S. Army Corps of Engineers *Wetlands Delineation Manual, 1987*, which defines a wetland as:

"Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

Wetland boundaries were primarily determined by establishing a series of unmarked transects from a known wetland into known upland locations surrounding the area under examination. At suspected boundary locations along the transect investigators looked for evidence of hydric soils, hydrophytic vegetation, and wetland hydrology, as well as, any obvious topographic changes (e.g. abrupt toe-of-slope line) along the wetland/upland perimeter that might occur.

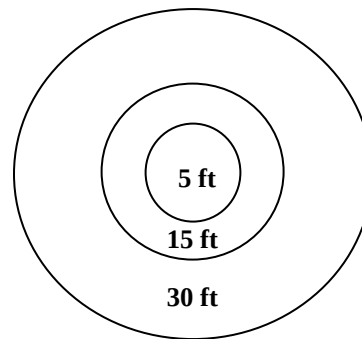


Figure 2. Typical wetland vegetation survey plot utilized within the study area.

Parameter 1- Hydrophytic Vegetation Criteria

For determining the presence of hydrophytic vegetation, plant species within each community were visually identified by strata (e.g. trees, saplings/shrubs, herbs/bryophytes and woody vines) and listed in descending order of dominance. The USACE defined sampling stratum has 5 percent or more total plant cover. If a stratum had less than 5 percent cover during the growing season, then those species and their cover values were recorded on the data form, assuming application of Indicator 3 (Prevalence Test) was necessary. However, these species were not generally included on the data sheets if the wetland determination could be made via Indicator 2 (Dominance Test). For Indicator 2 only those species that comprised 5% or more of a given strata were assessed.

Vegetation survey plots conformed to current USACE supplement guidelines and involved the use of nested circular plots radiating outward from the soil/hydrology test pit (Fig. 2). Plot sizes were as follows:

1. Tree stratum – 30 ft (9.1 m) radius
2. Woody vines (if present) – 30 ft (9.1 m) radius
3. Herb stratum – 5 ft (1.5 m) radius
4. Sapling/shrub stratum – 15 ft (4.6 m) radius

The wetland indicator status of observed dominant plant species was determined using the 2016 National Wetland Plant List for the State of Virginia:

- **OBL** (Obligate Wetland Plants) occur greater than 99 percent of the time in wetlands under natural conditions.
- **FACW** (Facultative Wetland Plants) occur between 67 and 99 percent of the time in wetlands under natural conditions.
- **FAC** (Facultative Plants) occur between 33 and 67 percent of the time in wetlands under natural conditions.

- **FACU** (Facultative Upland Plants) occur between 1 and 33 percent of the time in wetlands under natural conditions.
- **UPL** (Obligate Upland Plants) occur less than 1 percent of the time in wetlands under natural conditions.

Plant species dominance was determined as the most abundant species that individually or collectively accounted for more than 50 percent of the total absolute coverage of vegetation in the stratum, plus any other species that, by itself, accounts for at least 20 percent of the total (i.e. the 50/20 Rule).

The Army Corps regional supplement (Atlantic and Gulf Coastal Plain) to the original 1987 USACE manual identifies 4 primary indicators of hydrophytic vegetation, any of which, when met, signifies that the community indicates a wetland plant community. For purposes of brevity this section will only cover the most commonly encountered indicator at PETE (e.g. Indicator 2). For a complete description of all of the indicators the reader is directed to view the U.S Army Corps of Engineers (USACE) Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0), November 2010.

For a plant community to meet the vegetation criteria under Indicator 2 (a commonly employed indicator at PETE) more than 50 percent of the dominant plant species across all strata must be rated OBL, FACW, or FAC.

Parameter 2 - Hydrology Criteria

Wetland hydrology indicators provide evidence that episodes of inundation or soil saturation lasting more than a few days during the growing season have occurred repeatedly over a period of years and that the timing, duration, and frequency of wet conditions have been sufficient to produce a characteristic wetland plant community and hydric soil morphology. As stated in the Atlantic and Gulf Coastal Plain regional supplement the growing season begins when two or more non-evergreen vascular plant species growing within the study area exhibit one or more of the following biological indicators:

1. Emergence of herbaceous plants from the ground
2. Appearance of new growth from vegetative crowns (e.g., in graminoids, bulbs, and corms)
3. Coleoptile/cotyledon emergence from seed
4. Bud burst on woody plants (i.e., some green foliage is visible between
5. spreading bud scales)
6. Emergence or elongation of leaves of woody plants
7. Emergence or opening of flowers

Hydrologic indicators of wetland conditions are based on the direct observation of surface water or groundwater during a site visit (Group A indicators), evidence that the site is subject to flooding or ponding, although the inundation need not be directly observed at the time of the investigation (Group B indicators). The inundation (Group B) indicators include water marks, drift deposits, sediment deposits, and similar features. Other hydrologic indicators consist of evidence that the soil is saturated currently or was saturated recently such as oxidized rhizospheres and the presence of reduced iron or sulfur in the soil profile (Group C indicators), which indicate that the soil has been saturated for an extended period. The final group of hydrologic indicators (Group D) consists of landscape, vegetation, soil features, and evidence from other sources of data that indicate contemporary rather than historical wet conditions. Wetland hydrology indicators are intended as one-time observations of site conditions that are sufficient evidence of wetland hydrology in areas where hydric soils and hydrophytic vegetation are present. For a site to meet the wetland hydrologic criteria it need only possess one primary indicator or two secondary indicators from one of the aforementioned groups.

Parameter 3 - Hydric Soil Criteria

The National Technical Committee for Hydric Soils defines a hydric soil as a soil that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (USDA Soil Conservation Service 1994). One of the most significant changes to the original 1987 USACE manual with regards to wetland boundary determinations is in the area of hydric soil recognition and characterization. The revised indicators are much more specific and cover a broader range of potential wetland types than the original 1987 manual criteria.

Soil pits were excavated to a maximum depth of 21 inches (45.72 cm) using a sharp shooter shovel, unless on-site conditions such as shallow bedrock or buried alluvial cobbles prohibited excavation or one or more of the hydric soil indicators were met. The data sheets for each mapped wetland include information on the soil profile colors, presence/absence of redoximorphic features, texture, and presence/absence of any shallow confining layers and their depths on-site. A 2-inch diameter Dutch auger was utilized to make soil determinations along the wetland boundaries along with the vegetation and hydrology assessments.

GPS Survey of Wetland Boundaries

Pink wetland delineation flags were marked with a unique alpha numeric code and hung at regular intervals around the perimeter of each identified wetland habitat and located using a sub-meter accurate GPS system. Representative wetland test pits were also similarly flagged and located. GPS-based coordinates were collected for wetland test pit and boundary flags between 8-10 August 2017, using a Trimble Geo7X receiver with an external Hurricane antenna in the WGS 1984 datum, in meter coordinate. A minimum of 4 satellite vehicles were tracked and where possible a maximum Position Dilution of Precision (PDOP) of 6 was maintained for each set and a minimum of 50 positions were taken at each point feature. The data were post-processed and differentially corrected using Pathfinder Office 5.85 and base

data were downloaded from the CORS, LOYOLA LS06, Virginia (ITRF00 (1997) derived from IGS08 (New)) site. The corrected data were then exported to shapefile format for polygon creation in ARCMAP 10.5. Following this procedure over 83% of our collected GPS data has accuracies ranging from 0 – 3.5 ft, using the above standards. No tests were done to confirm the X/Y direction accuracy during this investigation. Table 1 below shows a more complete breakdown the GPS data's horizontal precision.

Table 1. Estimated accuracies for the 2945 corrected GPS positions for the Whitehill Flooding Technical Assistance Request.

Horizontal Precision	Percentage of GPS Positions within Range
0 - 2 in	0%
2 - 6 in	0%
6 - 12 in	0.37%
12 - 20 in	37.86%
20 - 40 in	45.57%
40 - 79 in	9.85%
79- 197 in	6.18%
>197 in	0.17%

Wetland Descriptions

Wetland 1 (Size – 22.64 ac): This wetland ecosystem lies almost entirely within the mapped study area boundary shown in Figure 1. The site occupies a historically disturbed bottomland location adjacent to a small housing development. Over 30 small ($\approx$ 1-2 feet deep, 2-4 feet wide) drainage ditches bisect this site in a variety of north/south and northwest/southeast directions (see Photograph 1 and Fig. 3). Presumably these earth works were put in place to promote drainage off-site and according to park staff (Julia Steele) they were probably constructed by the CCC in the early 1940s, but possibly related to WWI Camp Lee, or WWII Fort Lee activities. Regardless of their intent or origins they currently shunt all runoff waters within this watershed to a single collection point (see Fig. 4) which consists of a 12-inch diameter reinforced concrete pipe (see Photograph 4). Numerous incidents of flooding have been observed within the NPS lands in this area and the adjacent neighborhood which over time have likely created conditions ideal for the formation of wetland habitat.

