



United States Department of the Interior

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

January 2018

Memorandum

To: Richard McKenna, Civil Engineer, Delaware Water Gap National Recreation Area
From: Peter Sharpe Ph.D., PWS, Hydrologist, Northeast Region
Subject: Wetland Delineation Report for Travel, Old Mine Road Rehabilitation Project,
Delaware Water Gap National Recreation Area (DEWA)

Certification Statement – NJDEP:

"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining and preparing the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fine and imprisonment."

Preparer Signature: _____

Preparer Qualifications Statement – NJDEP

Peter Sharpe received his PhD in Marine, Estuarine, and Environmental Science from the University of Maryland and a M.S. in Environmental Pollution Control from the Pennsylvania State University. Pete joined the National Park Service in 2010 as the Northeast Regional Natural Resources Condition Assessment Coordinator following his post-doc work with the Institute for Research Technology and Agriculture (IRTA) in Catalonia, Spain. Pete now works as the Northeast Regional Hydrologist serving 85 inland and coastal parks and park units from southern Virginia to Northern Maine. Pete's scientific focus falls within the fields of tidal and non-tidal wetland ecology and water resource management. He has over 18 years of experience in applied wetland management techniques ranging from wetland delineations and habitat restoration to surface/ground water monitoring. Peter regularly collaborates with other aquatic resource specialists within the National Park Service, as well as, private and public sector experts. Peter maintains a small but active research program with his colleagues from IRTA, as well as, with scientists within the NPS and USGS. Dr. Sharpe's complete C.V. is available upon request.

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 The New Jersey Freshwater Wetlands Protection Act, N.J.S.A. 13:9B-1 et seq, and all wetlands subject to National Park Service (NPS) procedures for implementing *Director's Order #77-1: Wetland Protection* within the proposed Old Mine Road Rehabilitation Site within Delaware Water Gap National Recreation Area (DEWA) lands. As the state of New Jersey is one of only two states nationwide that has assumed the Federal Section 404 program under the Clean Water Act, the methods for identifying and delineating wetland features followed the protocol outlined in the 1989 Federal Interagency Committee for Wetland Delineation Manual (1989 Manual). A total of two palustrine wetlands encompassing 0.07 acres were identified and delineated from 27 -30 June 2017 within the 15.50 acre Study Area (Fig. 1). The observed wetlands were classified following the Cowardin et al. (1979) system as palustrine, emergent, habitats that exhibited varying degrees of soil saturation within the upper part of the soil profile (0-12 inches) at the time of the investigation. Both of the identified and mapped wetland systems meet the NJDEP (1989 Manual) criteria and the Cowardin et al. (1979) definitions of wetland habitats. Additionally, one unnamed perennial tributary (Riverine wetland – R3UB1) to the Delaware River was verified in the field at the intersection of Blue Mountain Lake Road and Old Mine Road. This system was mapped separately by professional land licensed surveyors, as well as, the segment of the Flat brook at the northern terminus of the project area. Both waterways and their mapped contours appear within the road way drawings along with the mapped palustrine features shown within this report.

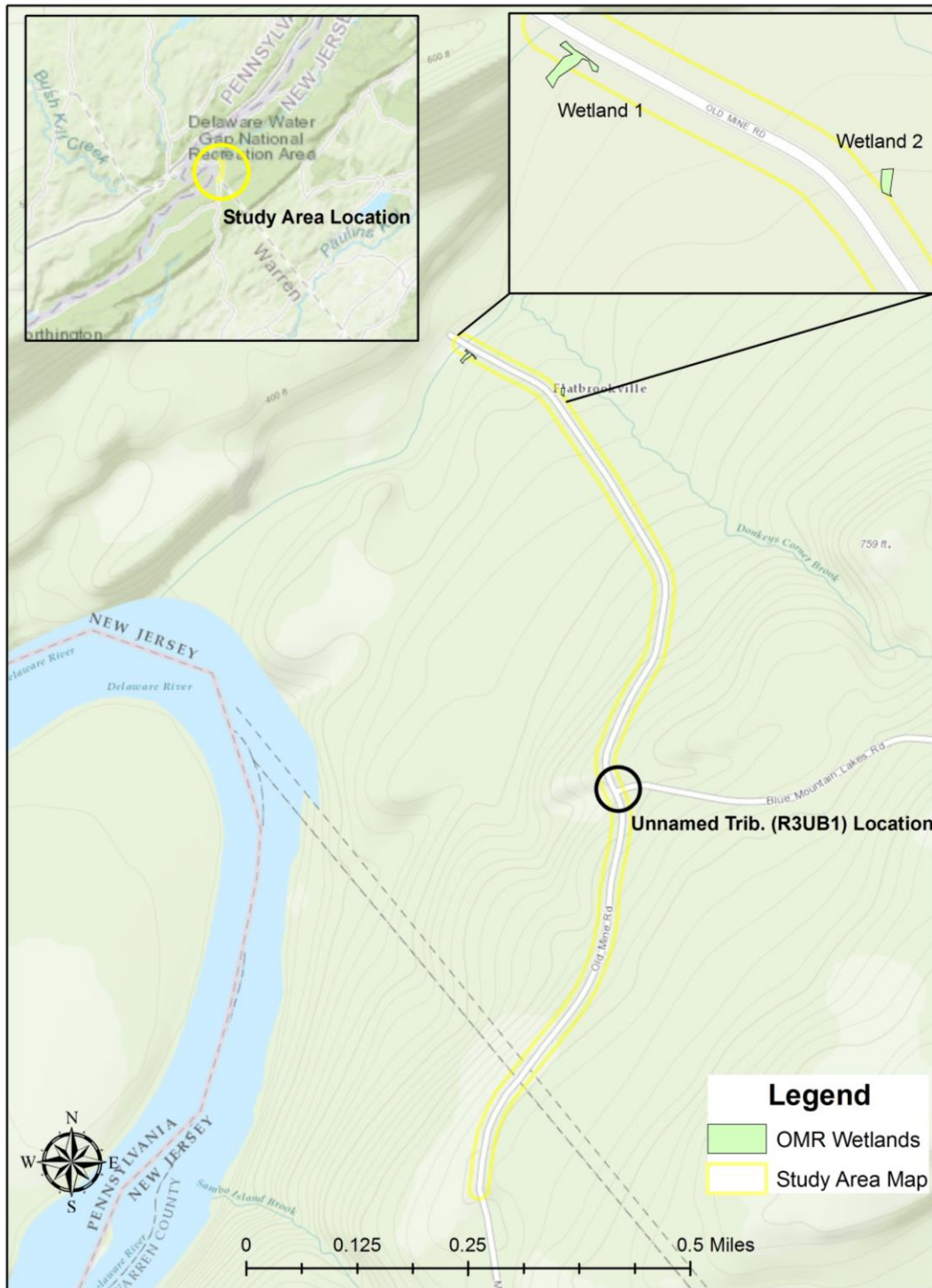


Figure 1. Old Mine Road (OMR) improvement project, study area and palustrine/riverine wetland features map.

