HTRW and Geotechnical Boring Studies Report

For

Wreck Pond Feasibility Study

Wreck Pond
Monmouth County
New Jersey

Contract No. W912DS-14-D-0001, Task Order 0005

Prepared for:

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
U.S. ARMY ENGINEER DISTRICT, NEW YORK

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1.0 INTRODUCTION

1.1 Purpose/Objective

The Wreck Pond Brook Watershed is in southern Monmouth County, New Jersey. Wreck Pond is a tidal pond located on the coast of the Atlantic Ocean. The major tributaries include Wreck Pond Brook, and Black Creek. Throughout the watershed, high stream velocities during flood conditions have caused the destabilization of stream banks in the watershed. Erosion of stream banks had resulted in the loss of riparian vegetation and wetlands. Erosion within the watershed has also contributed to excessive amounts of sediment to the system, which tends to settle as it flows into Wreck Pond, and is likely constrained from being flushed further into the ocean by the Wreck Pond outfall structure. This outfall structure was designed to exchange flow between Wreck Pond and the Atlantic Ocean and extend Wreck Pond outfall away from the swimming beach to lessen bacterial contamination of near shore waters.

Prior to Hurricane Sandy, Wreck Pond continued to accumulate silt and sediments and experience environmental quality issues due to its shallow condition, including eutrophic waters and degraded habitat for fish, birds, and invertebrates. Wreck Pond has also suffered significant loss of aquatic and wetland habitat, as well as recurring water quality problems, which in turn has resulted in multiple beach closings. The Hurricane Sandy event caused a breach of the dune beach system and formed a natural inlet next to the outfall structure. This inlet has created an increased exchange of water between Wreck Pond and the Atlantic Ocean. However, this situation is not stable and the inlet shows signs of closing when no significant storm events take place. The Feasibility Study will examine the following ecosystem restoration objectives for Wreck Pond:

- Restore in-water and riparian habitat
- Restore anadromous fish passage (restoring tidal exchange)
- Improve aquatic diversity and health
- Restore wetland habitat
- Reduce sedimentation
- Restore water quality to support fisheries

Alternatives measures will be formulated and evaluated to meet the planning objectives. The study will formulate and evaluate alternatives to improve the Wreck Pond aquatic ecosystem. Potential improvement measures to consider include:

- Modifying the outfall from Wreck Pond to the Atlantic Ocean to allow for increased tidal exchange and anadromous fish passage. Measures for outfall modification include
    - Modifying the existing outfall
    - Analysis of an additional outfall

- Establishing tidally influenced wetland communities (all study reaches). Measures for wetland community evaluation include (location dependent – salinity):
- Creating habitat through sedimentation control measures
- Stabilizing shorelines through the establishment of living shorelines and upland shrub land communities (all study reaches).
- Installing in-water structures to increase aquatic diversity
- Dredging material from Wreck Pond. Analysis will include dredging to:
  - "Historic Depth"
  - A specific depth based on analysis results
- Modifying drop structures, flow constraints and other transitions between Wreck Pond and Black Creek and other upstream points (two such measures to be analyzed).

In order to support the goals of the feasibility study, a U.S. Army Corps of Engineers-approved model of Wreck Pond, the water bodies directly upland of Wreck Pond, and the offshore waters in the immediate vicinity of the ocean outfall was developed. The model was calibrated and verified using available "normal" tide data. Existing conditions of the Wreck Pond System, including the hydraulic characteristics of the existing Wreck Pound outfall pipe, were modeled. The calibrated model will be used to investigate the effects of dredging and waterway feature modification.

This report describes the development and calibration of the Wreck Pond model.

1.2 Study Area

Wreck Pond in Spring Creek, New Jersey, is a tidal pond with a connection to the Atlantic Ocean through a 795-foot (ft) long and 7-ft diameter ocean outfall. Two small ponds in the upper portion of the Wreck Pond complex receive freshwater from Black Creek and are separated from the main pond by a weir at Ocean Avenue. The surface area of the Wreck Pond system, including the Black Creek ponds, is about 86 acres (0.13 square miles).

1.3 Desktop Review

1.3.1 USDA Soils Mapping

The USDA maps surficial soils throughout the country, originally for the purpose of agricultural activities, but has been used for decades to determine engineering properties of soils for preparation of geotechnical field investigations. These soils are described to shallow depths of 80 inches or less. The mapping is included within the USDA Web Soil Survey.[1]

The predominant soil unit mapped along the edges of Wreck Pond is Downer soils, but also include Hooksan sand, Klej loamy sand, Humaquepts, Atsion sand, and Udorthents described as follows:

[1] http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx

Downer – A very deep, well drained coarse-loamy sands to sandy loam, siliceous soils, yellowish brown in color below the A horizon.

Klej loamy sand – Associated with wetlands. A very deep, somewhat poorly drained, highly permeable sand to loamy sand, overlain by fibrous peat and reddish gray mucky peat.

Humaquepts – A frequently flooded (floodplain soil), with an A horizon of loam up to 18 inches thick, with sand down to depth.

Atsion sand – A very deep, poorly drained soil with moderately rapid permeability. General composition is sand with quartzose pebbles and little to no fines.

Udorthents – These soils are classified as fill and/or anthropogenic soils consisting of loam within the A horizon and loam sands to depth.

Hooksan sand – This soil is located between Wreck Pond and the beach to the east. This soil consists of beach sands to depths of 80 inches or more.

1.3.2 Geologic Mapping

The site is underlain by several formations, including surficial and deeper geologic formations. The site is located within the Coastal Plain Physiographic province and consists of the following surficial and bedrock geology.[2]

1.3.2.1 **Surficial Geology –** The site consists of Cape May Formation, Unit 2 (Qcm2), Salt-Marsh and Estuarine Deposits (Qmm), and Weathered Coastal Plain Formations (Qwcp).

Cape May Formation, Unit 2 (Qcm2) – Of late Pleistocene origin, deposits consist of sand, gravel, with minor components of silt, clay, peat and cobble gravel. Generally less than 50 feet thick in areas mapped outside of the Cape May Peninsula.

Salt-Marsh and Estuarine Deposits (Qmm) – Of Holocene origins, the soils consist of silt, sand, peat, clay, minor pebble gravels with colors of dark-brown, gray, and black. This deposit formed during Holocene sea-level rise and contains abundant organic matter.

Weathered Coastal Plain Formations (Qwcp) – Of chiefly Pleistocene origins, this formation consists of exposed sands and clay of Coastal Plain deeper geologic formations, and includes areas of alluvium and colluvium, with pebbles left over from erosion.

[2] NJDEP GeoWeb Map Viewer.

1.3.2.2 **Bedrock Geology** – The bedrock geologic formation is the Lower Member Kirkwood Formation (Tkl), consisting of sands and clays of the Miocene formation. In its outcrop this formation consists of light-colored quartz sands. The facies pinches out rapidly in the subsurface and the unit is predominantly a massive to finely laminated, dark-gray clay. Along the coast the sands thicken to over 75 feet and is part of the principal aquifer in the coastal region.

2.0 FIELD INVESTIGATIONS

The Hazardous, Toxic and Radioactive Waste (HTRW) and geotechnical studies were jointly conducted during one mobilization on the days of March 23rd through March 27th, 2015. All HTRW and geotechnical information was gathered from the same borings. A drilling subcontractor, Uni-Tech Drilling Co., Inc. (UTD), advanced the borings.

Prior to initiating field activities, a Health and Safety Plan and Hazard Analysis was completed and compiled into a report titled "Project Safety Document" dated February 2015. This report is incorporated by reference.

Geotechnical

Nine (9) borings were completed in Wreck Pond and one (1) in Black Creek by way of a pontoon barge. The drilling equipment consisted of a tripod rig with a mechanical capstan hoist. The borings were conducted in accordance with EM 1110-1-1804 (USACE Geotechnical Investigations). Sediments were sampled continuously in accordance with ASTM D 1586 (Standard Test Method for Penetration Test and Split-Barrel Sampling of Soils) and ASTM D 1587 (Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes). All encountered soils were described in accordance with the Unified Soil Classification System and the Burmister method to quantify the major and minor components (gravel, sand, silt and clay). All sediment samples were preserved and transported to the USACE certified Princeton Hydro geotechnical soils laboratory in accordance with ASTM D 4220 (Standard Practices for Preserving and Transporting Soil Samples).