Wetland indicators within this location were originally observed in the plant community and classified and reported by Patterson (2008) as a Coastal Plain/Piedmont Floodplain Swamp Forest (Mixed Oak/Red Maple) Landcover Class. This investigation and boundary delineation in August 2017 supports that original determination. The Cowardin et al. (1979) classification of this wetland is a palustrine, forested, broad leaved deciduous, seasonally flooded, partially drained/ditched system (PFO1Cd). Due to the anthropogenic nature of the site three separate wetland test plots/pits were sited to adequately characterize the community. Direct observations of standing water were made (see data sheet WTP-2, Appendix B), however, the majority of the site was dry at the time of the investigation (see Photograph 2). WTP-1 was a notable exception which was sited very near the main drainage feature of the area the site soils

conformed to the F3 hydric soil indicator. Typical dominant canopy species observed within the wetland test plots at the time of the investigation were *Liquidambar styraciflua*, *Quercus phellos*, and *Ulmus Americana* with an understory dominated by *Nyssa sylvatica*. Ground cover was generally sparse in many places and similar to Patterson (2008) *Pinus taeda* was also found scattered throughout the canopy in 2017.

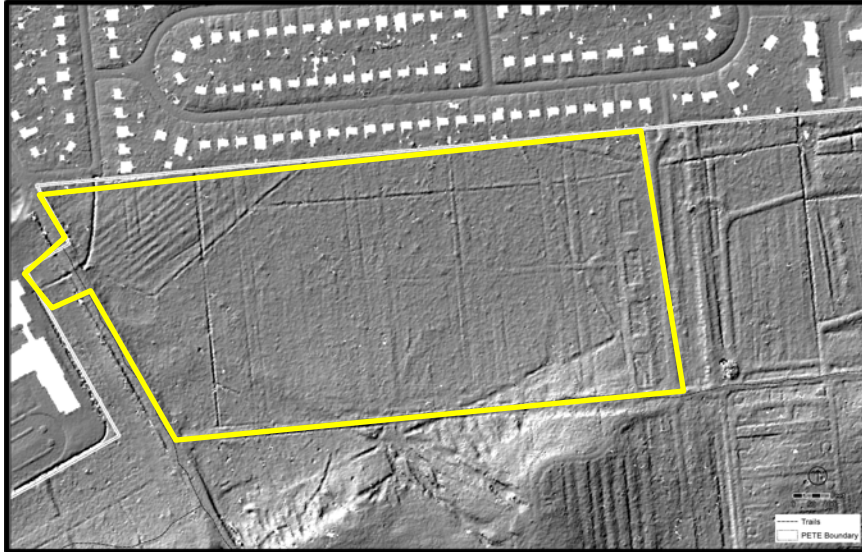


Figure 3. LiDAR image of the study area provided by PETE staff (Adam Baghetti). From the imagery the network of drainage ditches bisecting the Study Area (yellow boundary) can be easily seen.

Wetland 1 Functions and Values

A qualitative function and value analysis utilizing the US Army Corps of Engineers – New England District (*The Highway Methodology Workbook Supplement*, September 1999) was also conducted as supplement to this effort. Assessed principal function and values associated with Wetland 1 were numerous and included floodflow alteration, sediment toxicant/ retention, nutrient removal, production export, wildlife habitat,



Photograph 2 (P2) – Wetland 1 (PSS1E) view facing north.
Photo September 2017 – P. Sharpe.

recreation, educational/scientific value, and uniqueness/heritage. The combined cultural aspects of this wetland, its relative size within its contributing watershed, and proximity to schools and urban neighborhoods make this a highly valuable wetland ecosystem in terms of natural resource interpretation.

Riverine Wetland (Size – 0.08 ac):

Riverine wetlands as defined in Cowardin et al. (1979) includes all wetlands and deepwater habitats contained within a channel unless that wetland is dominated by trees, shrubs, or persistent emergents, emergent mosses, or lichens or is contained within water possessing ocean derived salts in excess of 0.50 ppt. Cowardin et al. (1979) further defines the definition of a channel as “an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water.

The riverine feature mapped in August 2017 and shown in Photograph 3 below exhibited characteristics of a riverine, intermittent, streambed, mud system (R4SB5). The flow regime of the waterway was determined based off of the presence of a defined bed and banks, natural channel substrates, and the lack of two or more obligate aquatic taxa (i.e. fishes or benthic macroinvertebrates) at the time of our survey. Additionally an assessment of basic hydrologic condition following the methodology described in Fritz et al. (2006) was conducted post-hoc. This unnamed riverine feature is a first order drainage to the Appomattox River originating out of a stormwater culvert at the north western limit of the study area (Figure 3 – “Origin”). This aquatic feature displays evidence of a low gradient system with substrates primarily comprised organic material and mud, with surface water present, but exhibited no signs of visible flow



Photograph 3 (P3) – Mapped riverine wetland system shown on NPS lands view is southeast looking upstream at the system and its riparian zones September 2017 – P. Sharpe.

during this survey. Indications of incision and erosion were observed, however, it appeared as if the system had stabilized with respect to the flow control points (culverts) shown in Photographs 3 and 4. Obligate aquatic taxa were not observed, however, numerous adult green frogs (*Rana clamitans melanota*) were seen utilizing the small pool directly below the culvert outflow in Photograph 3.

Riverine System Functions and Values

As this system appears to be intermittent in flow regime status it likely possess little wildlife habitat (aquatic) function and value apart from providing a seasonal breeding or resting/escape cover component for amphibians. The waterway appears to be relatively stable with some albeit limited connectivity to its floodplain (Wetland-1) within the study area. This system also



Photograph 4 (P4) – 12 inch RCP which serves as the only visible outlet for the 85.52 acre watershed system draining to this point. View is northwest August 2017 – P. Sharpe.

appears to contribute organic materials (i.e. small woody debris and leaf detritus) to the Appomattox River and is nearby a local school giving it some educational value as well.

Watershed Analysis (Basin Size - 85.52 acres)

A preliminary watershed analysis using StreamStats online software https://water.usgs.gov/osw/streamstats/ss_documentation.html was utilized to develop a suite of watershed characteristics and modeled flows in an effort to determine potential flooding characteristics within the project study area. The delineated basin was assessed in the field over the August 2017 field investigation and modified within the StreamStats software post-hoc in the office (Figure 4). As this is a highly modified landscape the watershed didn't conform to the

basic model generated in the StreamStats. The delineated watershed receives stormwater runoff from an elementary School, NPS roads (e.g. Siege Road), and an adjacent neighborhood (Pin Oaks Development). Surface water flow arrows were added to the basin in ARCMAP 10.5 to illustrate the surface flow field and the collection systems currently in place to transport runoff waters either to Poor Creek to the west or to the 12 inch reinforced concrete pipe shown in Photograph 4. Developed lands (National Land Cover Data Set 2006 data) cover approximately 22% of the delineated basin with a corresponding percentage of impervious area (NLCD 2011) of 4.63%. The StreamStats software allows the user to calculate a peak flow statistics report using a variety of different scenarios. In this instance the Peak-Flow statistics that were employed were the (Peak Urban06 2014) scenario, which represented a more conservative urban

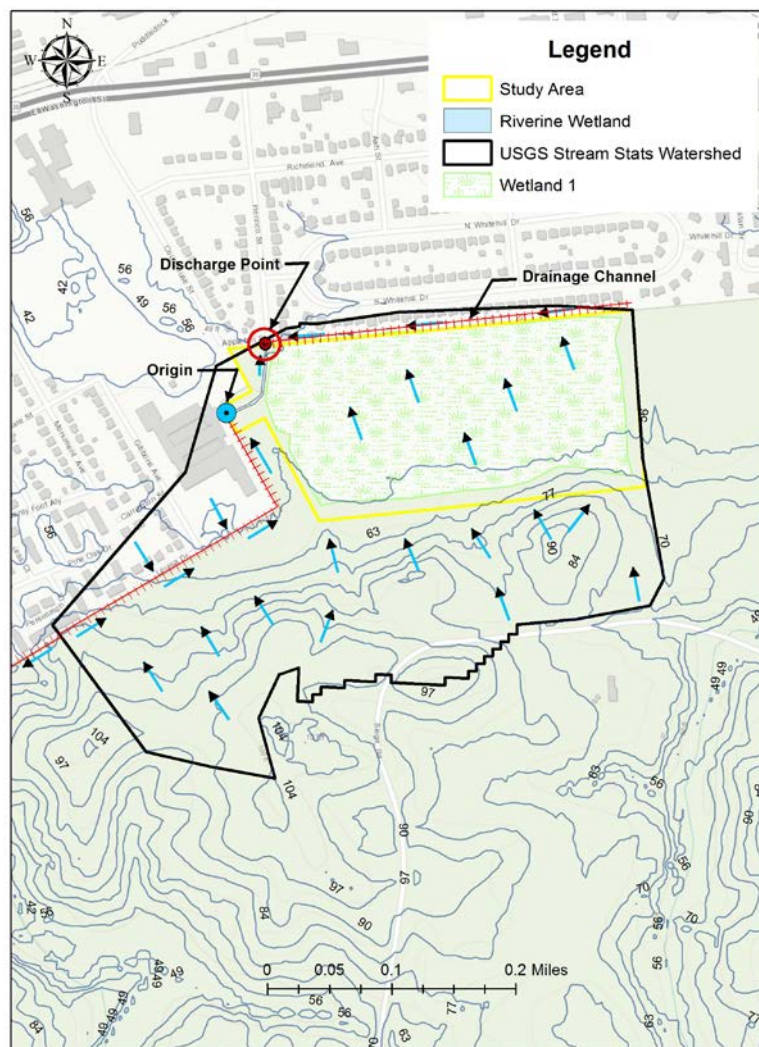


Figure 4. USGS StreamStats watershed boundary (modified and imported into ARCMAP 10.5) showing contours lines (feet) the surface water flow field (arrows) and the existing stormwater collection system in place. It should be noted that all of the flows shown here eventually discharge into a single collection point “Discharge Point” on the map.

modeling effort than the Peak Urban11 2014 scenario (Austin et al. 2011 and Austin, 2014).