Study Objectives

The purpose of this investigation was to provide detailed wetland/aquatic resource identification and boundary information in support of the Old Mine Road (OMR) improvement project within DEWA (see Fig. 1). The information obtained from this effort may be utilized for park compliance purposes if they proceed with plans to rehabilitate a degraded section of OMR located on the New Jersey side of Delaware Water Gap National Recreation Area.



Photograph 1. Photo looking northwest at a degraded section of Old Mine Road within the project study area. P. Sharpe - June 2017. (Photo Location Map – Appendix A)

Field Participants

Dr. Peter J. Sharpe, NPS (PWS)
Richard McKenna, NPS (Civil Engineer)

Introduction

It is the mission of the National Park Service to preserve and maintain the natural and cultural resources of Delaware Water Gap National Recreation Area and to interpret those same

resources to the visiting public and the scientific and scholarly community. Following a traverse of the 15.50 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 mapping these aquatic resources. The information contained here-in can be used to for New Jersey Freshwater Wetlands Protection Act, N.J.S.A. 13:9B-1 et seq, National Park Service (NPS) *Director's* Order #77-1: Wetland Protection, and NEPA compliance in support of the Old Mine Road Rehabilitation project.

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 1989 manual, thus the two types of wetland determination methods employed at DEWA were: (1) 1989 Federal Interagency Committee for Wetland Delineation Manual (1989 Manual) and (2) the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual (1987): Northcentral and Northeast Region (Version 2.0) January 2012. Primacy was given to the 1989 manual within the study area and the 1987 regional supplement was only utilized as a means of providing additional information on hydric soils, hydrology, and utilization of the most current (2016) National Wetland Plant List.

The NPS recognizes that most wetlands on NPS lands will have all three parameters. 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 New Jersey regulations and the NPS standard for identifying wetlands (Cowardin et al. 1979), for brevity, only the standards applicable for DEWA within the state of New Jersey are described below for a more detailed treatment of the other standards the reader is directed to D.O #77-1:

New Jersey Freshwater Wetland Delineation Methods (Routine Onsite Determination using the 1989 Manual, 3-Parameter Approach)

The routine onsite determination method outlined in the 1989 manual was utilized as the study area was relatively homogenous and paved within the 15.50 acre area shown on Figure 1. A primarily walk through of the entire study was conducted with representative soil test pits and hydric/non-hydric plant community assessments determined. Upon completion of the walk through any areas determined as wetland were assessed in greater detail through a series of transects from 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. The wetland/upland boundary line

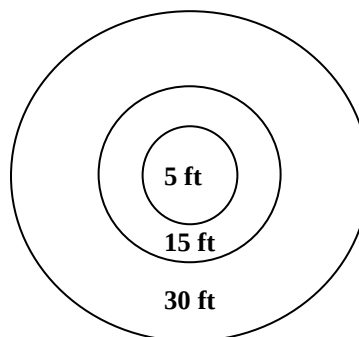


Figure 2. Typical wetland/upland vegetation survey plot utilized within the Old Mine Road study area.

was thus delineated in this general manner with representative wetland and upland data collected for each unique habitat observed in the field.

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 a 5 percent or more total plant cover cut-off. 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 2 (Prevalence Test) was necessary as a supplement to the 1989 manual. However, these species were not generally included on the data sheets except within the remarks section if the wetland determination could be made via the dominance criteria.

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

1. Tree stratum (if present) – 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 (if present) – 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 New Jersey:

- **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).

For a plant community to meet the vegetation criteria under the dominance criteria (a commonly employed indicator at DEWA) more than 50 percent of the dominant plant species across all strata must be rated OBL, FACW, and/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 Northcentral and Northeast Region (Version 2.0), January 2012 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, and/or evidence that the site is subject to flooding or ponding, although the inundation need not be directly observed at the time of the investigation. The inundation 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 which indicate that the soil has been saturated for an extended period. Another group of hydrologic indicators utilized during this field assessment consisted of landscape, vegetation, soil features, and evidence from other sources of data that indicate contemporary rather than historical wet conditions. It is worth noting that 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 listed in the 1989 Manual.

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 and 1989 USACE manuals with regards to wetland boundary determinations is in the area of hydric soil recognition and characterization. The 1989 Manual was the principal means of making hydric/non-hydric soil determinations in the field, however, hydric soils information from the Northcentral and Northeast Region (Version 2.0) January 2012, was also referenced in the field as supplemental information.

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 $\leq$ regular intervals of ≤ 75 feet per NJDEP guidelines around the perimeter of each identified wetland habitat and located using a sub-meter accurate GPS system (Trimble Geo 7X). Representative wetland test pits for each plant community type encountered within a wetland system were also similarly flagged and located as were representative upland test pit/plots. GPS-based coordinates were collected for wetland test pit and boundary flags between 27-28 June 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, VALHALLA (NYVH), NEW YORK (ITRF00 (1997)-Derived from IGS08 (NEW)). The corrected data were then exported to shapefile format for polygon creation in ARCMAP 10.5. Following this procedure 89% of our collected GPS data has accuracies ranging from 0 – 3.0 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 1546 corrected GPS positions for the Old Mine Road Rehabilitation project

Horizontal Precision	Percentage of GPS Positions within Range
0 - 2 in	-
2 - 6 in	0.13%
6 - 12 in	39.78%
12 - 20 in	32.79%
20 - 40 in	14.81%
40 - 79 in	10.48%
79- 197 in	2.01%

The unnamed tributary to the Delaware River whose location is highlighted in Figure 1 was located on project mapping using conventional land survey equipment – not the GPS equipment described and reported within this document. However, the ecological features of that waterway are described within this report and it's vertical and horizontal extents within the Old Mine Road rehabilitation project are shown on the engineering drawings along with the palustrine wetland features. For details regarding the survey work the reader is directed to the projects supporting permit application documents and the associated engineering design drawings.