Borings were progressed eight to fourteen feet below the top of accumulated sediment. . Depending on the sediment thickness the depth of boring below the accumulated material varied. In general, borings were progressed twelve feet below the top of sediment near the perimeter and eight feet below in the central areas. The borings were located in the field using a preliminary boring location map created for the field effort and prominent surface features (cross streets, outfalls, etc.). The final field locations were secured using a Trimble Pro Series GPS unit. The boring locations are shown in Appendix A. Geotechnical boring logs are provided in Appendix B. The elevation of each boring was obtained by overlaying the GPS'ed boring coordinates with a prior bathymetric survey completed for Wreck Pond[3] in June 2014.

To corroborate the bathymetric survey completed under task order W912DS-14-D-0001, Delivery Order 0002, two transects of the survey was overlain on the boring logs to create interpretive cross sections of the accumulated sediment and underlying parent materials. While there were several borings where the top of sediment did not match the bathymetric survey top of sediment, overall the borings corroborate the survey findings, with the exception of boring B-4, located near the eastern end of Wreck Pond. In this boring 4 feet of sandy sediment was encountered overlying 7 feet of sandy organic silt. It is apparent in this location that the top stratum of sandy sediment was likely the result of deposition of sands as a result of the storm surge during Hurricane Sandy. This finding reveals that the total accumulated sediment volume in Wreck Pond will increase over that calculated in the bathymetric survey. During the design

[3] Contract No. W912DS-140D-0001, Delivery Order 0002.

phase of a restoration project for Wreck Pond, this area should be investigated with additional borings to further define the extent of Hurricane Sandy related deposits and the pre-storm underlying sediment.

HTRW

The HTRW field investigation consisted of collection of continuous split spoons at each boring location to the target depth. Each split spoon was screened for organic vapors with a photoionization detector (PID) equipped with a 10.6 eV lamp. Samples were also screened for visual (e.g., staining, sheens) and olfactory signs of contamination.

One sample was chosen from each boring for laboratory analysis. Samples were analyzed according to the Laboratory Use Plan – HTRW Analyses (Appendix C). Each sample was analyzed for the following constituents:

Table 2-1: Constituents and Analytical Methodology

Constituents	Analytical Method
VOCs + 15	EPA Method 8260C
SVOCs + 25	EPA Methods 8270D & 8270D SIM
Pesticides	EPA Method 8081B
PCBs	EPA Method 8082A
RCRA Metals	EPA Methods 6010C, 6020A and 7471B

*VOCs– volatile organic compounds; SVOCs – semi-volatile organic compounds; "+15" and "+25" – the number of tentatively identified compounds reported for VOC and SVOC analysis, respectively; SIM – selective ion monitoring to meet NJDEP reporting limits for specific compounds; PCBs – polychlorinated biphenyls; RCRA – Resource Conservation and Recovery Act.

Samples were proposed to be collected from the interval exhibiting the most evidence of contamination. However, no evidence of contamination was encountered during the field effort so the samples were collected from either the top foot of the accumulated sediment or from the material directly underneath the accumulated sediment. Samples for VOC analysis from the top foot of accumulated sediment were collected from the 6-12 inch interval. Samples for the remaining analyses were collected from the entire foot. The following table summarizes the samples that were collected for laboratory analysis:

Table 2-2: HTRW Sample Collection Summary

Boring Name	Sample Name	Sample Date, Time	Sample Depth, ft bgs	Description
B-1	B-1-0-1-03242015	3/24/2015, 14:15	0-1	Accumulated Sediment
B-2	B-2-0-1-03242015	3/24/2015, 12:45	0-1	Accumulated Sediment
B-3	B-3-0-1-03242015	3/24/2015, 11:00	0-1	Accumulated Sediment
B-4	B-4-1-2-03242015	3/24/2015, 09:45	1-2	Sand
B-5	B-5-0-1-03262015	3/26/2015, 11:35	0-1	Accumulated Sediment
B-6	B-6-6-7-03262015	3/26/2015, 10:35	6-7	Sand
B-7	B-7-0-1-03262015	3/26/2015, 09:40	0-1	Accumulated Sediment
B-8	B-8-0-1-03252015	3/25/2015, 14:20	0-1	Accumulated Sediment
B-9	B-9-4-5-03252015	3/25/2-15, 13:40	4-5	Sand
B-10	B-10-0-1-03272015	3/27/2015, 13:15	0-1	Accumulated Sediment

Sample naming used the following convention;

- Boring Number -
- Start sample depth (in ft.) -
- End sample depth (in ft.) -
- Date (month, day, year)

For example, sample name “B-1-0-1-03242015” is the sample from boring B-1 from 0-1 feet below the pond bottom that was collected on March 24, 2015.

The following sample information was written on each jar and maintained on a sample log; initials of sampler, date/time, location, depth, required analyses, sample owner, unique sample name and, if applicable, any preserving agents used. Samples were transported to the laboratory under chain-of-custody protocols via courier. Four shipments of samples were sent; three were couriered the next day after sample collection by the laboratory and one was couriered on the same day by HDR. Samples couriered the next day were stored in HDR's laboratory in a secure and temperature controlled environment until pick-up.

3.0 HTRW RESULTS

HTRW

The sediment sample analytical results were compared to applicable NJDEP Ecological Screening Criteria (ESC) which was determined to be the Lowest Effects Level (LEL) for sediment in freshwater. The ESC were selected based on the surface water classification of Wreck Pond in the NJDEP Surface Water Quality Standards (SWQS; N.J.A.C 7:9B) as FW2-NT[4] (Appendix D). The Severe Effects Level (SEL) is also provided for reference. Table 3-1 summarizes exceedances of the ESC for each analyte. HTRW laboratory testing results are attached separately.

Table 3-1 – ESC Exceedance Summary

Analyte	Lowest Effects Level (LEL)	Severe Effects Level (SEL)	Concentration Range Detected		Frequency Exceeding LEL	Frequency Exceeding SEL
Chromium	26	110	ND	59	7/10	0/10
Arsenic	6	33	0.41	27	7/10	0/10
Mercury	0.17	2	ND	1.6	6/10	0/10
Lead	31	250	ND	150	6/10	0/10
Cadmium	0.6	10	ND	2.9	4/10	0/10
Pyrene	0.195	850	ND	0.8	4/10	0/10
Silver	0.5		ND	1	3/10	0/10
Benzo[a]anthracene	0.108	1480	ND	0.32	3/10	0/10
p,p'-DDE	0.0032	19	ND	0.012	2/10	0/10
Benzo[a]pyrene	0.15	1440	ND	0.39	2/10	0/10
Benzo[g,h,i]perylene	0.170	320	ND	0.38	2/10	0/10
Chrysene	0.166	460	ND	0.41	2/10	0/10
Dibenzo[a,h]anthracene	0.033	130	ND	0.082	1/10	0/10
Fluoranthene	0.423	1020	ND	0.67	1/10	0/10
Indeno[1,2,3-cd]pyrene	0.2	320	ND	0.33	1/10	0/10
Phenanthrene	0.204	950	ND	0.58	1/10	0/10

The samples from the sand below the accumulated sediment in Wreck Pond did not contain any elements or compounds at concentrations above the ESCs. A sample of this material was not collected from Black Creek.

The accumulated sediment in Wreck Pond contains concentrations of metals, pesticides and polycyclic aromatic hydrocarbons (PAHs) above the ESCs. PAHs are a subset of SVOCs. The accumulated sediment in Black Creek contains concentrations of arsenic and chromium above the ESCs.

Chromium and arsenic were detected in all seven of the samples of the accumulated sediment at concentrations above the ESCs. Mercury and lead were detected in six of these samples at concentrations above the ESCs. Cadmium and silver were detected above the ESCs in four and

[4] "FW2" - The general surface water classification applied to those fresh waters that are not designated as FW1 or Pinelands Waters. "NT" means nontrout waters. From NJDEP SWQS 7:9B-1.4 Definitions.

three of the samples in this same set, respectively. None of these metals exceeded their respective SEL criteria.

Pesticides were only detected in the samples from B-1 and B-2. These samples contained p,p'-DDE concentrations of 0.005 and 0.012 mg/kg, respectively. The ESC for p,p'-DDE is 0.0032 mg/kg. B-1 and B-2 were located in close proximity to stormwater outfalls along Ocean Road.

SVOC exceedances were limited to PAHs in four samples. The samples were from B-2, B-5, B-7 and B-8. B-2 is located in close proximity to a stormwater outfall along Ocean Road. B-5, B-7 and B-8 are located downstream from the railroad tracks.