The resulting peak flow statistics for the 2-year Peak Flood and the 100-year Peak Flood were then used in conjunction with the Headwater Depth for Concrete Pipe Culverts with Inlet Control nomograph (Chart 1B) from the Federal Highways Administration (FHWA) publication No. FHWA-HIF-12-026. This procedure allowed for a reasonable estimate to be made of appropriate culvert sizing to convey stormwater flows offsite.

An important disclaimer to this analysis is that the StreamStats calculations and model used, as well as, the FHWA nomograph was not done by a professional engineer or storm water hydrologist. Therefore any analysis reported here should be considered provisional and subject to change upon peer review. With these caveats in mind - the 2-year Peak Urban flood within the Figure 3 watershed was calculated at 25.7 cfs (cubic feet per second) with a subsequent 100-year Peak Urban Flow of 162 cfs. Based on these peak flows and the Chart 1B FHWA nomograph the ideal diameter of the culvert shown in Photograph 4 should be somewhere between 27 and 30 inches (it is currently 12 inches in diameter). Using the same nomograph but with the 100-year Peak Urban Flow of 162 cfs the culvert would need to be at least 54 inches in diameter in order to adequately pass stormwater through the site assuming an unsubmerged headwater depth of 1 foot.

These calculations, coupled with the evidence of a large forested wetland ecosystem (Wetland – 1) occupying lands rated as having low levels of hydric soil components (5B Emporia Sandy Loam), no historic National Wetland Inventory Designation (see Appendix A mapping), and public, as well as, NPS observations of severe flooding in this area lend support to the theory that the existing culvert (Photograph 4) is improperly sized to convey stormwater offsite.

Recommendations

Large, mature forested wetlands such as the ecosystem delineated and reported herein are extremely difficult to replace once they are lost. Though the wetland system in question may have formed under anthropogenic circumstances the fact that it exists means that it is afforded protection under the Organic Act, the Clean Water Act, and DO #77.1. Keeping these NPS policy and federal regulatory obligations in mind means that even if the existing culvert and associated drainage system were to be enlarged to promote drainage off-site this would likely alter the existing hydroperiod within Wetland-1 causing it to become drier and possibly convert to a non-wetland state. This would be considered a permanent impact to the wetland that would require compensation under DO #77.1 and possibly Section 404 of the Clean Water Act. Additionally, the NPS does not own the 12 inch RCP in question, that structure and its associated drainage network is the property of the City of Petersburg, (P. Sharpe personal communication, T. Blumenschine August 2017).

Low Earth Berm

With the aforementioned information as context I recommend that the PETE staff consider the construction of a low (3-4 feet high) berm system that runs along the northern boundary of Wetland-1 between the Whitehill Development and the NPS lands. The berm system would

need to be designed and built such that overland flows were captured and retained within NPS lands while providing minimal impact to the existing viewshed from the adjacent neighborhood. The berm would also serve as a simple restoration tool to alleviate the influence of the numerous ditches which currently bisect this wetland system (see Photograph 1 and Fig. 3). Engineering design work and coordination with the City of Petersburg would still need to be conducted, as well as, compliance with NPS cultural resource staff, and the Norfolk District of the U.S. Army Corps of Engineers to ensure that this solution doesn't adversely impact cultural resources/landscapes located on-site and ensure Clean Water Act compliance.

Dr. Kevin Noon (NPS-WRD) or myself could be your principal point of contacts for guidance related to the development of a formal wetland statement of findings should the proposed project proceed and it is determined that permanent or temporary wetland impacts should arise as a result of the project and the PETE staff are required to submit those documents to comply with internal DO #77.1 standards.

If you have any questions regarding this report please call Peter Sharpe at (267) 858-1001. This report along with its geospatial data will be posted to the NPS IRMA site for PETE.

cc: (by e-mail only)