Wetland Descriptions

Wetland 1 (Size – 0.05 ac): This ecosystem lies within an old utility access road at the top of bank of the Flat Brook. Site soils were mapped by the USDA/NRCS as UccAs – Udifluvents, 0-3 percent slopes, and general soil textures were consistent with the typical profile. The wetland occupied the road bed of what appeared to be an unmaintained utility right-of-way (see Photograph 2) and appeared to receive groundwater from at least one seep that appeared to have been exposed during the construction of the road. The wetland plant community was dominated by *Leersia oryzoides*, however, there were numerous other wetland plant species present (see Appendix B data sheet remarks WTP-1). The Cowardin et al. (1979) classification of this wetland is a palustrine, emergent, persistent, continuously saturated habitat (PEM1D). The wetland system discharges directly into the Flat Brook and also appears to intercept a portion of Old Mine Road runoff waters. Wetland soils were high value/ low chroma (7.5YR_4/1) but with 5% of the matrix showing redoximorphic features (10YR 5/6).



Photograph 2 – Wetland 1 (PEM1D) view facing northeast with Old Mine Road located just behind the utility pole. Photo June 2017 – P. Sharpe. (Photo Location Map – Appendix A)

Wetland 2 (Size – 0.02 ac): Wetland 2 is a smaller system compared to Wetland-1 and is located almost entirely out of the project study area (see Figure 1 and Appendix A mapping). Wetland 2 soils were mapped as Lackawanna cobbly fine sandy loam, 8-15% slopes, (LacCc) and the test pit data did not conform in texture to the typical profile described in the soil survey. Low chroma colors dominated the matrix from 2-18 inches depth (7.5YR 4/2) with 20% of the soil profile also exhibiting redoximorphic features indicative of hydric soils (7.5YR 4/8). Soil saturation and a high groundwater table were observed within the wetland test pit, and it did appear as if the site may drain to the Flat Brook under runoff producing storm events based on the presence of a small, dry, drainage channel located at the northern limit of the site (see Photograph 3). The dominant wetland plant species observed within the site at the time of the investigation was *Poa palustris* although several other non-dominants were also observed within the wetland and are included in the remarks section of the attached data sheet (WTP-2). The Cowardin et al. (1979) classification for this site is palustrine, emergent, nonpersistent, seasonally flooded/saturated habitat (PEM2E).



Photograph 3 – Wetland 2 (PEM2E) view is north looking at the wetland and the small ephemeral drainage feature Photo Date June 2017 – P. Sharpe. (Photo Location Map – Appendix A)

Wetland 2 Functions and Values and NJAC 7:7A-3.2 Classification

Wetland 2 function and values included groundwater discharge, floodflow alteration, and sediment/toxicant retention. This wetland system was rated as an “Ordinary Resource” value as outlined in the state of New Jersey regulation 7:7A-3.2. “Classification of freshwater wetlands by resource value.” The primary justification for this ranking is that this wetland system doesn’t meet the “exceptional resource” criteria, is less than 5,000 square feet in size, and appears to be isolated except under potentially heavy rainfall/runoff conditions.

Riverine Wetland (Unnamed Tributary to the Delaware River) (Size $\approx$ 0.003 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 within our study area was an unnamed tributary to the Upper Delaware River.

This feature exhibited characteristics of a riverine, upper perennial, unconsolidated bottom, cobble/gravel system (R3UB1). As this system was unmapped by USGS and NJDEP the flow regime of the waterway was estimated based off of the presence of a defined bed and banks, natural channel substrates, and the presence of two or more obligate aquatic taxa at the time of our survey (plecoptera and trichoptera larva).

This waterway appears to be generally stable within our very limited project study area with the bulk of its habitat within the Old Mine Road vicinity being encased within a 60 inch reinforced concrete pipe (RCP). No obvious signs of incision or erosion problems within the vicinity of the RCP where observed. It should be noted that there is a 6-10 foot abrupt change in elevation on the downstream end of the existing RCP (see Photographs 4 and 5)

which likely precludes any upstream movement of aquatic species north of Old Mine Road.



Photograph 4 – Unnamed tributary to the Upper Delaware River (R3UB1) view is northwest looking downstream at the section of the waterway as it passes through an RCP underneath Old Mine Road. June 2017 – P. Sharpe. (Photo Location Map – Appendix A)

Riverine System Functions and Values

The system did appear to be perennial based on a rapid field assessment , however, the presence of steep grade difference on the downstream end of the RCP limits upstream movement of most higher order aquatic taxa (e.g. fishes) thereby reducing some of its habitat value. Apart from the obvious influences of the roadway culvert at this location the waterway appears to be a relatively stable high gradient, first order, stream system which likely provides some productivity and nutrient export to the Upper Delaware River.



Photograph 5 – Unnamed tributary to the Upper Delaware River (R3UB1) view is northwest looking out of the RCP (downstream end) on Old Mine Road. Note the drop-off from the rock in the foreground to the waterway below. Photo taken June 2017 – P. Sharpe. (Photo Location Map – Appendix A)

Recommendations

If the proposed Old Mine Road Rehabilitation Project were to proceed then the findings of this report including the associated wetland spatial data collected in the field could be used for D.O. #77.1 and Freshwater Wetlands Protection Act, N.J.S.A. 13:9B-1 et seq compliance purposes. Dr. Kevin Noon (NPS-WRD) or myself could be your principal point of contacts for guidance related to the development of a formal wetland and floodplain 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.

However, given the size of the palustrine and riverine systems within the proposed study area park staff are advised to consult with Kevin Noon upon an analysis of the potential impacts as these are likely to be below the NPS de minimus value of 0.1 acre. This may reduce the compliance needs and any subsequent restoration requirements of the project under D.O.#77.1. However, park staff are encouraged to coordinate with NJDEP regarding this project as they administer the federal Clean Water Act through various regulatory programs including the Freshwater Wetlands Protection Act, N.J.S.A. 13:9B-1 et seq. Compliance with the appropriate New Jersey State regulations will be essential to ensure this project is in good legal standing.

The NJDEP may require additional information including more detailed location data in the form of a professional land licensed survey of all wetland/waterway boundaries for purposes of a Line Verification and generation of formal “transition area” boundaries as defined under their N.J.A.C. 7:7A-3.3. Wetlands -1 and 2 which currently lie within 18 and 48 feet respectively of Old Mine Road may require a waiver from NJDEP for their transition zones.