PCBs were not detected in any of the 10 samples. VOCs were not detected at concentrations above the ESCs in any sample.

The analytical results were also compared to the NJDEP Residential Direct Contact Soil Remediation Standards (RDCSRS). The RDCSRS are not applicable to the sediment in the pond. The comparison is intended to inform the alternatives analysis and may be applicable if the sediment was dredged and placed at an upland location in New Jersey.

Table 3-2 - NJDEP RDCSRS Exceedance Summary

Analyte	RDCSRS	Concentration Range Detected		Frequency Exceeding RDCSRS
Benzo[a]pyrene	0.2	ND	0.39	*2/10*
Arsenic	19	0.41	27	*2/10*

Only two compounds exceeded the RDCSRS; benzo[a]pyrene and arsenic. These exceedances were from three separate samples; B-2, B-7 and B-8 of accumulated sediment in Wreck Pond.

4.0 GEOTECHNICAL ANALYSIS AND RESULTS

4.1 Laboratory Testing

Princeton Hydro performed laboratory testing on twenty one (21) soil samples collected from the completed soil borings. The samples were testing in accordance with the following testing methodologies.

Table 4-1: ASTM Standard Tests Performed

Standard	Description
ASTM D2216	Standard Test Method for Water (Moisture) Content of Soils
ASTM D422	Standard Test Method for Particle Size Analysis of Soils
ASTM D4318	Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D2166	Standard Test Method for Unconfined Compressive Strength of Cohesive Soil
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

The results of the laboratory testing program are summarized in Table 4-2 through Table 4-5 below. The geotechnical laboratory testing report can be found in Appendix E of this report.

Table 4-2: Geotechnical Laboratory Testing Results

Location	**B1**	**B1**	**B2**	**B2**	**B3**
Sample	**S1**	**S3-S5**	**S2-S4**	**S5-S6**	**S1-S5**
Depth, ft	**2-4**	**4-14**	**0-9**	**9-14**	**0-11**
Parameters	Results				
	ASTM D2216				
Moisture Content (%)	85	34	128	17	120
	ASTM D422				
Gravel (%)	0	0	0	3	0
Sand (%)	21	6	4	95	9
Silt (%)	7	30	77	2	75
Clay (%)	9	64	20	1	17
	ASTM D4318				
Liquid Limit	NT	50	NT	NP	94
Plastic Limit	NT	27	NT	NP	42
Plasticity Index	NT	23	NT	NP	52
USCS Description	Organic Silt with Sand	Fat Clay	Organic Silt	Poorly Graded Sand	Organic Silt
USCS Symbol	OH	CH	OH	SP	OH

Table 4-3: Geotechnical Laboratory Testing Results

Location	B3	B4	B4	B4	B5
Sample	S6	S1-S2	S3-S5	S6	S4
Depth, ft	11-14	0-4	4-11	11-12	6-8
Parameters	Results				
			ASTM D2216		
Moisture Content (%)	19	20	73	23	28
			ASTM D422		
Gravel (%)	8	3	0	0	0
Sand (%)	88	93	34	91	95
Silt (%)	1	2	53	7	4
Clay (%)	2	1	13	2	1
			ASTM D4318		
Liquid Limit	NP	NP	NT	NP	NP
Plastic Limit	NP	NP	NT	NP	NP
Plasticity Index	NP	NP	NT	NP	NP
USCS Description	Poorly Graded Sand	Poorly Graded Sand	Sandy Organic Silt	Poorly Graded Sand with Silt	Poorly Graded Sand
USCS Symbol	SP	SP	OH	SP-SM	SP

Table 4-4: Geotechnical Laboratory Testing Results

Location	B5	B6	B7	B7	B8
Sample	S5-S6	S4-S5	S1-S3	S4-S6	S3
Depth, ft	8-11.5	7-10	0-6	6-12	4-6
Parameters	Results				
			ASTM D2216		
Moisture Content (%)	8	9	86	11	26
			ASTM D422		
Gravel (%)	40	42	0	32	0
Sand (%)	58	57	13	66	94
Silt (%)	1	1	67	2	4
Clay (%)	0	0	20	0	2
			ASTM D4318		
Liquid Limit	NP	NP	NT	NP	NP
Plastic Limit	NP	NP	NT	NP	NP
Plasticity Index	NP	NP	NT	NP	NP
USCS Description	Poorly Graded Sand with Gravel	Poorly Graded Sand with Gravel	Organic Silt	Poorly Graded Sand with Gravel	Poorly Graded Sand with Silt
USCS Symbol	SP	SP	OH	SP	SP-SM

Table 4-5: Geotechnical Laboratory Testing Results

Location	B8	B9	B9	B10	B10
Sample	S4-S5	S1	S3-S4	S1-S3	S5-S6
Depth, ft	6-10	0-3	3-8	0-7.5	8-12
Parameters	Results				
	ASTM D2216				
Moisture Content (%)	7	94	7	82	16
	ASTM D422				
Gravel (%)	46	0	38	0	5
Sand (%)	51	20	57	42	88
Silt (%)	2	66	4	51	5
Clay (%)	0	14	1	8	2
	ASTM D4318				
Liquid Limit	NP	NT	NP	85	NP
Plastic Limit	NP	NT	NP	48	NP
Plasticity Index	NP	NT	NP	37	NP
USCS Description	Poorly Graded Sand with Gravel	Organic Silt with Sand	Poorly Graded Sand with Silt and Gravel	Organic Silt with Sand	Poorly Graded Sand with Silt
USCS Symbol	SP	OH	SP-SM	OH	SP-SM

4.2 Slope Stability Analysis

The bathymetric survey previously performed by Princeton Hydro, field investigation, and laboratory testing reveal that Wreck Pond has a layer of accumulated heterogeneous organic silt that varies in thickness, underlain primarily by sandy soils. The clay material encountered in Boring 1 is the exception to this. However, since the extent of the material is not known from the investigation, and it is not located in a critical section, it will not be used for the analysis.

This analysis primarily investigated the stability of the underlying sandy stratum post dredging. Due to the very soft nature of the accumulated sediment, this stratum was not analyzed for slope stability as it is assumed that this material would not hold a consistent excavated slope and readily flow along excavated edges. Therefore, for the purpose of this analysis it is assumed that the lake will either be fully or partially dredged to the original bottom (sandy substratum) or excavated to deepen the original bottom. The water depth and sediment thickness maps developed from the bathymetric survey show the area around Boring 3 to be the most critical; i.e. the greatest elevation change and sediment thickness. Therefore, the post dredging stability will be focused in this area. Engineering design parameters have been determined as a result of the laboratory testing. The parameters relevant for the analysis are presented in Table 4-6 below:

Table 4-6: Engineering Design Parameters

Stratum	II
USCS Type[1]	SP
Description[1]	Poorly Graded Sand
Relative Density[2], %	56
Dry Density[3], pcf (γ_d)	112
Saturated Density, pcf (γ_{sat})	133.28
Internal Strength[3], degrees (φ)	34

[1]ASTM D2487, [2]Correlation between penetration resistance and relative density of sandy soils, M. Cubrinovski, K. Ishihara (2012), [3]NAVFAC, Fig 7, P7.1-149

The slope stability analysis for Wreck Pond was completed utilizing the program Slide 6.0 (Roc Science); this program analyzes slope stability using two dimensional limit equilibrium theory for several specific finite element and mass balance scenarios. The water depth and sediment thickness information estabilshed during the bathymetric survey was used to model a 300' cross section intersecting boring B3. This cross section can be seen in the figure below. The green section represents the soft organic sediment within the lake, and the orange section represents the stiff sand material underlying the sediment. The sand was defined using the properties listed in the Table 4-6 (above). It is noted that due to the limitation of boring depths, deeper soil characteristics use to complete the model were assumed to continue as the same soil type encountered at the bottom of the borings.