PETE – Tim Blumenschine, Julia Steele

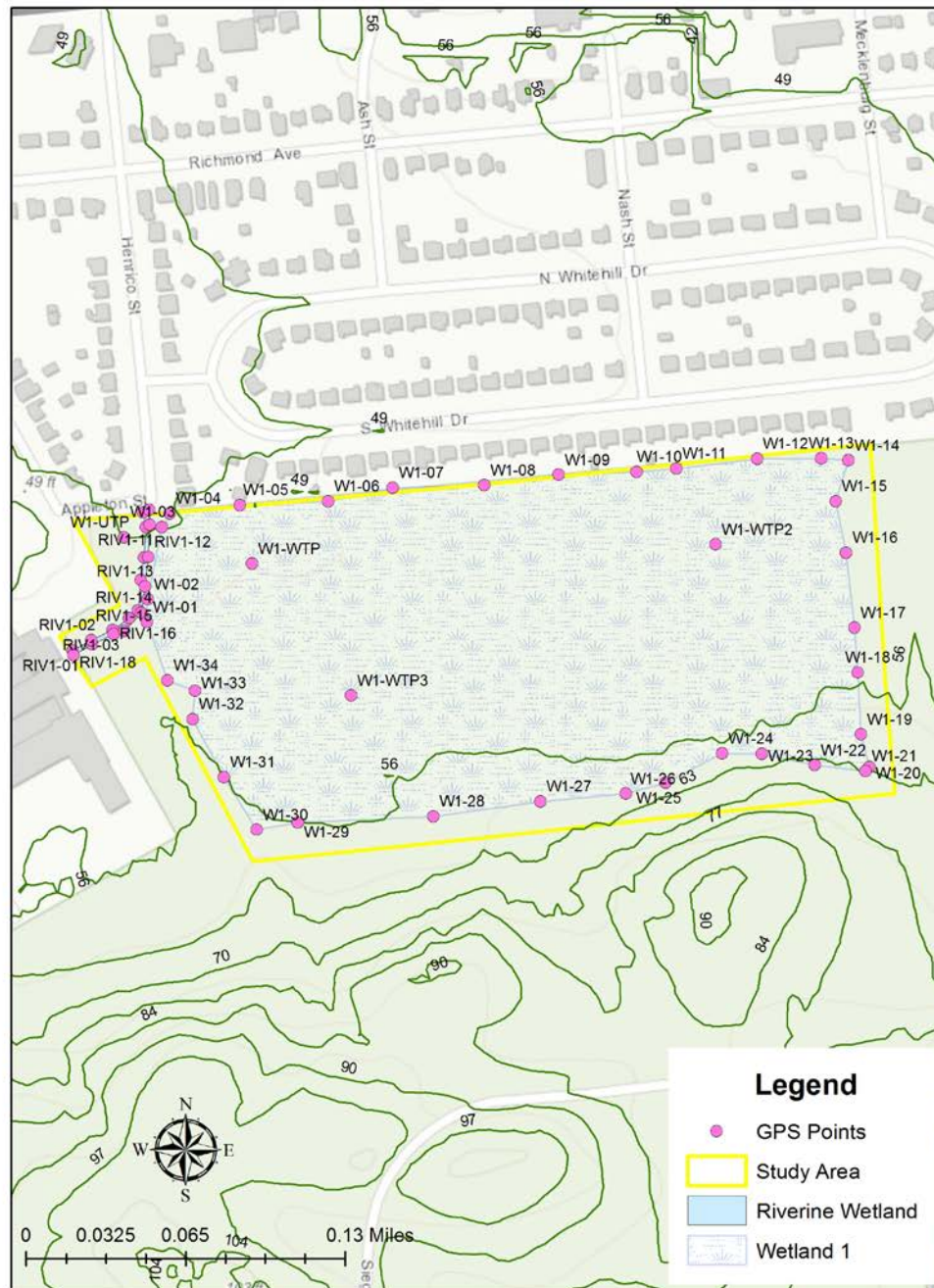
WRD - K. Noon, A. Ellsworth

NERO – Carmen Chapin

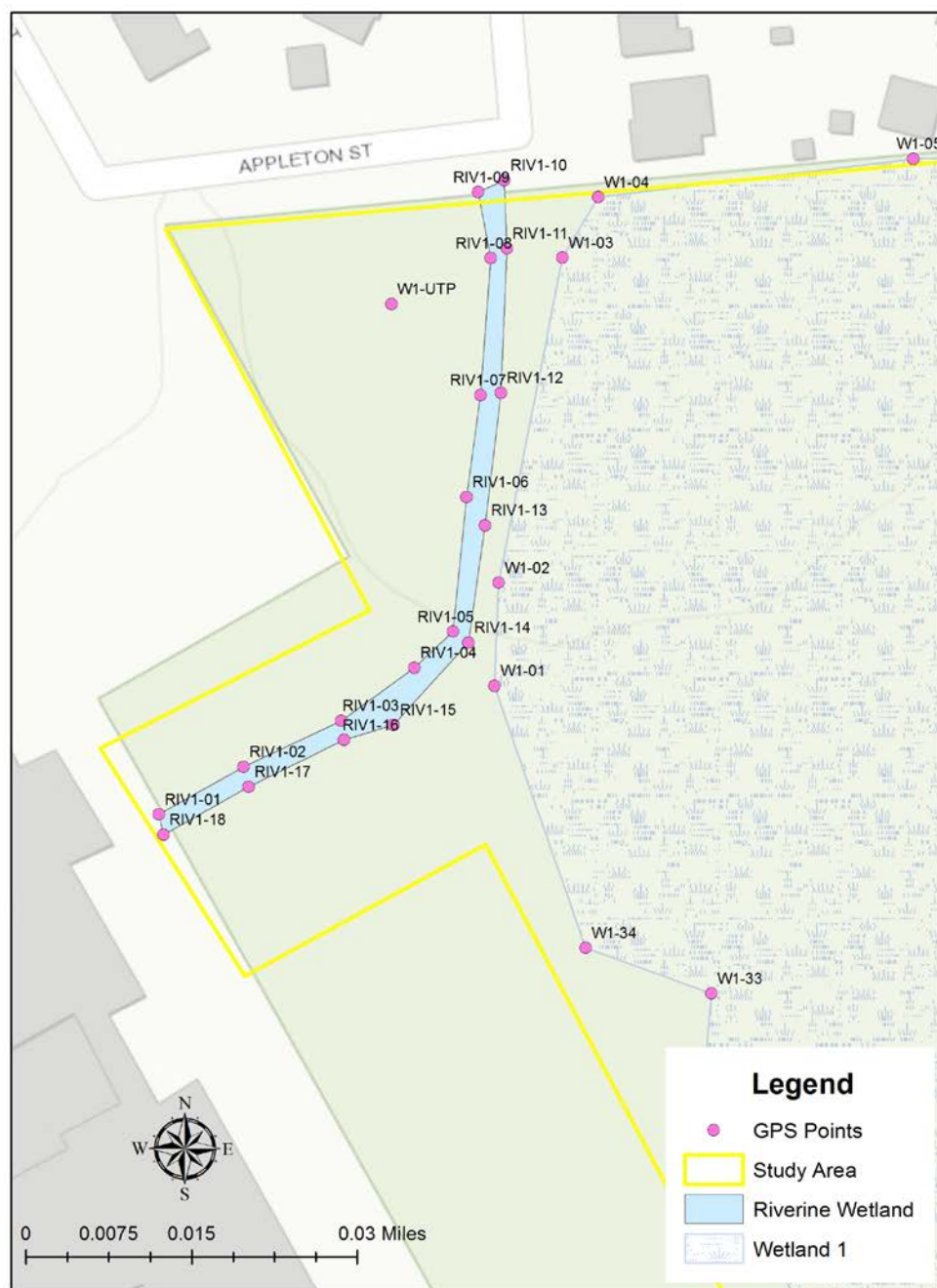
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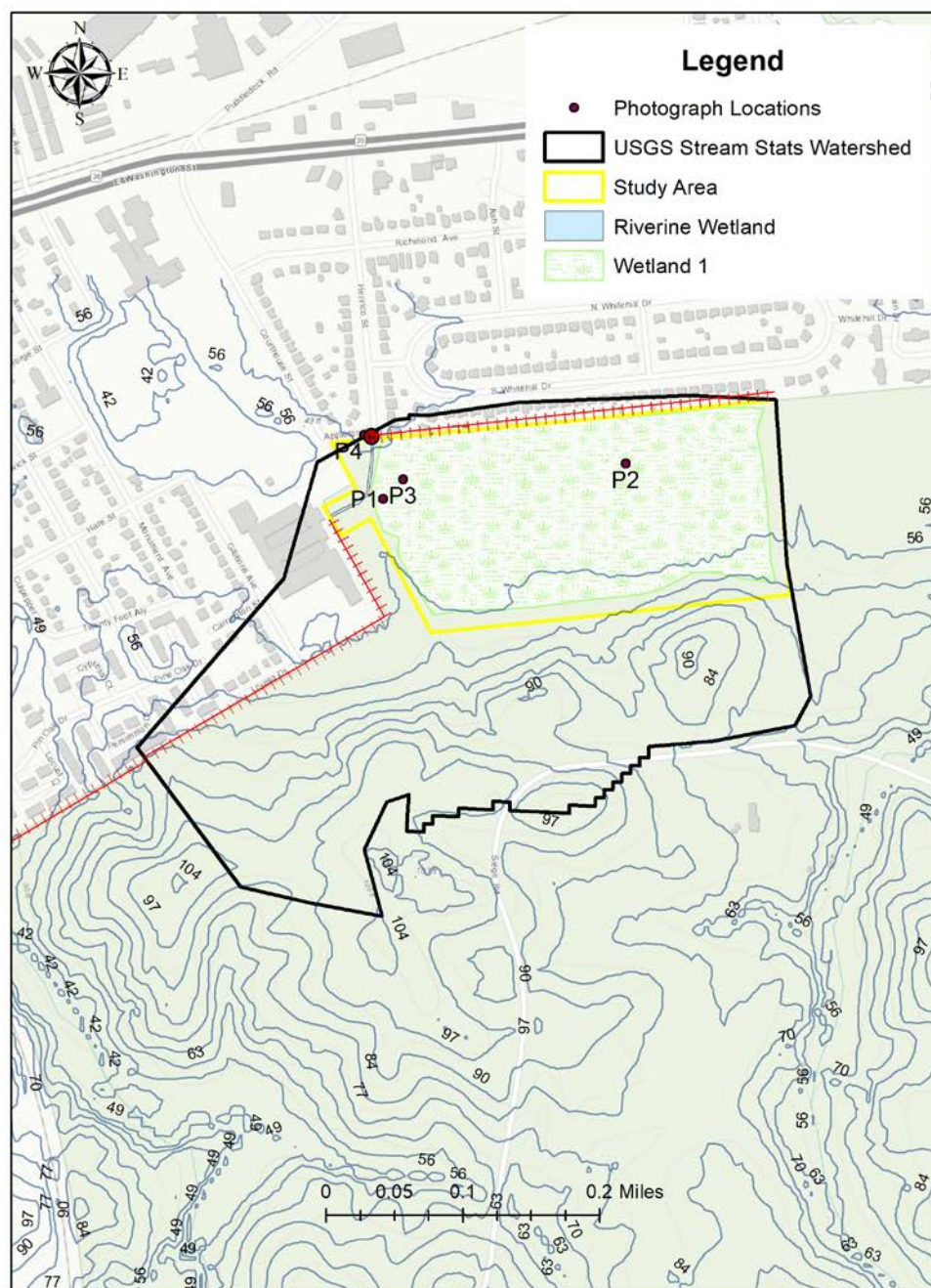
Appendix A – Detailed Project Mapping and NWI/USDA Soil Survey Maps



Wetland-1 showing boundary points and wetland test pit/vegetation data collection locations (WTP/UTP) along with a portion of the riverine system.