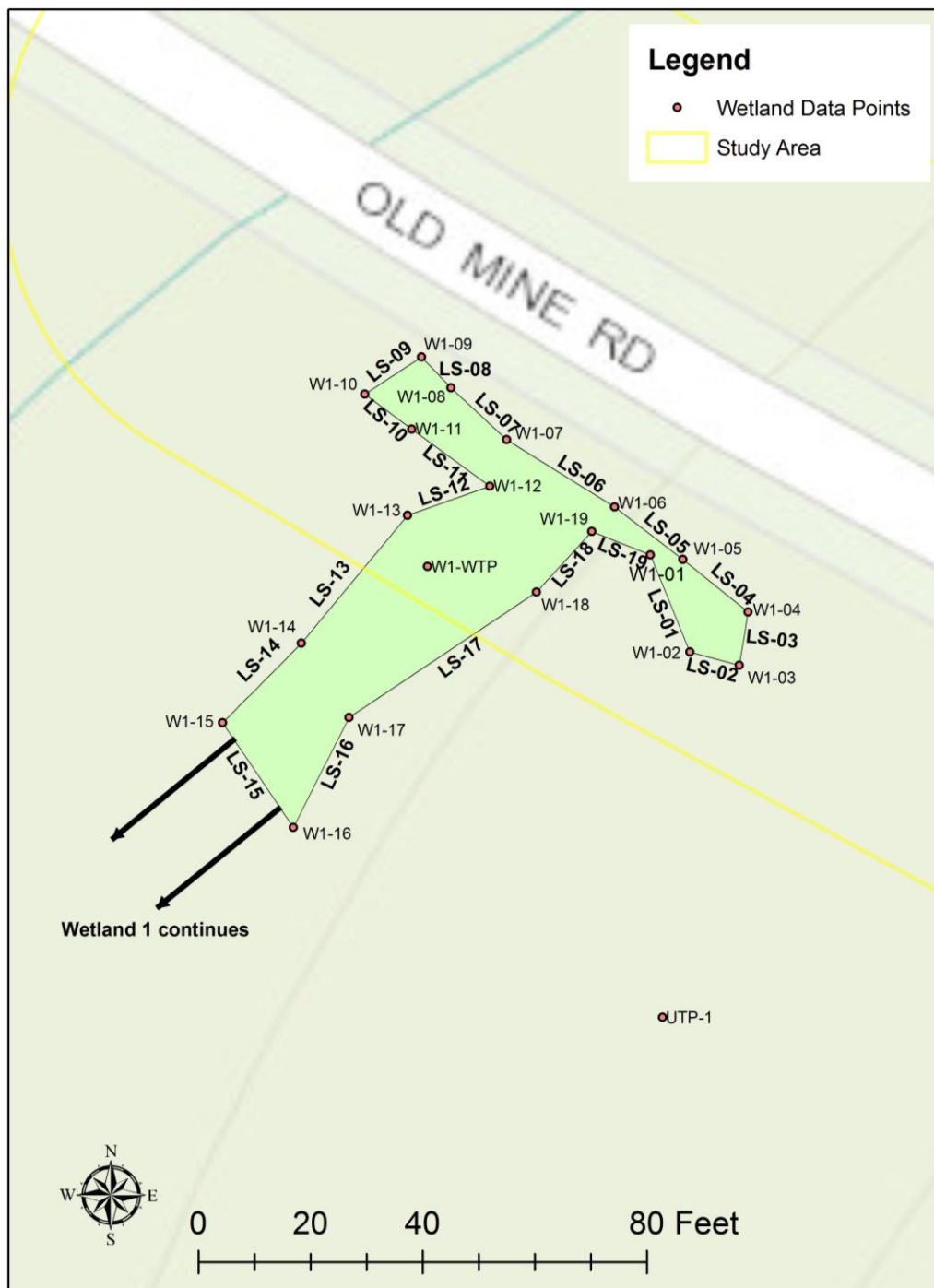
If you have any questions regarding this report please call Peter Sharpe at (267) 858-1001.