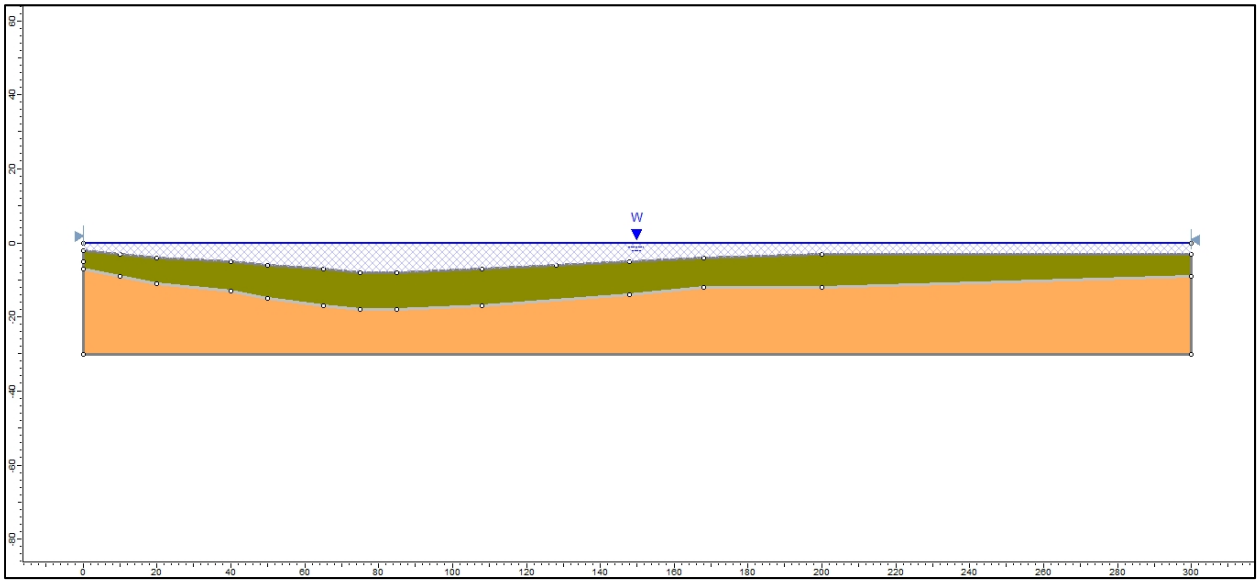


Figure 1: Undredged Cross Section

For the first part of the analysis, it was assumed the sediment in Wreck Pond would be completely removed, and the lake bottom geometry would be maintained. The stability of the lake bottom was computed utilizing the Simplified Bishop Method. This method is a modified Method of Slices where normal interaction forces between adjacent slices are assumed to be

collinear and the resultant interslice shear force is zero. The failure limits were set at the edge of the model and the toe of the slope. The model, as well as the results of the analysis can be seen in Figure 2 below.

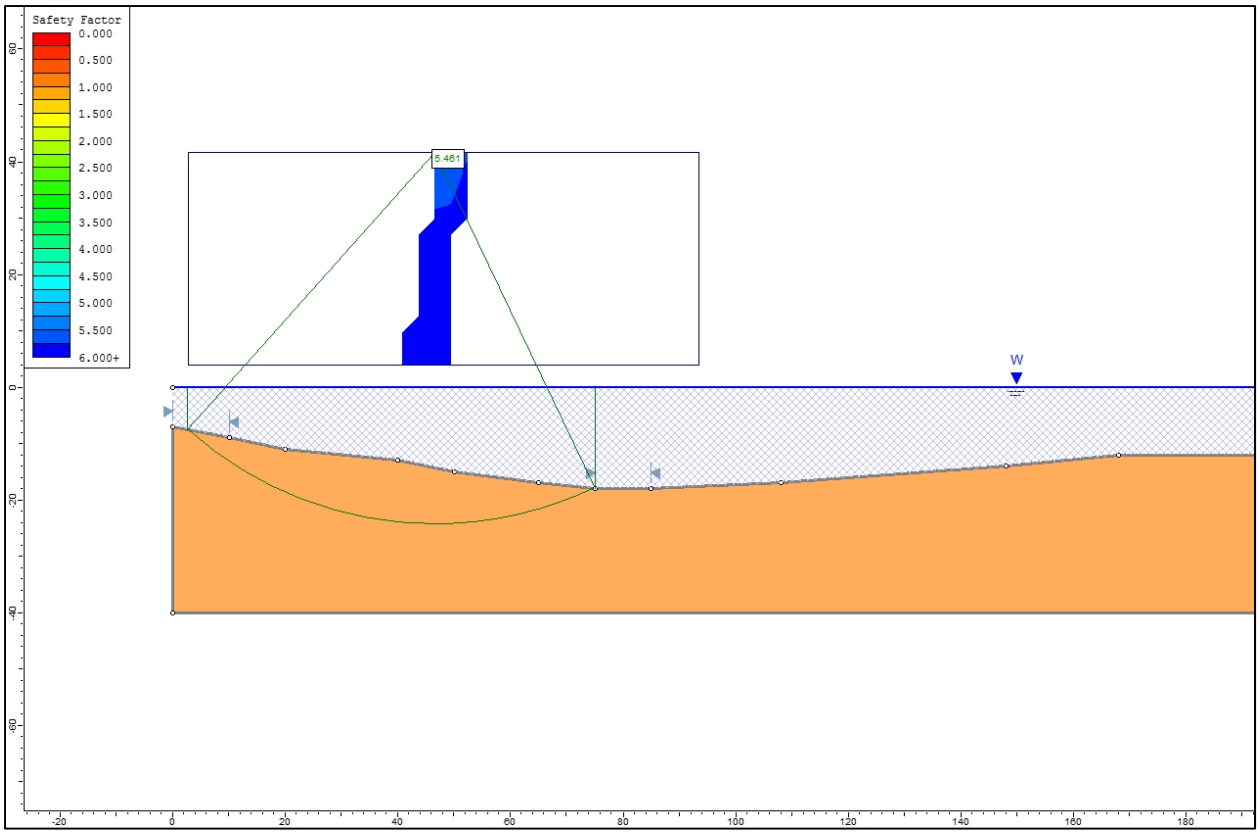


Figure 2: Analysis on Fully Dredged Lake

The next step in the analysis was to determine the steepest slope the sandy material could be on, while maintaining the required Factor of Safety (FS) of 1.5. Slopes of 2:1, 2.5:1, and 3:1 were analyzed for stability. The results of these models can be seen in the Figures 3, 4, and 5 as well as Table 6 below:

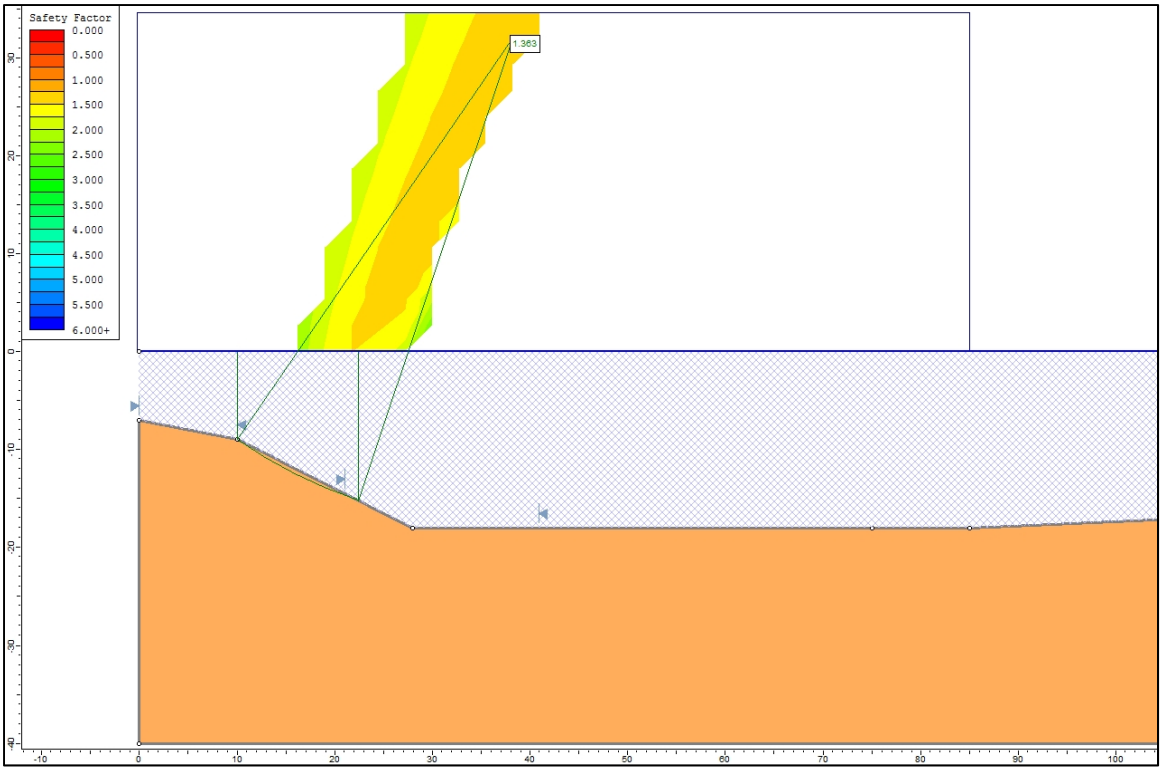


Figure 3: 2:1 Slope

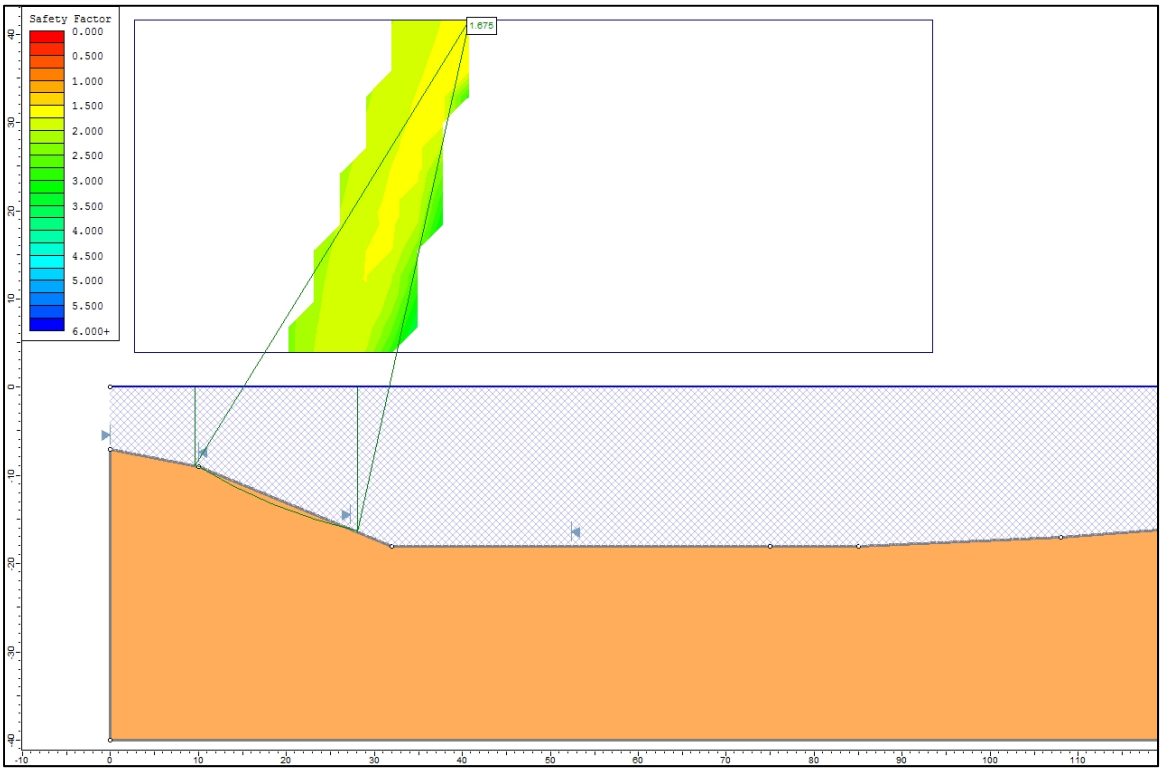


Figure 4: 2.5:1 Slope

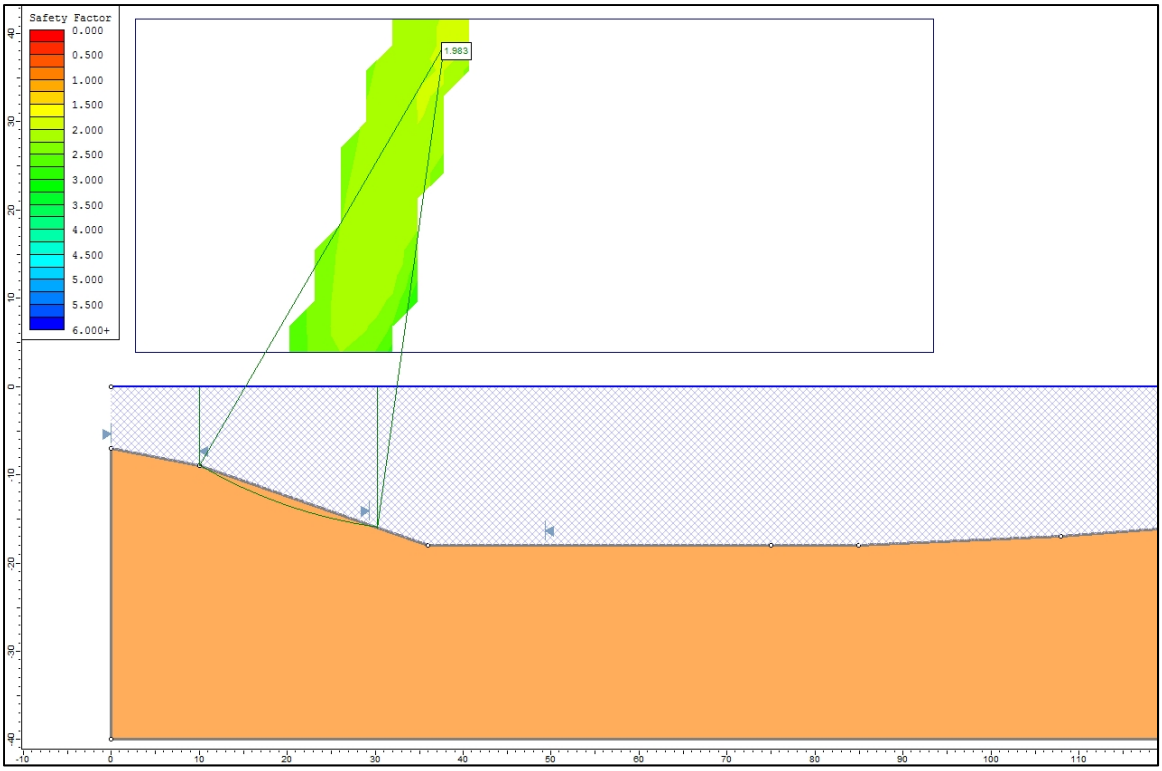


Figure 5: 3:1 Slope

Table 4-7: Slope Stability Results

Maximum Slope	Factor of Safety
Unmodified	5.46
2:1	1.36
2.5:1	1.68
3:1	1.98

5.0 CONCLUSIONS AND NEXT STEPS

HTRW

Conclusions

The analytical results indicate SVOCs, pesticides and metals are present at concentrations in the accumulated sediment above applicable ESCs in Wreck Pond and Black Creek. The underlying sand samples did not have concentrations of any analytes exceeding the ESCs in either Wreck Pond.

If dredging is selected as a component of restoration, exposure of the underlying sand subsequent to dredging would not produce an unacceptable ecological risk as concentrations of contaminants in this material are below the respective ESCs.

Recommendations

Dredged accumulated sediment may be considered for upland beneficial reuse as only three marginal exceedances of the RDCSRS were reported. If beneficial reuse is not considered, disposal facilities are likely to be able to accept the dredged material given its relatively low concentrations of contaminants. Additional samples for laboratory analysis may be required based on the final volume to be dredged and the disposal or beneficial reuse options selected.

Geotechnical

Conclusions

In general, Wreck Pond contains a variable thickness layer of organic silt with varying quantities of sand, underlain by poorly graded sands that pre-date the pond and are part of the underlying geologic parent materials. The exceptions to the pattern of organic silts over underlying sands was found in borings B-1 and B-4.

Within boring B-1 a medium stiff to very still gray fat clay was encountered (near the weir separating Wreck Pond from Black Creek). This stiff clay was encountered from a depth of 4 feet to the termination of the boring at 14 feet below the top of sediment.

Boring B-4 revealed 4 feet of sandy sediment overlying 7 feet of sandy organic silt. It is apparent in this location that the top stratum of sandy sediment was likely the result of deposition of sands as a result of the storm surge during Hurricane Sandy. This finding reveals that the total accumulated sediment volume in Wreck Pond will increase over that calculated in the bathymetric survey.