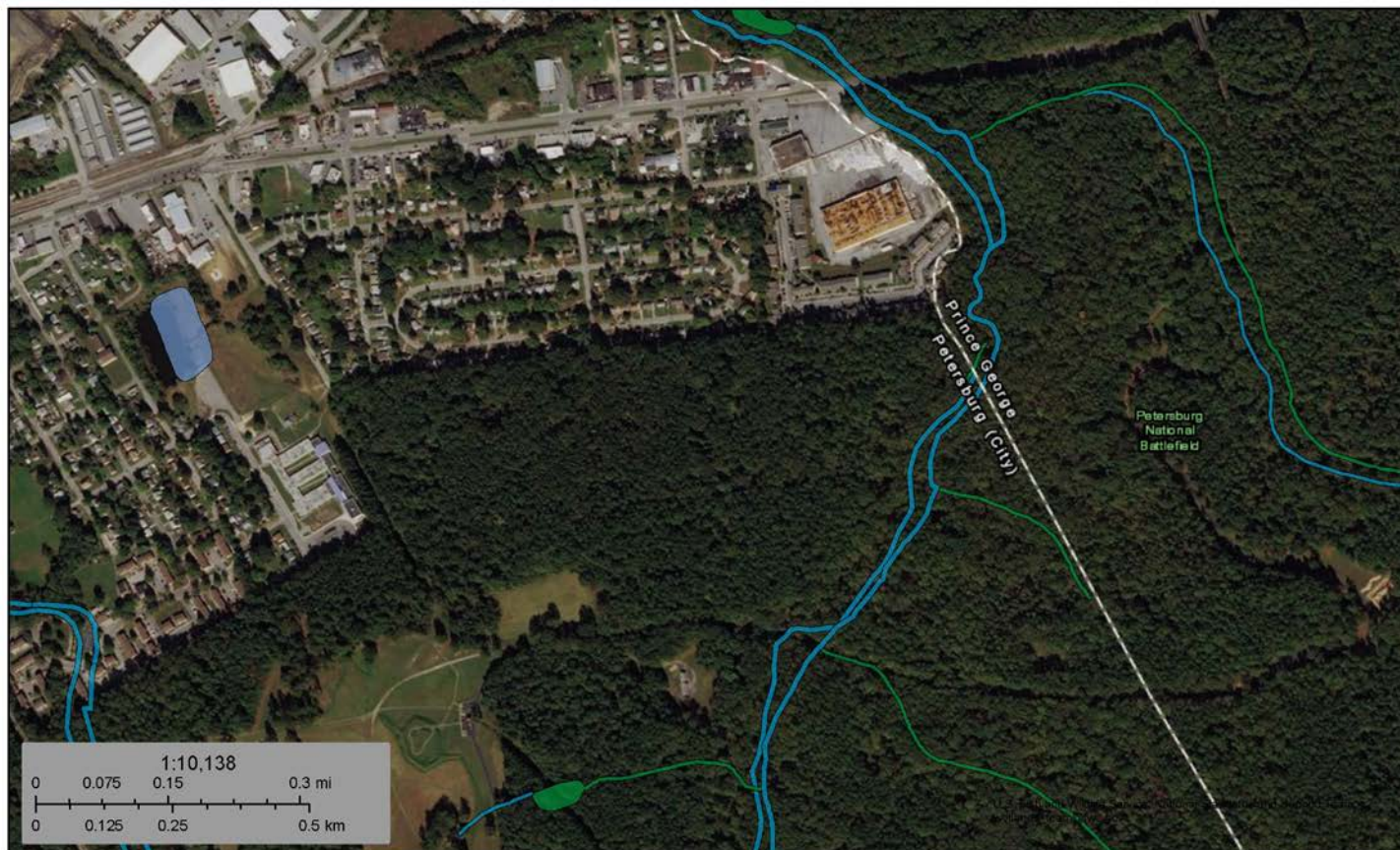


Riverine Wetland (RIV1) showing boundary points and its location relative to Wetland-1 and some of the sites topographic features.



Photograph Location Map for the project. Additional pictures covering the study area and surrounding watershed are available upon request.

NWI Map - Whitehill Area of PETE



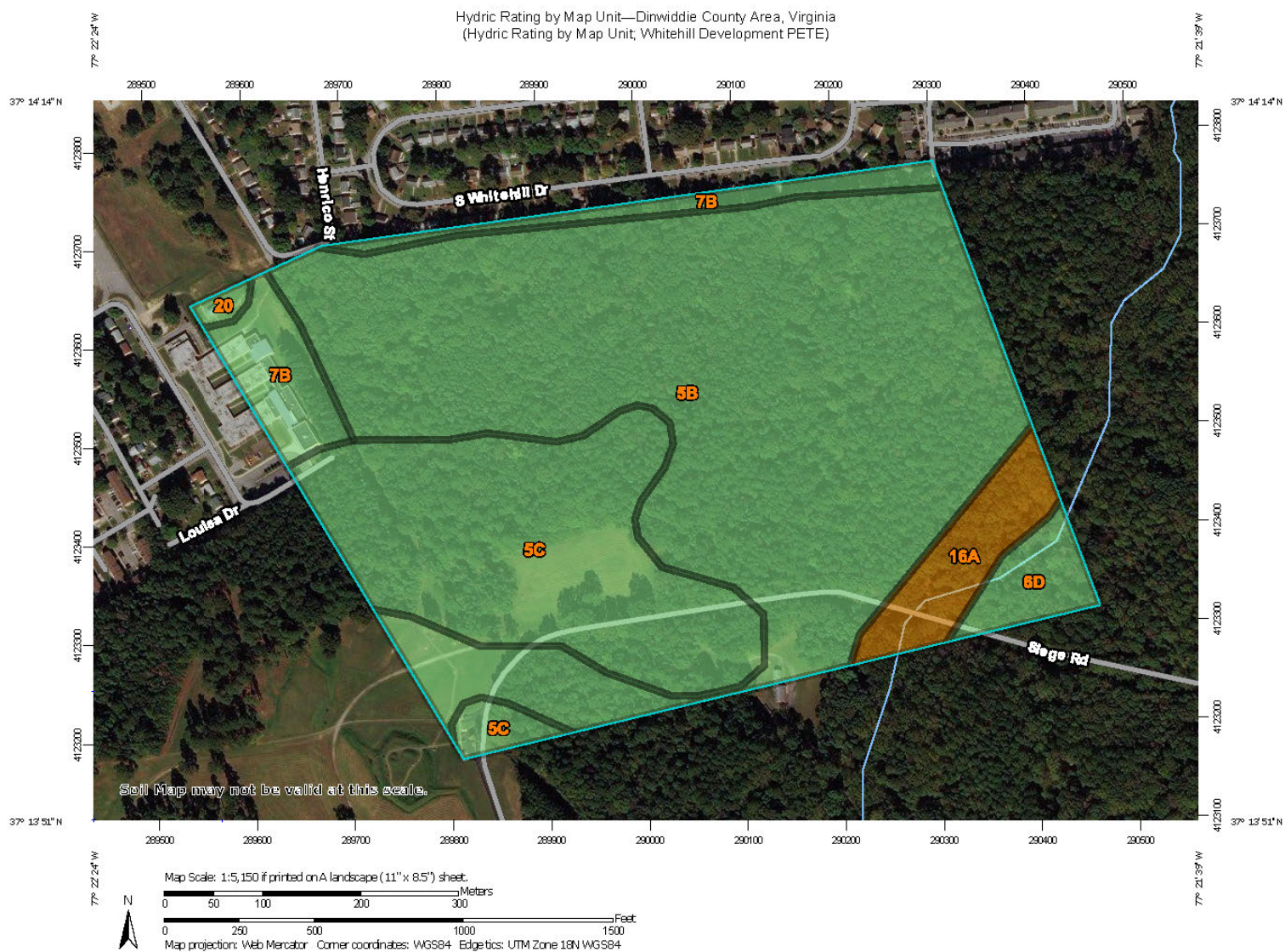
February 28, 2018

Wetlands

	Estuarine and Marine Deepwater		Freshwater Emergent Wetland		Lake
	Estuarine and Marine Wetland		Freshwater Forested/Shrub Wetland		Other
			Freshwater Pond		Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

National Wetlands Inventory (NWI)
This page was produced by the NW Mapper



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

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Appendix B – Wetland Delineation Data Forms and Function and Value Sheets

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: PETE Whitehill Dev. City/County: Petersburg Sampling Date: 8/9/2017
 Applicant/Owner: NPS State: VA Sampling Point: W1-WTP 2
 Investigator(s): Peter Sharpe, Section, Township, Range: NA
 Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Flat Slope (%): 1-2%
 Subregion (LRR or MLRA): LRR P Lat: 37.235921 Long: -77.366709 Datum: NAD 83
 Soil Map Unit Name: 5B - Emporia Sandy Loam NWI Classification: PFO1Cd

Are climatic / hydrologic conditions on the site typical for this time of year? ☒ Yes ☐ No (If no, explain in Remarks.)

Are ☐ Vegetation ☐ Soil ☐ Hydrology significantly disturbed?

Are "Normal Circumstances" present? ☒ Yes ☐ No

Are ☐ Vegetation ☐ Soil ☐ Hydrology naturally problematic?