cc: (by e-mail only)
DEWA – Richard McKenna
WRD - K. Noon
NERO – Carmen Chapin

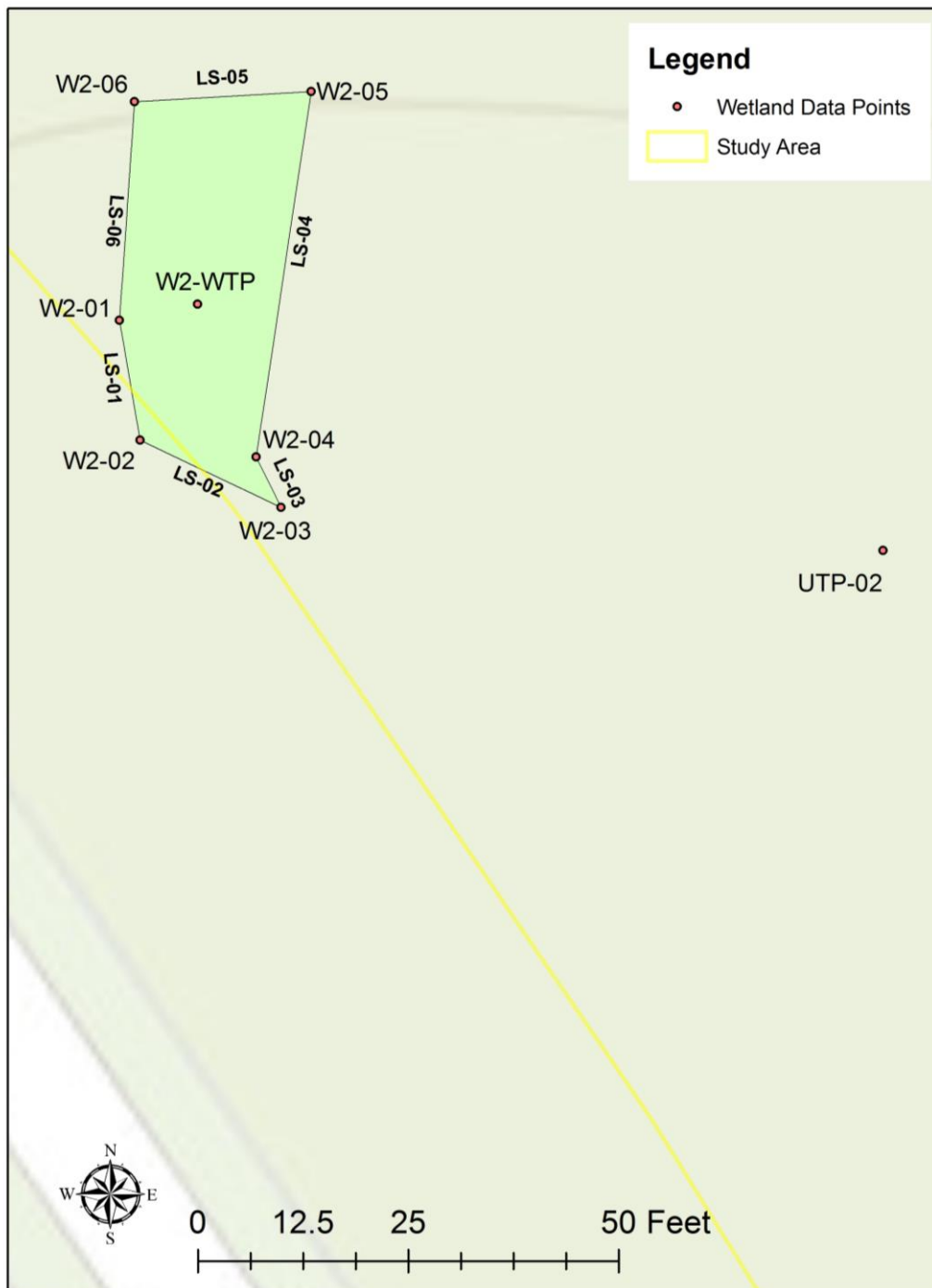
References Cited

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- USDA Natural Resources Conservation Service. 1994. National food security act manual, third edition (as amended). Washington, DC.

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



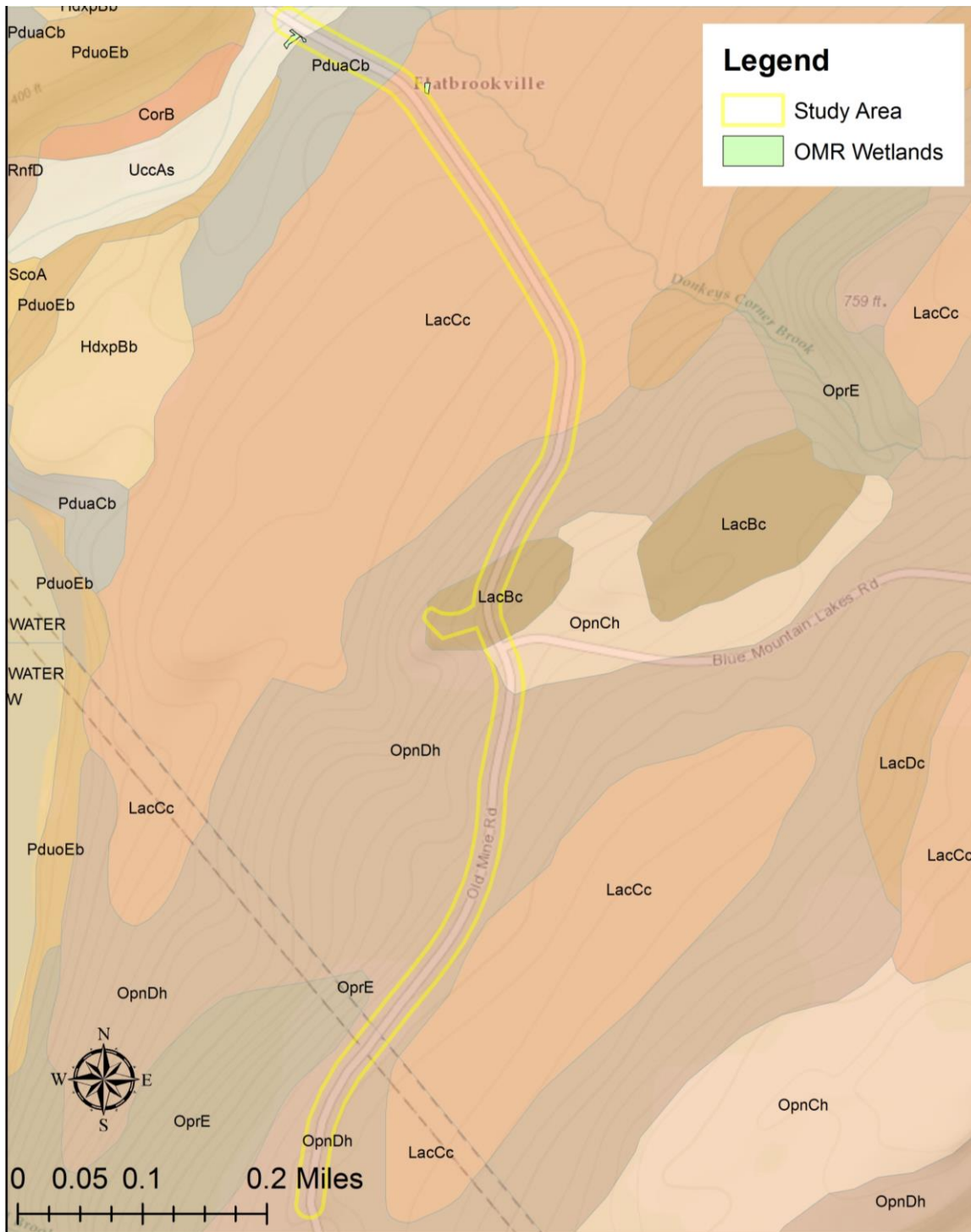
Wetland-1 showing boundary points, wetland and upland test pit/vegetation data collection locations (WTP/UTP) and line segments.