The accumulated sediment consists of highly organic silt with moisture contents ranging from 73% to 128%, and very soft. In most instances penetration of the accumulated sediment was achieved with the weight of rod, weight of hammer, or a few blows per foot. As a result this material is highly unstable from a structural stability standpoint and would have both low compressive or shear strengths. This leads to the conclusion that the accumulated sediment

would not maintain a consistent slope if excavated, and in fact, the bathymetric survey illustrates that the majority of natural slopes within the pond are greater than 10:1. The exception to this low slope angle is at the northeast corner where the pond is consistently scoured by an inlet pipe. It is the incoming stormwater that likely is the reason for the steeper slopes, and if that source of scour were to cease the slopes would, over time, flow and fill in to similar slopes as in the remainder of the pond.

Due to the very low strength of this accumulated material, any loading of this material would create mud-waves due to high deformation and displacement. The relatively high organic and moisture content of the accumulated sediment would also not provide adequate qualities for use of the material as structural fill for beneficial use, if dredged and disposed of off-site.

The underlying sands, on the contrary, are of a medium dense to dense consistency with no organic content. The exception found was at boring B-1, where a gray fat clay was encountered, however, this material was found to be stiff to very still, with no appreciable organic content, and likely part of, albeit of differing soil types, the underlying parent material. As a result of laboratory unconfined compressive testing, this clay was found to have a compressive strength of up to 2.5 tons per square foot (tsf), with a shear strength of 1.2 tsf. This material would hold slopes of near vertical if excavated, although as will be stated below, this would not be recommended.

Slope stability was completed on a section of the pond, assuming that the pond would 1) be dredged of all accumulated sediment to expose the underlying parent material, and 2) would be excavated to a deeper depth to increase the pond's overall depth. It was assumed that any excavation would be accomplished at least 10 feet from a shoreline to reduce a slope's exposure to surface wave action, and not impact adjacent structures such as bulkheads. The excavation below the top of parent material was also assume to be carried out to meet the maximum depth (about 18 feet below a median water surface elevation of 0 feet NAVD) in the location of the analysis) of parent material in the middle of Wreck Pond.

A range of slopes were input into the model to assess the stability of various scenarios. For the purpose of slope stability, the engineering standard for a stable slope is achieving at least a factor of safety of 1.5. For the various slope analyzed, it was found that a slope of 2.5 to 1 would be considered stable.

Recommendations

Based on the completed field investigation, laboratory analysis, and engineering modeling and analysis, the accumulated sediment within Wreck Pond is highly organic, contains high moisture contents, and has very low strength parameters. Therefore, it is recommended that any approach to the restoration of Wreck Pond not rely on the ability of the sediment to hold a slope of any greater than 20:1 and, even that slope would not necessarily maintain consistency over time due to the potential flowing nature of the materials. It is not recommended that any structural materials such as rock or other structure added to Wreck Pond be designed to sit atop the accumulated sediment.

The underlying sands, on the contrary, are relatively stable and could provide support for structures. Even the clay encountered in boring, B-1 would provide relative adequate structural support for nature-based types of structures that might be introduced to the Wreck Pond system.

Based on the results of the slope stability analysis, it is recommended that any excavation into the underlying parent material be designed to maintain a slope of no greater than 3 to 1, and the top of slope maintain a distance from any shoreline or man-made structure of at least 10 feet to ensure that such features are not destabilized.

It is finally noted that these recommendations do not account for hydraulic impacts to the pond's substrate such as erosion and scour that may occur as a result of wave, storm surge or general water circulation patterns.

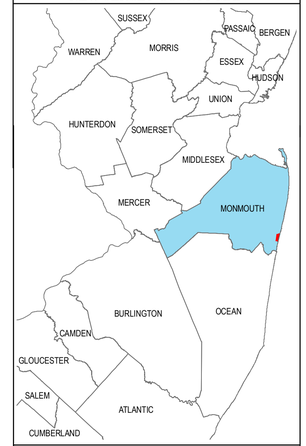
Due to the findings of deeper sediment accumulation at the location of boring B-4 at the eastern end of Wreck Pond, it is recommended that additional borings be progressed in the during the design phase of a restoration project for Wreck Pond to further define the extent of Hurricane Sandy related deposits and the pre-storm underlying sediment.

APPENDICES

Appendix A

Boring Location Map

NEW JERSEY COUNTY MAP



NOTES

1. Boring drilled by Princeton Hydro, LLC and Uni-Tech Drilling Company, Franklinville, NJ.
2. Drilling took place from March 23rd through March 27th, 2015

N

0 100 200 Feet

1 inch = 100 feet

PREPARED FOR:

US ARMY CORPS OF ENGINEERS

PRINCETON HYDRO, LLC

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WWW.PRINCETONHYDRO.COM
OFFICES IN SICKLERVILLE,NJ AND EXTON, PA

PROJECT NAME/LOCATION:

BATHYMETRIC SURVEY OF WRECK POND

SPRING LAKE BOROUGH MONMOUTH COUNTY, NJ

DRAWING NAME:

BORING LOCATION MAP

Legend

- Boring Locations
- Lake Boundary
- Sediment Thickness Contours (in Feet)

File: P:\1450\Projects\1450001\GIS\MXD\WaterDepth.mxd

Appendix B

Geotechnical Boring Logs and Interpretive Sections

Princeton Hydro

PRINCETON HYDRO LLC
LAKESIDE BUSINESS PARK
1200 LIBERTY PLACE
SICKLERVILLE, NJ 08081
(p)856.629.8889 (f)856.629.8866

LOG OF BORING: B-1

PROJECT: Wreck Pond Geotech
CLIENT: USACE
SITE ADDRESS: Wreck Pond, Spring Lake, NJ

PROJECT NUMBER: 1450.007		DATE AND TIME STARTED: 3/24/15, 1400	DATE AND TIME FINISHED: 3/24/15, 1445
DRILLING CONTRACTOR: Unitech Drilling Company Inc.		DRILLING METHOD: Continuous Split Spoon	
DRILLING EQUIPMENT: Barge Rig		DRILLER/HELPER: Cunard, Jay, Dave	PLUNGE/TREND: 90
SAMPLING METHOD: Split Spoon, Shelby Tube		LOGGED BY: B. Achey	
NORTHING: 477073.112	EASTING: 622484.15 ELEV.: -0.974	TOTAL DEPTH (ft.): 14.0	
DATUM (H,V): NJ State Plane NAD83, NAVD88		BORING LOCATION: See plan location	

DEPTH (feet)	SAMPLES No.	Type	Blows/6" SS or RQD	DESCRIPTION NAME (USCS,USDA): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	ELEVATION (feet)	bpf 1 10 100	REMARKS
Ground Surface					Depth, GW		
1–3	S1	SS	WH/24	STRATUM I: Organic Silt with Sand (OH), black (10YR 2/1), wet, very soft to soft, organic odor. Mostly silt, trace sand.	-1 to -4	WH	
4				4.0			
5–7	S2	SS	5-3-2-3	STRATUM III: Fat Clay (CH), greenish gray (5G 5/1) with common, fine, prominent yellowish brown (10YR 5/6) relict iron accumulations from 4.0 to 6.0 fbgs. From 6.0 to 14.0 dark gray (10YR 4/1). Moist, medium to very stiff. Mostly clay, trace sand.	-5 to -8	5	
7–8	S3	SS	6-10-16-24		-8	26	
8–10	ST-1	Shelby			-9 to -11		Shelby tube driven from 8 to 10'. 18" recovery.
10–11	S4	SS	7-5-7-14		-11 to -12	12	
12–13	S5	SS	11-12-16-20		-13 to -14	28	
14				14.0	-15		
				Boring terminated at 14.0 feet below the pond bed.	-16 to -17		

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LOG OF BORING: B-2

PROJECT: Wreck Pond Geotech
CLIENT: USACE
SITE ADDRESS: Wreck Pond, Spring Lake, NJ

PROJECT NUMBER: 1450.007		DATE AND TIME STARTED: 3/24/15, 1200	DATE AND TIME FINISHED: 3/24/15, 1300
DRILLING CONTRACTOR: Unitech Drilling Company Inc.		DRILLING METHOD: Continuous Split Spoon	
DRILLING EQUIPMENT: Barge Rig		DRILLER/HELPER: Cunard, Jay, Dave	PLUNGE/TREND: 90
SAMPLING METHOD: Split Spoon		LOGGED BY: B. Achey	
NORTHING: 477103.471	EASTING: 623064.536 ELEV.: -1.469	TOTAL DEPTH (ft.): 14.0	
DATUM (H,V): NJ State Plane NAD83, NAVD88		BORING LOCATION: See plan location	