(If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? ☒ Yes ☐ No	Is the Sampled Area within a Wetland? ☒ Yes ☐ No
Hydric Soil Present? ☒ Yes ☐ No	
Wetland Hydrology Present? ☒ Yes ☐ No	
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) ☒ Surface Water (A1) ☐ Oxidized Rhizospheres along Living Roots (C3) ☐ High Water Table (A2) ☐ Presence of Reduced Iron (C4) ☐ Saturation (A3) ☐ Recent Iron Reduction in Tilled Soils (C6) ☒ Water Marks (B1) ☐ Thin Muck Surface (C7) ☒ Sediment Deposits (B2) ☐ Other (Explain in Remarks) ☐ Drift Deposits (B3) ☐ Algal Mat or Crust (B4) ☐ Iron Deposits (B5) ☐ Inundation Visible on Aerial Imagery (B7) ☒ Water Stained Leaves (B9) ☐ Aquatic Fauna (B13) ☐ Marl Deposits (B15) (LRR U) ☐ Hydrogen Sulfide Odor (C1)		Secondary Indicators (minimum of two required) ☐ Surface Soil Cracks (B6) ☐ Sparsely Vegetated Concave Surface (B8) ☒ Drainage Patterns (B10) ☐ Moss Trim Lines (B16) ☐ Dry-Season Water Table (C2) ☐ Crayfish Burrows (C8) ☐ Saturation Visible on Aerial Imagery (C9) ☒ Geomorphic Position (D2) ☐ Shallow Aquitard (D3) ☐ FAC-Neutral Test (D5) ☐ Sphagnum Moss (D8) (LRR T, U)
Field Observations: Surface Water Present? ☒ Yes ☐ No Depth (inches): <u>0.25</u> Water Table Present? ☐ Yes ☒ No Depth (inches): _____ Saturation Present? ☐ Yes ☒ No Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? ☒ Yes ☐ No	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks: Butressed Tree Roots		

VEGETATION (Four Strata) – Use scientific names of plants.

 Sampling Point: W1-WTP

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>Liquidambar styraciflua</u>	<u>17.5</u>	☒ Yes ☐ No	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A)
2. <u>Quercus phellos</u>	<u>17.5</u>	☒ Yes ☐ No	<u>FACW</u>	
3. <u>Ulmus americana</u>	<u>17.5</u>	☒ Yes ☐ No	<u>FAC</u>	Total Number of Dominant Species Across All Strata: <u>5</u> (B)
4. <u>Acer rubrum</u>	<u>3.5</u>	☐ Yes ☒ No	<u>FAC</u>	
5. _____	_____	☐ Yes ☐ No	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>80.000</u> % (A/B)
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B) Prevalence Index = B/A = _____
8. _____	_____	_____	_____	
<u>56</u> = Total Cover 50% of total cover: <u>28</u> 20% of total cover: <u>11.2</u>				Hydrophytic Vegetation Indicators: ☐ 1 - Rapid Test for Hydrophytic Vegetation ☒ 2 - Dominance Test is >50% ☐ 3 - Prevalence Index is ≤3.0* ☐ Problematic Hydrophytic Vegetation* (Explain)
Sapling/Shrub Stratum (Plot size: _____) 1. <u>Nyssa sylvatica</u> <u>7.5</u> ☒ Yes ☐ No <u>FAC</u> 2. <u>Ilex opaca</u> <u>1.5</u> ☐ Yes ☒ No <u>FAC</u> 3. _____ ☐ Yes ☐ No _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____				
<u>9</u> = Total Cover 50% of total cover: <u>4.5</u> 20% of total cover: <u>1.8</u>				*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
Herb Stratum (Plot size: _____) 1. <u>poaceae sp. (veg)</u> <u>17.5</u> ☒ Yes ☐ No _____ 2. _____ ☐ Yes ☐ No _____ 3. _____ ☐ Yes ☐ No _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ 11. _____ 12. _____				
<u>17.5</u> = Total Cover 50% of total cover: <u>8.75</u> 20% of total cover: <u>3.5</u>				Hydrophytic Vegetation Present? ☒ Yes ☐ No
Woody Vine Stratum (Plot size: _____) 1. _____ ☐ Yes ☐ No _____ 2. _____ 3. _____ 4. _____ 5. _____ _____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				
Remarks: (If observed, list morphological adaptations below). Herb layer sparse				

Sampling Point: W1-WTP

Atlantic and Gulf Coastal Plain Region – Version 2.0

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: PETE Whitehill Dev. City/County: Petersburg Sampling Date: 8/9/2017
 Applicant/Owner: NPS State: VA Sampling Point: W1-WTP1
 Investigator(s): Peter Sharpe, Section, Township, Range: NA
 Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): CONCAVE Slope (%): 0.5%
 Subregion (LRR or MLRA): LRR P Lat: 37.235887 Long: -77.370026 Datum: NAD 83
 Soil Map Unit Name: 5B - Emporia Sandy Loam NWI Classification: PFO1Cd

Are climatic / hydrologic conditions on the site typical for this time of year? ☒ Yes ☐ No (If no, explain in Remarks.)

Are ☐ Vegetation ☐ Soil ☐ Hydrology significantly disturbed?

Are "Normal Circumstances" present? ☒ Yes ☐ No

Are ☐ Vegetation ☐ Soil ☐ Hydrology naturally problematic?

(If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? ☒ Yes ☐ No	Is the Sampled Area within a Wetland? ☒ Yes ☐ No
Hydric Soil Present? ☒ Yes ☐ No	
Wetland Hydrology Present? ☒ Yes ☐ No	
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) ☐ Surface Water (A1) ☐ Oxidized Rhizospheres along Living Roots (C3) ☐ High Water Table (A2) ☐ Presence of Reduced Iron (C4) ☐ Saturation (A3) ☐ Recent Iron Reduction in Tilled Soils (C6) ☐ Water Marks (B1) ☐ Thin Muck Surface (C7) ☐ Sediment Deposits (B2) ☐ Other (Explain in Remarks) ☐ Drift Deposits (B3) ☐ Algal Mat or Crust (B4) ☐ Iron Deposits (B5) ☐ Inundation Visible on Aerial Imagery (B7) ☒ Water Stained Leaves (B9) ☐ Aquatic Fauna (B13) ☐ Marl Deposits (B15) (LRR U) ☐ Hydrogen Sulfide Odor (C1)		Secondary Indicators (minimum of two required) ☐ Surface Soil Cracks (B6) ☐ Sparsely Vegetated Concave Surface (B8) ☒ Drainage Patterns (B10) ☐ Moss Trim Lines (B16) ☐ Dry-Season Water Table (C2) ☐ Crayfish Burrows (C8) ☐ Saturation Visible on Aerial Imagery (C9) ☒ Geomorphic Position (D2) ☐ Shallow Aquitard (D3) ☐ FAC-Neutral Test (D5) ☐ Sphagnum Moss (D8) (LRR T, U)
Field Observations: Surface Water Present? ☐ Yes ☒ No Depth (inches): _____ Water Table Present? ☐ Yes ☒ No Depth (inches): _____ Saturation Present? ☐ Yes ☒ No Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? ☒ Yes ☐ No	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks: Buttressed tree roots		

VEGETATION (Four Strata) – Use scientific names of plants.

 Sampling Point: W1-WTP1

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>Ulmus americana</u>	<u>17.5</u>	☐ Yes ☒ No	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>3</u> (A)
2. <u>Quercus phellos</u>	<u>17.5</u>	☐ Yes ☒ No	<u>FACW</u>	
3. <u>Liquidambar styraciflua</u>	<u>37.5</u>	☒ Yes ☐ No	<u>FAC</u>	Total Number of Dominant Species Across All Strata: <u>3</u> (B)
4. <u>Morus rubra</u>	<u>17.5</u>	☐ Yes ☒ No	<u>FACU</u>	
5. _____	_____	☐ Yes ☐ No	_____	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.000</u> % (A/B)
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species _____ x 1 = _____ FACW species _____ x 2 = _____ FAC species _____ x 3 = _____ FACU species _____ x 4 = _____ UPL species _____ x 5 = _____ Column Totals: _____ (A) _____ (B)
8. _____	_____	_____	_____	
<u>90</u> = Total Cover 50% of total cover: <u>45</u> 20% of total cover: <u>18</u>				Prevalence Index = B/A = _____
Sapling/Shrub Stratum (Plot size: _____) 1. <u>Ulmus rubra</u> <u>17.5</u> ☒ Yes ☐ No <u>FAC</u> 2. <u>Celtis occidentalis</u> <u>2.5</u> ☐ Yes ☒ No <u>FACU</u> 3. _____ ☐ Yes ☐ No _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____				
<u>20</u> = Total Cover 50% of total cover: <u>10</u> 20% of total cover: <u>4</u>				Hydrophytic Vegetation Indicators: ☐ 1 - Rapid Test for Hydrophytic Vegetation ☒ 2 - Dominance Test is >50% ☐ 3 - Prevalence Index is ≤3.0* ☐ Problematic Hydrophytic Vegetation* (Explain)
Herb Stratum (Plot size: _____) 1. <u>Microstegium vimineum</u> <u>37.5</u> ☒ Yes ☐ No <u>FAC</u> 2. _____ ☐ Yes ☐ No _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ 11. _____ 12. _____				
<u>37.5</u> = Total Cover 50% of total cover: <u>18.75</u> 20% of total cover: <u>7.5</u>				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
Woody Vine Stratum (Plot size: _____) 1. <u>Vitis sp.</u> <u>3.5</u> ☐ Yes ☒ No _____ 2. <u>Smilax sp. (veg)</u> <u>3.5</u> ☐ Yes ☒ No _____ 3. _____ ☐ Yes ☐ No _____ 4. _____ 5. _____				
<u>7</u> = Total Cover 50% of total cover: <u>3.5</u> 20% of total cover: <u>1.4</u>				Hydrophytic Vegetation Present? ☒ Yes ☐ No
Remarks: (If observed, list morphological adaptations below).				