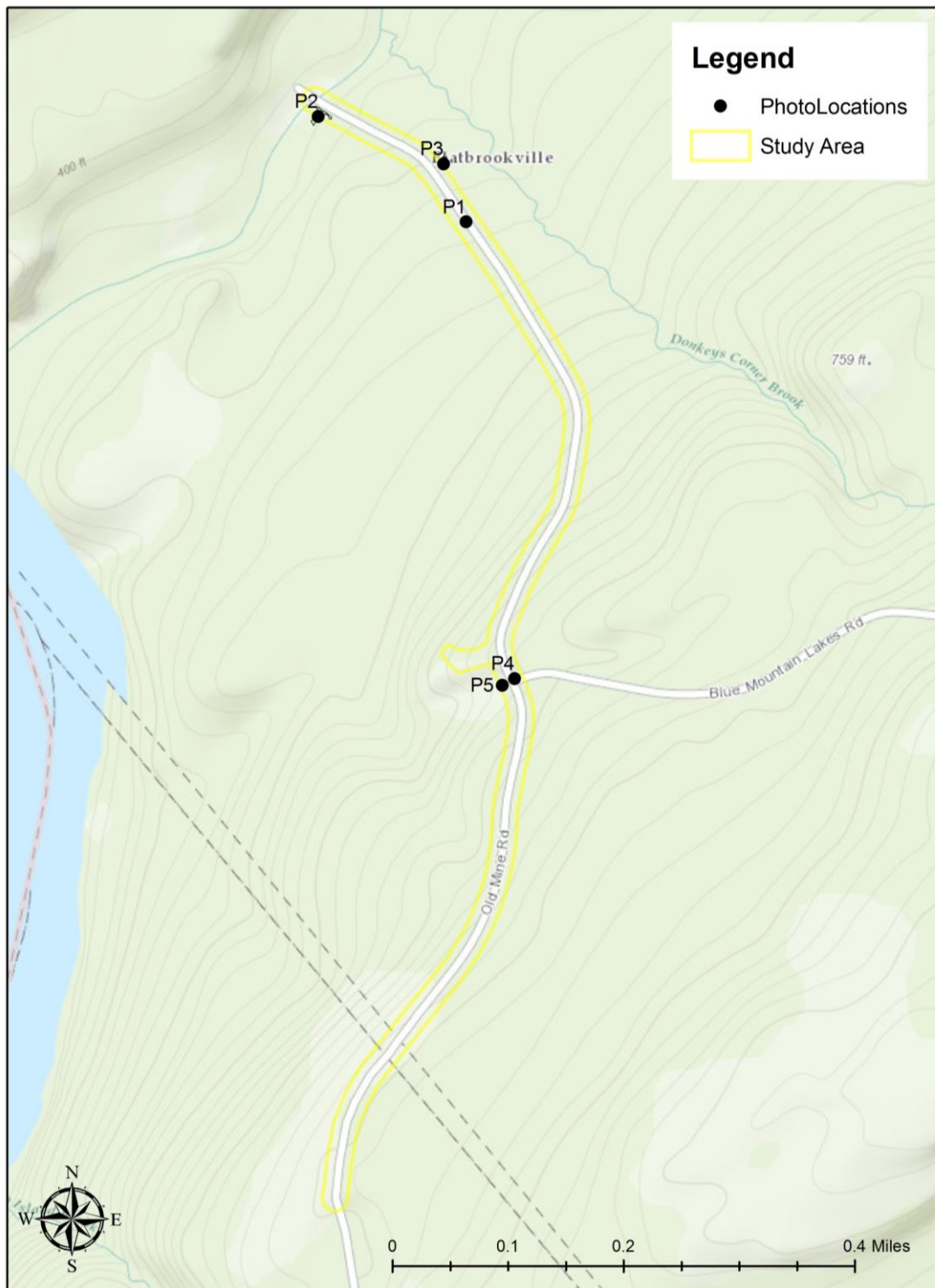
Wetland-2 showing boundary points, wetland and upland test pit/vegetation data collection locations (WTP/UTP) and line segments.



National Wetland Inventory Mapping for the project area.



USDA/NRCS Soil Survey Mapping for the project area.



Photograph Location Map for the Old Mine Road Rehabilitation Project. P1 stands for Photograph 1 and so on.

Appendix B – Wetland Delineation Data Sheets

Routine Wetland Determination – Data Form (1989 Criteria)

Project/Site: DEWA Old Mine Road				Date: 6/27/2017	
Applicant/Owner: The National Park Service				County: Sussex	
Investigator(s): Peter J. Sharpe				State: New Jersey	
Do Normal Conditions exist on the site?				Yes	☒ No ☐
Is the site significantly disturbed (Atypical Situation)?				Yes	☒ No ☐
Is the area a potential Problem Area? (if needed explain on reverse)				Yes	☐ No ☒
				Community ID: PEM1D	
				Transect ID: NA	
				Plot ID: WTP-1	

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Leersia oryzoides</i>	H	OBL	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that OBL, FACW, or FAC (excluding FAC-): 100%

Remarks: Non-dominant species (50/20 Rule) included numerous additional wetland plants such as: *Carex lurida* (7.5%), *Carex intumescens* (3.5%), *Impatiens capensis* (3.5%), *Microstegium vimineum* (3.5%), *Poa palustris* (7.5%), *Scirpus atrovirens* (7.5%), *Symplocarpus foetidus* (3.5%), *Mentha arvensis* (3.5%), *Persicaria sagittata* (1.5%), *Equisetum arvense* (7.5%).

HYDROLOGY

Recorded Data (Describe in Remarks)		WETLAND HYDROLOGY INDICATORS	
☐	Stream, Lake or Tide Gauge	Primary Indicators: ☐ Inundated ☒ Saturated in the Upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☒ Drainage Patterns in Wetlands	
☐	Aerial Photographs		
☐	Other		
☒	No Recorded Data Available	Secondary Indicators (2 or more Required): ☐ Oxidized Root Channels in Upper 12 inches ☒ Water-Stained Leaves ☐ Local Soil Survey Data ☐ FAC-Neutral Test ☐ Other (Explain in Remarks)	
FIELD OBSERVATIONS			
Depth of Surface Water	0.25 (in)		
Depth to Free Water in Pit	15.0 (in)		
Depth to Saturated Soil	0.0 (in)		

SOILS

Map Unit Name (Series and Phase):							
Depth (inches)	Matrix		Redox Features				Texture
	Color (moist)	%	Color (moist)	%	Type	Loc	
0-18	7.5YR 4/1	95	10YR 5/6	5	Con.	Matrix	Sandy clay loam

HYDRIC SOIL INDICATORS:

☐	Histosol	☐	Concretions
☐	Histic Epipedon	☐	High Organic Content in Surface Layer in Sandy Soils
☐	Sulfidic Odor	☐	Organic Streaking in Sandy Soils
☒	Aquic Moisture Regime	☐	Listed on Local Hydric Soils List
☐	Reducing Conditions	☐	Listed on National Hydric Soils List
☒	Gleyed or Low-Chroma Colors	☐	Other (Explain in Remarks)

Remarks: Hit rock at 18 inches depth. This wetland occurs within an old roadbed and the rock is believed to be aggregate from road construction.

Wetland Determination

Hydrophytic Vegetation Present?	☒	Yes	☐	No	Is this Sampling Point Within a Wetland?	☒ Yes ☐ No
Wetland Hydrology Present?	☒	Yes	☐	No		
Hydric Soils Present?	☒	Yes	☐	No		
Remarks:						

Routine Wetland Determination – Data Form (1989 Criteria)

Project/Site: DEWA Old Mine Road				Date: 6/27/2017	
Applicant/Owner: The National Park Service				County: Sussex	
Investigator(s): Peter J. Sharpe				State: New Jersey	
Do Normal Conditions exist on the site?			Yes ☒	No ☐	Community ID: Upland
Is the site significantly disturbed (Atypical Situation)?			Yes ☐	No ☒	Transect ID: NA
Is the area a potential Problem Area? (if needed explain on reverse)			Yes ☐	No ☒	Plot ID: UTP-1

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Fagus grandifolia</i>	T	FACU	9.		
2. <i>Fagus grandifolia</i> (understory)	S	FACU	10.		
3. <i>Fagus grandifolia</i> (seedlings)	H	FACU	11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that OBL, FACW, or FAC (excluding FAC-): 0%

Remarks: Other non-dominant forest plants (50/20 Rule) included: *Tsuga Canadensis* (17.5%) and *Prunus avium* (17.5%) in the canopy. *Polystichum acrostichoides* (2.5 %) and *Pyrola americana* (1.5%) were observed within the herb layer. Overall understory and herb cover was sparse.