DEPTH (feet)	SAMPLES No.	Type	Blows/6" SS or RQD	DESCRIPTION NAME (USCS,USDA): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	ELEVATION (feet)	bpf 1 10 100	REMARKS
				Ground Surface			
1	S1	SS	WH/24	STRATUM I: Organic Silt (OH), black (10YR 2/1), wet, very soft to soft, organic odor. Mostly silt, little sand.	-2	WH	
2					-3		
3	S2	SS	WH/24		-4	WH	
4					-5		
5	S3	SS	WH/24		-6	WH	
6					-7		
7	S4	SS	WH/24		-8	WH	
8					-9	WH	
9	S5	SS	WH-WH-4-9	9.0	-10		
10				STRATUM II: Poorly Graded Sand (SP), grayish brown (10YR 5/2), wet, medium dense to dense. Mostly sand, little gravel, trace silt.	-11	13	
11	S6	SS	7-10-10-13		-12	20	
12					-13		
13	S7	SS	13-19-25-16		-14	44	
14				14.0	-15		
15				Boring terminated at 14.0 feet below the pond bed.	-16		
					-17		
					-18		

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LOG OF BORING: B-3

PROJECT: Wreck Pond Geotech
CLIENT: USACE
SITE ADDRESS: Wreck Pond, Spring Lake, NJ

PROJECT NUMBER: 1450.007		DATE AND TIME STARTED: 3/24/15, 1000	DATE AND TIME FINISHED: 3/24/15, 1100
DRILLING CONTRACTOR: Unitech Drilling Company Inc.		DRILLING METHOD: Continuous Split Spoon	
DRILLING EQUIPMENT: Barge Rig		DRILLER/HELPER: Cunard, Jay, Dave	PLUNGE/TREND: 90
SAMPLING METHOD: Split Spoon		LOGGED BY: B. Achey	
NORTHING: 476859.612	EASTING: 623410.681 ELEV.: -4.261	TOTAL DEPTH (ft.): 14.0	
DATUM (H,V): NJ State Plane NAD83, NAVD88		BORING LOCATION: See plan location	

DEPTH (feet)	SAMPLES No.	Type	Blows/6" SS or RQD	DESCRIPTION NAME (USCS,USDA): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	ELEVATION (feet)	bpf 1 10 100	REMARKS
				Ground Surface			
1	S1	SS	WH/24	STRATUM I: Organic Silt (OH), black (10YR 2/1), wet, very soft, organic odor. Mostly silt, trace sand.	-5	WH	
2					-6		
3	S2	SS	WH/24		-7	WH	
4					-8		
5	S3	SS	WH/24		-9	WH	
6					-10		
7	S4	SS	WH/24		-11	WH	
8					-12		
9	S5	SS	WH/24		-13	WH	
10					-14	WH	
11	S6	SS	WH-WH-15-15	11.0 STRATUM II: Poorly Graded Sand (SP), grayish brown (10YR 5/2), wet, medium dense to dense. Mostly sand, little gravel, trace si	-15	30	
12					-16		
13	S7	SS	16-19-19-18		-17	38	
14				14.0 Boring terminated at 14.0 feet below the pond bed.	-18		
15					-19		
					-20		
					-21		

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LOG OF BORING: B-4

PROJECT: Wreck Pond Geotech
CLIENT: USACE
SITE ADDRESS: Wreck Pond, Spring Lake, NJ

PROJECT NUMBER: 1450.007		DATE AND TIME STARTED: 3/23/15, 1445	DATE AND TIME FINISHED: 3/24/15, 1000
DRILLING CONTRACTOR: Unitech Drilling Company Inc.		DRILLING METHOD: Casing	
DRILLING EQUIPMENT: Barge Rig		DRILLER/HELPER: Cunard, Jay, Dave	PLUNGE/TREND: 90
SAMPLING METHOD: Split Spoon		LOGGED BY: B. Achey	
NORTHING: 476018.695	EASTING: 623374.594 ELEV.: -0.919	TOTAL DEPTH (ft.): 12.0	
DATUM (H,V): NJ State Plane NAD83, NAVD88		BORING LOCATION: See plan location	

DEPTH (feet)	SAMPLES No.	Type	Blows/6" SS or RQD	DESCRIPTION NAME (USCS,USDA): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	ELEVATION (feet)	bpf 1 10 100	REMARKS
				Ground Surface			
1	S1	SS	1-1-3-2	STRATUM IV: Poorly Graded Sand (SP), black (2.5Y 2.5/1), wet, very loose, organic odor. Mostly sand, trace silt.	-1		
2					-2	4	
3	S2	SS	4-4-5-4		-3		
4					-4	9	
				4.3	-5		
5	S3	SS	3-WH/18	STRATUM I: Sandy Organic Silt (OH), black (10YR 2/1), wet, very soft to soft, organic odor. Mostly silt, little sand.	-6	WH	
6					-7		
7	S4	SS	1-1/12-2		-8	2	Shelby tube attempt from 8 to 10'. Zero recovery.
8					-9		
9					-10		
10	S5	SS	4-8		-11		
11				11.0	-12	15	
	S6	SS	7-5	STRATUM II: Poorly Graded Sand with Silt (SP-SM), gray (10YR 6/1), wet, medium dense. Mostly sand, trace silt, trace gravel.			
12				12.0	-13		
				Boring terminated at 12.0 feet below the pond bed.			
13					-14		
14					-15		
15					-16		
					-17		

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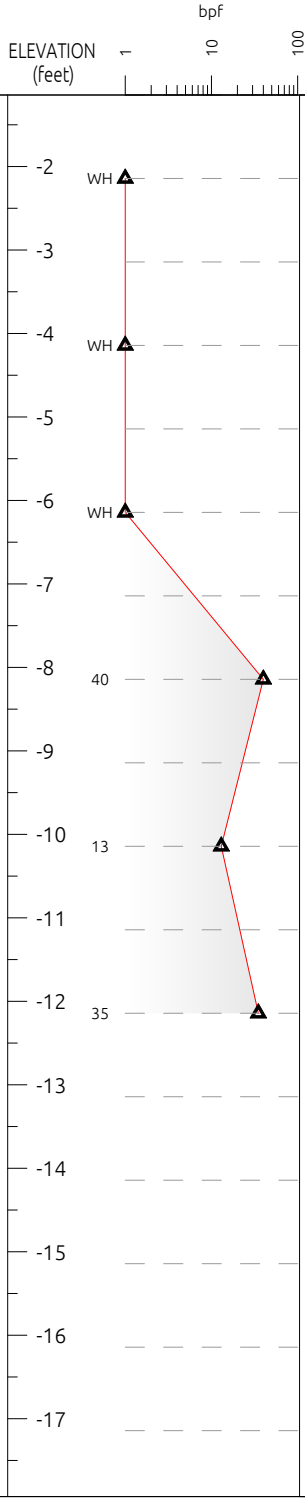
LOG OF BORING: B-5

PROJECT: Wreck Pond Geotech
CLIENT: USACE
SITE ADDRESS: Wreck Pond, Spring Lake, NJ

PROJECT NUMBER: 1450.007		DATE AND TIME STARTED: 3/26/15, 1120	DATE AND TIME FINISHED: 3/26/15, 1145
DRILLING CONTRACTOR: Unitech Drilling Company Inc.		DRILLING METHOD: Continuous Split Spoon	
DRILLING EQUIPMENT: Barge Rig		DRILLER/HELPER: Cunard, Jay, Dave	PLUNGE/TREND: 90
SAMPLING METHOD: Split Spoon		LOGGED BY: B. Achey	
NORTHING: 476415.75	EASTING: 622753.664 ELEV.: -1.143	TOTAL DEPTH (ft.): 12.0	
DATUM (H,V): NJ State Plane NAD83, NAVD88		BORING LOCATION: See plan location	