SOIL

Sampling Point: W1-WTP1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox		Type ¹	Loc ²	Texture	Remarks
	Color (moist)	%	Color (moist)	%				
0-5	10 YR 2/2	100	N/A		N/A		Sa, Lo	
5-21	10 YR 5/4	50	10 YR 5/8	50	C	M	Sa, Lo	
¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. ²Location: PL=Pore Lining, M=Matrix. Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) ☐ Histosol (A1) ☐ Histic Epipedon (A2) ☐ Black Histic (A3) ☐ Hydrogen Sulfide (A4) ☐ Stratified Layers (A5) ☐ Organic Bodies (A6) (LRR P, T, U) ☐ 5 cm Mucky Mineral (A7) (LRR P, T, U) ☐ Muck Presence (A8) (LRR U) ☐ 1 cm Muck (A9) (LRR P, T) ☐ Depleted Below Dark Surface (A11) ☐ Thick Dark Surface (A12) ☐ Coast Prairie Redox (A16) (MLRA 150A) ☐ Sandy Mucky Mineral (S1) (LRR O, S) ☐ Sandy Gleyed Matrix (S4) ☐ Sandy Redox (S5) ☐ Stripped Matrix (S6) ☐ Dark Surface (S7) (LRR P, S, T, U) ☐ Polyvalue Below Surface (S8) (LRR S, T, U) ☐ Thin Dark Surface (S9) (LRR S, T, U) ☐ Loamy Mucky Mineral (F1) (LRR O) ☐ Loamy Gleyed Matrix (F2) ☐ Depleted Matrix (F3) ☐ Redox Dark Surface (F6) ☐ Depleted Dark Surface (F7) ☒ Redox Depressions (F8) ☐ Marl (F10) (LRR U) ☐ Depleted Ochric (F11) (MLRA 151) ☐ Iron-Manganese Masses (F12) (LRR O, P, T) ☐ Umbric Surface (F13) (LRR P, T, U) ☐ Delta Ochric (F17) (MLRA 151) ☐ Reduced Vertic (F18) (MLRA 150A, 150B) ☐ Piedmont Floodplain Soils (F19) (MLRA 149A) ☐ Anomalous Bright Loamy Soils (F20) (MLRA 149A, 153C, 153D) Indicators for Problematic Hydric Soils: ☐ 1 cm Muck (A9) (LRR O) ☐ 2 cm Muck (A10) (LRR S) ☐ Reduced Vertic (F18) (outside MLRA 150A, B) ☐ Piedmont Floodplain Soils (F19) (LRR P, S, T) ☐ Anomalous Bright Loamy Soils (F20) (MLRA 153B) ☐ Red Parent Material (TF2) ☐ Very Shallow Dark Surface (TF12) ☐ Other (Explain in Remarks) ³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.								
Restrictive Layer (if observed): Type: _____ Depth (inches): _____						Hydric Soil Present? ☒ Yes ☐ No		
Remarks: Soil does not neatly fit into F8 as only 1 inch of the layer containing redox concentrations occurs within the upper 6 inches of the soil profile. However, this area has an extensive ditch system (CCC era) which coupled with historic earth disturbances has likely affected the normal hydrologic processes on-site, as well as, the soil geochemistry.								

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: PETE Whitehill Dev. City/County: Petersburg Sampling Date: 8/9/2017
 Applicant/Owner: NPS State: VA Sampling Point: W1-UTP
 Investigator(s): Peter Sharpe, Section, Township, Range: NA
 Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): CONCAVE Slope (%): 1-2%
 Subregion (LRR or MLRA): LRR P Lat: 37.235738 Long: -77.371222 Datum: NAD 83
 Soil Map Unit Name: 5B - Emporia sandy loam NWI Classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? ☒ Yes ☐ No (If no, explain in Remarks.)

Are ☐ Vegetation ☐ Soil ☐ Hydrology significantly disturbed?

Are "Normal Circumstances" present? ☒ Yes ☐ No

Are ☐ Vegetation ☐ Soil ☐ Hydrology naturally problematic?

(If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? ☐ Yes ☒ No	Is the Sampled Area within a Wetland? ☐ Yes ☒ No
Hydric Soil Present? ☐ Yes ☒ No	
Wetland Hydrology Present? ☒ Yes ☐ No	
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) ☐ Surface Water (A1) ☐ Oxidized Rhizospheres along Living Roots (C3) ☐ High Water Table (A2) ☐ Presence of Reduced Iron (C4) ☐ Saturation (A3) ☐ Recent Iron Reduction in Tilled Soils (C6) ☒ Water Marks (B1) ☐ Thin Muck Surface (C7) ☐ Sediment Deposits (B2) ☐ Other (Explain in Remarks) ☐ Drift Deposits (B3) ☐ Algal Mat or Crust (B4) ☐ Iron Deposits (B5) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Water Stained Leaves (B9) ☐ Aquatic Fauna (B13) ☐ Marl Deposits (B15) (LRR U) ☐ Hydrogen Sulfide Odor (C1)		Secondary Indicators (minimum of two required) ☐ Surface Soil Cracks (B6) ☒ Sparsely Vegetated Concave Surface (B8) ☐ Drainage Patterns (B10) ☒ Moss Trim Lines (B16) ☐ Dry-Season Water Table (C2) ☐ Crayfish Burrows (C8) ☐ Saturation Visible on Aerial Imagery (C9) ☒ Geomorphic Position (D2) ☐ Shallow Aquitard (D3) ☐ FAC-Neutral Test (D5) ☐ Sphagnum Moss (D8) (LRR T, U)
Field Observations: Surface Water Present? ☐ Yes ☒ No Depth (inches): _____ Water Table Present? ☐ Yes ☒ No Depth (inches): _____ Saturation Present? ☐ Yes ☒ No Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? ☒ Yes ☐ No	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks:		

VEGETATION (Four Strata) – Use scientific names of plants.

 Sampling Point: W1-UTP

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <i>Celtis occidentalis</i>	87.5	☒ Yes ☐ No	FACU	Number of Dominant Species That Are OBL, FACW, or FAC: <u>0</u> (A)
2. <i>Quercus phellos</i>	17.5	☐ Yes ☒ No	FACW	Total Number of Dominant Species Across All Strata: <u>3</u> (B)
3. <i>Ilex opaca</i>	3.5	☐ Yes ☒ No	FACU	Percent of Dominant Species That Are OBL, FACW, or FAC: <u>0.000</u> % (A/B)
4. _____	_____	☐ Yes ☐ No	_____	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>0</u> x 2 = <u>0</u> FAC species <u>0</u> x 3 = <u>0</u> FACU species <u>91</u> x 4 = <u>364</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>91</u> (A) <u>364</u> (B) Prevalence Index = B/A = <u>4</u>
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
<u>108.5</u> = Total Cover 50% of total cover: <u>54.25</u> 20% of total cover: <u>21.7</u>				Hydrophytic Vegetation Indicators: ☐ 1 - Rapid Test for Hydrophytic Vegetation ☐ 2 - Dominance Test is >50% ☐ 3 - Prevalence Index is ≤3.0* ☐ Problematic Hydrophytic Vegetation* (Explain)
Sapling/Shrub Stratum (Plot size: _____)				
1. <i>Celtis occidentalis</i>	3.5	☒ Yes ☐ No	FACU	
2. _____	_____	☐ Yes ☐ No	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	*Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic. Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
<u>3.5</u> = Total Cover 50% of total cover: <u>1.75</u> 20% of total cover: <u>.7</u>				Hydrophytic Vegetation Present? ☐ Yes ☒ No
Herb Stratum (Plot size: _____)				
1. Bare Ground	95	☒ Yes ☐ No	_____	
2. _____	_____	☐ Yes ☐ No	_____	
3. _____	_____	_____	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
<u>95</u> = Total Cover 50% of total cover: <u>47.5</u> 20% of total cover: <u>19</u>				
Woody Vine Stratum (Plot size: _____)				
1. <i>Vitis</i> sp.	3.5	☒ Yes ☐ No	_____	
2. <i>Smilix</i> sp.	0.5	☐ Yes ☒ No	_____	
3. _____	_____	☐ Yes ☐ No	_____	
4. _____	_____	_____	_____	
5. _____	_____	_____	_____	
<u>4</u> = Total Cover 50% of total cover: <u>2</u> 20% of total cover: <u>.8</u>				
Remarks: (If observed, list morphological adaptations below).				