HYDROLOGY

Recorded Data (Describe in Remarks)		WETLAND HYDROLOGY INDICATORS				
☐	☐ Stream, Lake or Tide Gauge			Primary Indicators:		
	☐ Aerial Photographs					☐ Inundated
	☐ Other					☐ Saturated in the Upper 12 inches
☒	No Recorded Data Available			☐ Water Marks		
FIELD OBSERVATIONS				☐ Drift Lines		
Depth of Surface Water	NA (in)			☐ Sediment Deposits		
Depth to Free Water in Pit	NA (in)			☐ Drainage Patterns in Wetlands		
Depth to Saturated Soil	NA (in)			Secondary Indicators (2 or more Required):		
				☐ Oxidized Root Channels in Upper 12 inches		
				☐ Water-Stained Leaves		
				☐ Local Soil Survey Data		
				☐ FAC-Neutral Test		
				☐ Other (Explain in Remarks)		

SOILS

Map Unit Name (Series and Phase):							
Depth (inches)	Matrix		Redox Features				Texture
	Color (moist)	%	Color (moist)	%	Type	Loc	
0-3	10YR 3/2	100					Silt Loam
3-10	10YR 4/4	100					Silt Loam

HYDRIC SOIL INDICATORS:

Histosol Histic Epipedon Sulfidic Odor Aquic Moisture Regime Reducing Conditions Gleyed or Low-Chroma Colors	Concretions High Organic Content in Surface Layer in Sandy Soils Organic Streaking in Sandy Soils Listed on Local Hydric Soils List Listed on National Hydric Soils List Other (Explain in Remarks)
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Remarks: Hit rock at 10 inches depth – soils appeared to be very well drained and exhibited extremely stony characteristics.

Wetland Determination

Wetland Determination				
Hydrophytic Vegetation Present?	☐	Yes	☒	No
Wetland Hydrology Present?	☐	Yes	☒	No
Hydric Soils Present?	☐	Yes	☒	No
Is this Sampling Point Within a Wetland? ☐ Yes ☒ No				
Remarks:				

Routine Wetland Determination – Data Form (1989 Criteria)

Project/Site: DEWA Old Mine Road				Date: 6/27/2017	
Applicant/Owner: The National Park Service				County: Sussex	
Investigator(s): Peter J. Sharpe				State: New Jersey	
Do Normal Conditions exist on the site?			Yes ☒	No ☐	Community ID: PEM2E
Is the site significantly disturbed (Atypical Situation)?			Yes ☐	No ☒	Transect ID: NA
Is the area a potential Problem Area? (if needed explain on reverse)			Yes ☐	No ☒	Plot ID: WTP-2

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. <i>Poa palustris</i>	H	FACU	9.		
2.			10.		
3.			11.		
4.			12.		
5.			13.		
6.			14.		
7.			15.		
8.			16.		

Percent of Dominant Species that OBL, FACW, or FAC (excluding FAC-): 100%

Remarks: Other non-dominant forest plants (50/20 Rule) included: *Leersia oryzoides* (17.5%), *Impatiens capensis* (3.5%), *Microstegium vimineum* (7.5%), and *Equisetum arvense* (3.5%).

HYDROLOGY

Recorded Data (Describe in Remarks)		WETLAND HYDROLOGY INDICATORS	
☐	☐ Stream, Lake or Tide Gauge	Primary Indicators:	
	☐ Aerial Photographs		
	☐ Other		
☒	No Recorded Data Available	☐ Inundated ☒ Saturated in the Upper 12 inches ☐ Water Marks ☐ Drift Lines ☒ Sediment Deposits ☒ Drainage Patterns in Wetlands	
FIELD OBSERVATIONS			
Depth of Surface Water	NA (in)		
Depth to Free Water in Pit	10.0 (in)		
Depth to Saturated Soil	0.0 (in)	Secondary Indicators (2 or more Required): ☐ Oxidized Root Channels in Upper 12 inches ☒ Water-Stained Leaves ☐ Local Soil Survey Data ☐ FAC-Neutral Test ☐ Other (Explain in Remarks)	

SOILS

Map Unit Name (Series and Phase):

Depth (inches)	Matrix		Redox Features				Texture
	Color (moist)	%	Color (moist)	%	Type	Loc	
0-2	10YR 2/1	100					Silty, clay, loam
2-18	7.5YR 4/2	80	7.5YR 4/8	20	Con.	Matrix	Sandy, clay, loam

HYDRIC SOIL INDICATORS:

☐	Histosol	☐	Concretions
☐	Histic Epipedon	☐	High Organic Content in Surface Layer in Sandy Soils
☐	Sulfidic Odor	☐	Organic Streaking in Sandy Soils
☐	Aquic Moisture Regime	☐	Listed on Local Hydric Soils List
☐	Reducing Conditions	☐	Listed on National Hydric Soils List
☒	Gleyed or Low-Chroma Colors	☐	Other (Explain in Remarks)

Remarks:

Wetland Determination

Hydrophytic Vegetation Present?	☒	Yes	☐	No	Is this Sampling Point Within a Wetland?	☒ Yes ☐ No
Wetland Hydrology Present?	☒	Yes	☐	No		
Hydric Soils Present?	☒	Yes	☐	No		

Remarks:

Routine Wetland Determination – Data Form (1989 Criteria)

Project/Site: DEWA Old Mine Road				Date: 6/27/2017	
Applicant/Owner: The National Park Service				County: Sussex	
Investigator(s): Peter J. Sharpe				State: New Jersey	
Do Normal Conditions exist on the site?			Yes ☒	No ☐	Community ID: UPLAND
Is the site significantly disturbed (Atypical Situation)?			Yes ☐	No ☒	Transect ID: NA
Is the area a potential Problem Area? (if needed explain on reverse)			Yes ☐	No ☒	Plot ID: UTP-2

VEGETATION

Dominant Plant Species	Stratum	Indicator	Dominant Plant Species	Stratum	Indicator
1. Tsuga canadensis	T	FACU	9.		
2. Quercus rubra	T	FACU	10.		
3. Betula lenta	T	FACU	11.		
4. Carpinus caroliniana	S	FAC	12.		
5. Berberis thunbergii	S	FACU	13.		
6. Polystichum acrostichoides	H	FACU	14.		
7.			15.		
8.			16.		