Sampling Point: W1-UTP

Atlantic and Gulf Coastal Plain Region – Version 2.0

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: PETE Whitehill Dev. City/County: Petersburg Sampling Date: 8/9/2017
 Applicant/Owner: NPS State: VA Sampling Point: W3-WTP3
 Investigator(s): Peter Sharpe, Section, Township, Range: NA
 Landform (hillslope, terrace, etc.): Floodplain Local relief (concave, convex, none): Flat Slope (%): 1-2%
 Subregion (LRR or MLRA): LRR P Lat: 37.234535 Long: -77.369092 Datum: NAD 83
 Soil Map Unit Name: 5B - Emporia Sandy Loam NWI Classification: PFO1Cd

Are climatic / hydrologic conditions on the site typical for this time of year? ☒ Yes ☐ No (If no, explain in Remarks.)

Are ☐ Vegetation ☐ Soil ☐ Hydrology significantly disturbed?

Are "Normal Circumstances" present? ☒ Yes ☐ No

Are ☐ Vegetation ☐ Soil ☐ Hydrology naturally problematic?

(If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? ☒ Yes ☐ No	Is the Sampled Area within a Wetland? ☒ Yes ☐ No
Hydric Soil Present? ☒ Yes ☐ No	
Wetland Hydrology Present? ☒ Yes ☐ No	
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one is required; check all that apply) ☐ Surface Water (A1) ☐ Oxidized Rhizospheres along Living Roots (C3) ☐ High Water Table (A2) ☐ Presence of Reduced Iron (C4) ☐ Saturation (A3) ☐ Recent Iron Reduction in Tilled Soils (C6) ☐ Water Marks (B1) ☐ Thin Muck Surface (C7) ☒ Sediment Deposits (B2) ☒ Other (Explain in Remarks) ☐ Drift Deposits (B3) ☐ Algal Mat or Crust (B4) ☐ Iron Deposits (B5) ☐ Inundation Visible on Aerial Imagery (B7) ☐ Water Stained Leaves (B9) ☐ Aquatic Fauna (B13) ☐ Marl Deposits (B15) (LRR U) ☐ Hydrogen Sulfide Odor (C1)		Secondary Indicators (minimum of two required) ☐ Surface Soil Cracks (B6) ☐ Sparsely Vegetated Concave Surface (B8) ☒ Drainage Patterns (B10) ☐ Moss Trim Lines (B16) ☐ Dry-Season Water Table (C2) ☐ Crayfish Burrows (C8) ☐ Saturation Visible on Aerial Imagery (C9) ☒ Geomorphic Position (D2) ☐ Shallow Aquitard (D3) ☐ FAC-Neutral Test (D5) ☐ Sphagnum Moss (D8) (LRR T, U)
Field Observations: Surface Water Present? ☐ Yes ☒ No Depth (inches): _____ Water Table Present? ☐ Yes ☒ No Depth (inches): _____ Saturation Present? ☐ Yes ☒ No Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? ☒ Yes ☐ No	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:		
Remarks: butressed tree roots		

VEGETATION (Four Strata) – Use scientific names of plants.

 Sampling Point: W3-WTP3

Tree Stratum (Plot size: _____)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet:
1. <u>Pinus taeda</u>	<u>17.5</u>	☐ Yes ☒ No	<u>FAC</u>	Number of Dominant Species That Are OBL, FACW, or FAC: <u>4</u> (A) Total Number of Dominant Species Across All Strata: <u>4</u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u>100.000</u> % (A/B)
2. <u>Quercus phellos</u>	<u>37.5</u>	☒ Yes ☐ No	<u>FACW</u>	
3. <u>Liquidambar styraciflua</u>	<u>37.5</u>	☒ Yes ☐ No	<u>FAC</u>	
4. <u>Ulmus americana</u>	<u>3.5</u>	☐ Yes ☒ No	<u>FACW</u>	
5. _____	_____	☐ Yes ☐ No	_____	Prevalence Index worksheet: Total % Cover of: _____ Multiply by: _____ OBL species <u>0</u> x 1 = <u>0</u> FACW species <u>44.5</u> x 2 = <u>89</u> FAC species <u>110</u> x 3 = <u>330</u> FACU species <u>0</u> x 4 = <u>0</u> UPL species <u>0</u> x 5 = <u>0</u> Column Totals: <u>154.5</u> (A) <u>419</u> (B) Prevalence Index = B/A = <u>2.712</u>
6. _____	_____	_____	_____	
7. _____	_____	_____	_____	
8. _____	_____	_____	_____	
<u>96</u> = Total Cover 50% of total cover: <u>48</u> 20% of total cover: <u>19.2</u>				Hydrophytic Vegetation Indicators: ☐ 1 - Rapid Test for Hydrophytic Vegetation ☒ 2 - Dominance Test is >50% ☒ 3 - Prevalence Index is ≤3.0* ☐ Problematic Hydrophytic Vegetation* (Explain)
Sapling/Shrub Stratum (Plot size: _____) 1. <u>Liquidambar styraciflua</u> <u>17.5</u> ☒ Yes ☐ No <u>FAC</u> 2. <u>Ulmus americana</u> <u>3.5</u> ☐ Yes ☒ No <u>FACW</u> 3. _____ ☐ Yes ☐ No _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____				
<u>21</u> = Total Cover 50% of total cover: <u>10.5</u> 20% of total cover: <u>4.2</u>				
Herb Stratum (Plot size: _____) 1. <u>Microstegium vimineum</u> <u>37.5</u> ☒ Yes ☐ No <u>FAC</u> 2. _____ ☐ Yes ☐ No _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____ 9. _____ 10. _____ 11. _____ 12. _____				
<u>37.5</u> = Total Cover 50% of total cover: <u>18.75</u> 20% of total cover: <u>7.5</u>				Definitions of Four Vegetation Strata: Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height. Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall. Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall. Woody vine – All woody vines greater than 3.28 ft in height.
Woody Vine Stratum (Plot size: _____) 1. _____ ☐ Yes ☐ No _____ 2. _____ 3. _____ 4. _____ 5. _____				
_____ = Total Cover 50% of total cover: _____ 20% of total cover: _____				
Hydrophytic Vegetation Present? ☒ Yes ☐ No				
Remarks: (If observed, list morphological adaptations below). 				

Sampling Point: W3-WTP3

Atlantic and Gulf Coastal Plain Region – Version 2.0

Wetland Function-Value Evaluation Form

Total area of wetland 22.64 ac Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No
 Adjacent land use Urban lands Distance to nearest roadway or other development 100 feet
 Dominant wetland systems present PFO1Cd Contiguous undeveloped buffer zone present No
 Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? urban/wildland interface
 How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland 1 - PETE/Whitehill
 Wetland I.D. _____
 Latitude 37.2345 Longitude -77.3690
 Prepared by: NPS Date 8/9/2017
 Wetland Impact:
 Type NA Area NA
 Evaluation based on:
 Office X Field _____
 Corps manual wetland delineation
 completed? Y X N _____

Function/Value	Suitability		Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
	Y	N			
 Groundwater Recharge/Discharge		X			
 Floodflow Alteration	X		1,3,5,6,7,9,10,11,12,13,15,17,18	3	
 Fish and Shellfish Habitat		X			
 Sediment/Toxicant Retention	X		3,4,5,7,16	5	
 Nutrient Removal	X		3,5,7,8,10,13,14	13	
 Production Export	X		2,4,5,7,10,13	4	Reptile/amphibian use observed, White-tailed Deer, small mammals, birds
 Sediment/Shoreline Stabilization		X			
 Wildlife Habitat	X		4,5,7,8,9,10,11,13,15, 16,17,18,19,20,21		
 Recreation	X		1,4,5,7,11,12	12	
 Educational/Scientific Value	X		3,9,10,13,14	9	
 Uniqueness/Heritage	X		8,10,27,19	19	see Patterson (2008) vegetation description
 Visual Quality/Aesthetics	X		9	9	site has low visual quality, but easy access by public
ES Endangered Species Habitat		X			
Other					

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 0.08 ac Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No

Adjacent land use NPS - Park Land (Forest) Distance to nearest roadway or other development 100 feet

Dominant wetland systems present R4SB5 Contiguous undeveloped buffer zone present No

Is the wetland a separate hydraulic system? No If not, where does the wetland lie in the drainage basin? LOW

How many tributaries contribute to the wetland? 1 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Riverine 1- PETE/Whitehill

Latitude 37.235 Longitude -77.371

Prepared by: NPS Date 8/9/2017

Wetland Impact:
Type NA Area NA

Evaluation based on:
Office X Field

Corps manual wetland delineation
completed? Y X N

Function/Value	Suitability		Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
	Y	N			
 Groundwater Recharge/Discharge		X			
 Floodflow Alteration		X			
 Fish and Shellfish Habitat		X			
 Sediment/Toxicant Retention		X			
 Nutrient Removal		X			
 Production Export	X			10	2,4,5,10,11,13
 Sediment/Shoreline Stabilization		X			
 Wildlife Habitat	X			18	4,7,8,16,18,20
 Recreation		X			
 Educational/Scientific Value	X			9	3,6,8,9,10,13,12,14
 Uniqueness/Heritage		X			
 Visual Quality/Aesthetics		X			
ES Endangered Species Habitat		X			
Other					

Notes:

* Refer to backup list of numbered considerations.