Percent of Dominant Species that OBL, FACW, or FAC (excluding FAC-): 16.67%

Remarks:

HYDROLOGY

☐ Recorded Data (Describe in Remarks) ☐ Stream, Lake or Tide Gauge ☐ Aerial Photographs ☐ Other		WETLAND HYDROLOGY INDICATORS	
☒ No Recorded Data Available		Primary Indicators:	
		☐ Inundated ☐ Saturated in the Upper 12 inches ☐ Water Marks ☐ Drift Lines ☐ Sediment Deposits ☐ Drainage Patterns in Wetlands	
FIELD OBSERVATIONS		Secondary Indicators (2 or more Required): ☐ Oxidized Root Channels in Upper 12 inches ☐ Water-Stained Leaves ☐ Local Soil Survey Data ☐ FAC-Neutral Test ☐ Other (Explain in Remarks)	
Depth of Surface Water	NA (in)		
Depth to Free Water in Pit	NA (in)		
Depth to Saturated Soil	NA (in)		

SOILS

Map Unit Name (Series and Phase):							
Matrix			Redox Features				
Depth (inches)	Color (moist)	%	Color (moist)	%	Type	Loc	Texture
0-4	10YR 3/1	100					Stony
4-15	10YR 4/4	100					Very Stony

HYDRIC SOIL INDICATORS:

☐	Histosol	☐	Concretions
☐	Histic Epipedon	☐	High Organic Content in Surface Layer in Sandy Soils
☐	Sulfidic Odor	☐	Organic Streaking in Sandy Soils
☐	Aquic Moisture Regime	☐	Listed on Local Hydric Soils List
☐	Reducing Conditions	☐	Listed on National Hydric Soils List
☐	Gleyed or Low-Chroma Colors	☐	Other (Explain in Remarks)

Remarks:

Wetland Determination

Hydrophytic Vegetation Present?	☐	Yes	☒	No	Is this Sampling Point Within a Wetland?	☐ Yes ☒ No
Wetland Hydrology Present?	☐	Yes	☒	No		
Hydric Soils Present?	☐	Yes	☒	No		
Remarks:						

Appendix C – Wetland Function and Value Data Sheets

Wetland Function-Value Evaluation Form

Total area of wetland 0.05 ac Human made? Yes Is wetland part of a wildlife corridor? Yes or a "habitat island"? No
 Adjacent land use Waterway, park road, and public lands Distance to nearest roadway or other development 18 feet
 Dominant wetland systems present PEM1D Contiguous undeveloped buffer zone present No
 Is the wetland a separate hydraulic system? Yes If not, where does the wetland lie in the drainage basin? _____
 How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland -1 OMR Project
 Latitude 41.1010 Longitude -74.9623
 Prepared by: PJS Date 1/18/2018
 Wetland Impact:
 Type NA Area NA
 Evaluation based on:
 Office X Field X
 Corps manual wetland delineation completed? Y X N _____

Function/Value	Suitability Y N		Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	X		2,4,5,7,13,	7	
 Floodflow Alteration	X		5,9,13,	5	
 Fish and Shellfish Habitat		X			
 Sediment/Toxicant Retention	X		1,2,3,4,10,14,16	14	
 Nutrient Removal		X			
 Production Export	X		1,2,7,10,12	10	
 Sediment/Shoreline Stabilization	X		2,3,6,9,12,15	15	
 Wildlife Habitat		X			
 Recreation		X			
 Educational/Scientific Value		X			
 Uniqueness/Heritage		X			
 Visual Quality/Aesthetics		X			
ES Endangered Species Habitat		X			
Other					

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 0.02 ac Human made? Yes Is wetland part of a wildlife corridor? Yes or a "habitat island"? No

Adjacent land use Waterway, park road, and public lands Distance to nearest roadway or other development 48 feet

Dominant wetland systems present PEM2E Contiguous undeveloped buffer zone present No

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

How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list)

Wetland I.D. Wetland -2 OMR Project

Latitude 41.1004 Longitude -74.9602

Prepared by: PJS Date 1/18/2018

Wetland Impact:
Type NA Area NA

Evaluation based on:

Office X Field X

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		2,4,5,10,13	10	
 Floodflow Alteration	X		5,9,11,	9	
 Fish and Shellfish Habitat		X			
 Sediment/Toxicant Retention	X		1,2,4,6,9	1	
 Nutrient Removal		X			
 Production Export		X			
 Sediment/Shoreline Stabilization		X			
 Wildlife Habitat		X			
 Recreation		X			
 Educational/Scientific Value		X			
 Uniqueness/Heritage		X			
 Visual Quality/Aesthetics		X			
ES Endangered Species Habitat		X			
Other					

Notes:

* Refer to backup list of numbered considerations.

Wetland Function-Value Evaluation Form

Total area of wetland 0.003 ac Human made? No Is wetland part of a wildlife corridor? Yes or a "habitat island"? No
 Adjacent land use Waterway, park road, and public lands Distance to nearest roadway or other development 5 feet
 Dominant wetland systems present R3UB1 Contiguous undeveloped buffer zone present No
 Is the wetland a separate hydraulic system? Yes If not, where does the wetland lie in the drainage basin? _____
 How many tributaries contribute to the wetland? 0 Wildlife & vegetation diversity/abundance (see attached list) _____

Wetland I.D. Unnamed Trib - OMR Project
 Latitude 41.0938 Longitude -74.9589
 Prepared by: PJS Date 1/18/2018
 Wetland Impact:
 Type NA Area NA
 Evaluation based on:
 Office X Field X
 Corps manual wetland delineation completed? Y N X

Function/Value	Suitability Y N	Rationale (Reference #)*	Principal Function(s)/Value(s)	Comments
 Groundwater Recharge/Discharge	X			This function likely occurs but was unverified in the field
 Floodflow Alteration	X			
 Fish and Shellfish Habitat	X	1,2,8,10,14,17	14	Habitat for smaller forage fishes present, however, fish passage barriers are present
 Sediment/Toxicant Retention	X			
 Nutrient Removal	X			
 Production Export	X	1,2,4,10,13	4	
 Sediment/Shoreline Stabilization	X			
 Wildlife Habitat	X			
 Recreation	X			
 Educational/Scientific Value	X			
 Uniqueness/Heritage	X			
 Visual Quality/Aesthetics	X			
ES Endangered Species Habitat	X			
Other				

Notes:

* Refer to backup list of numbered considerations.