DEPTH (feet)	SAMPLES No.	Type	Blows/6" SS or RQD	DESCRIPTION NAME (USCS,USDA): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.
				Ground Surface
1	S1	SS	WH/24	STRATUM I: Organic Silt with Sand (OH), black (10YR 2/1), wet, very soft, organic odor. Mostly silt, little sand.
2				
3	S2	SS	WH/24	
4				
5	S3	SS	WH/24	
6				6.0
7	S4	SS	13-20-20-15	STRATUM II: Poorly Graded Sand (SP), gray (10YR 5/1), wet, medium dense. Mostly fine sand, trace silt. Becoming gravelly from 8.0 to 12.0'.
8				
9	S5	SS	6-6-7-10	
10				
11	S6	SS	18-15-20-23	
12				12.0
13				Boring terminated at 12.0 feet below the pond bed.
14				
15				



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LOG OF BORING: B-6

PROJECT: Wreck Pond Geotech
CLIENT: USACE
SITE ADDRESS: Wreck Pond, Spring Lake, NJ

PROJECT NUMBER: 1450.007		DATE AND TIME STARTED: 3/26/15, 1000	DATE AND TIME FINISHED: 3/26/15, 1045
DRILLING CONTRACTOR: Unitech Drilling Company Inc.		DRILLING METHOD: Continuous Split Spoon	
DRILLING EQUIPMENT: Barge Rig		DRILLER/HELPER: Cunard, Jay, Dave	PLUNGE/TREND: 90
SAMPLING METHOD: Split Spoon		LOGGED BY: B. Achey	
NORTHING: 476642.481	EASTING: 622802.446 ELEV.: -1.984	TOTAL DEPTH (ft.): 10.0	
DATUM (H,V): NJ State Plane NAD83, NAVD88		BORING LOCATION: See plan location	

DEPTH (feet)	SAMPLES No.	Type	Blows/6" SS or RQD	DESCRIPTION NAME (USCS,USDA): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	ELEVATION (feet)	bpf 1 10 100	REMARKS
				Ground Surface			
1–2	S1	SS	WH/24	STRATUM I: Organic Silt with Sand (OH), black (10YR 2/1), wet, very soft, organic odor. Mostly silt, little sand.	-2 to -3	WH	
2–3	S2	SS	WH/24		-3 to -5	WH	
4–5	S3	SS	WH/24		-5 to -7	WH	
6–7				7.0	-7 to -9		
7–8	S4	SS	26-20	STRATUM II: Poorly Graded Sand with Gravel (SP), grayish brown (10YR 5/2), wet, medium dense to dense. Mostly sand and gravel, trace silt.	-9 to -11	46	
8–9	S5	SS	5-11-15-18		-11 to -12	26	
10				10.0	-12		
				Boring terminated at 10.0 feet below the pond bed.			
11–15					-13 to -18		

Princeton Hydro

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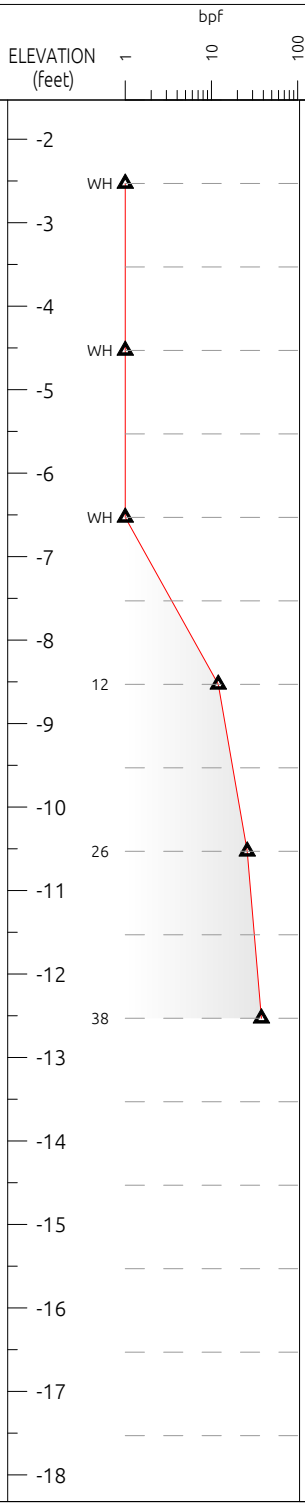
LAKESIDE BUSINESS PARK
1200 LIBERTY PLACE
SICKLERVILLE, NJ 08081
(p)856.629.8889 (f)856.629.8866

LOG OF BORING: B-7

PROJECT: Wreck Pond Geotech
CLIENT: USACE
SITE ADDRESS: Wreck Pond, Spring Lake, NJ

PROJECT NUMBER: 1450.007		DATE AND TIME STARTED: 3/26/15, 0920	DATE AND TIME FINISHED: 3/26/15, 0945
DRILLING CONTRACTOR: Unitech Drilling Company Inc.		DRILLING METHOD: Continuous Split Spoon	
DRILLING EQUIPMENT: Barge Rig		DRILLER/HELPER: Cunard, Jay, Dave	PLUNGE/TREND: 90
SAMPLING METHOD: Split Spoon		LOGGED BY: B. Achey	
NORTHING: 476548.997	EASTING: 622274.506 ELEV.: -1.53	TOTAL DEPTH (ft.): 12.0	
DATUM (H,V): NJ State Plane NAD83, NAVD88		BORING LOCATION: See plan location	

DEPTH (feet)	SAMPLES No.	Type	Blows/6" SS or RQD	DESCRIPTION NAME (USCS,USDA): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.
				Ground Surface — Depth, GW
1–5	S1	SS	WH/24	STRATUM I: Organic Silt (OH), black (10YR 2/1), wet, very soft to medium, organic odor. Mostly silt, trace sand.
2	S2	SS	WH/24	
4	S3	SS	WH/24	
6				6.0
6–11	S4	SS	7-5-7-13	STRATUM II: Poorly Graded Sand with Gravel (SP), grayish brown (10YR 5/2), wet, medium dense to very dense. Mostly gravel and sand, trace silt.
9	S5	SS	11-10-16-16	
11	S6	SS	11-18-20-50/3	
12				12
				Boring terminated at 12.0 feet below the pond bed.



REMARKS

Princeton Hydro

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LAKESIDE BUSINESS PARK
1200 LIBERTY PLACE
SICKLERVILLE, NJ 08081
(p)856.629.8889 (f)856.629.8866

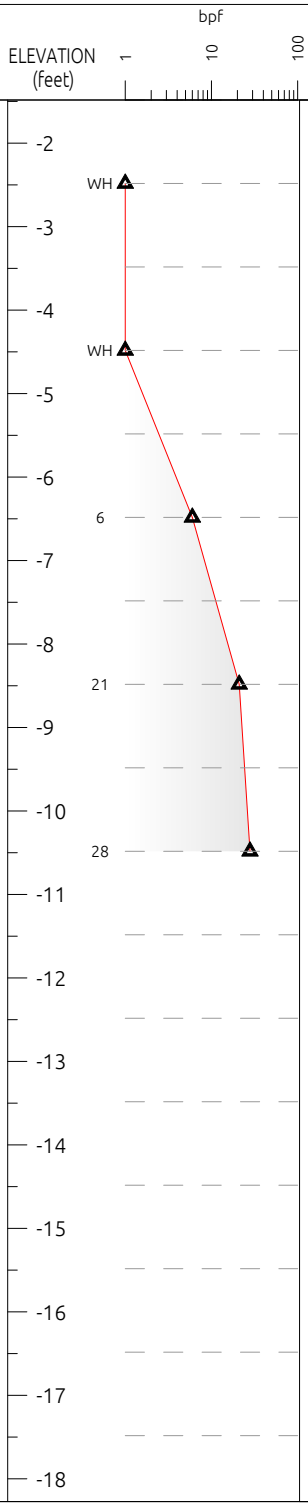
LOG OF BORING: B-8

PROJECT: Wreck Pond Geotech
CLIENT: USACE
SITE ADDRESS: Wreck Pond, Spring Lake, NJ

PROJECT NUMBER: 1450.007		DATE AND TIME STARTED: 3/25/15, 1415	DATE AND TIME FINISHED: 3/25/15, 1445
DRILLING CONTRACTOR: Unitech Drilling Company Inc.		DRILLING METHOD: Continuous Split Spoon	
DRILLING EQUIPMENT: Barge Rig		DRILLER/HELPER: Cunard, Jay, Dave	PLUNGE/TREND: 90
SAMPLING METHOD: Split Spoon		LOGGED BY: B. Achey	
NORTHING: 476392.443	EASTING: 621827.997 ELEV.: -1.483	TOTAL DEPTH (ft.): 10.0	
DATUM (H,V): NJ State Plane NAD83, NAVD88		BORING LOCATION: See plan location	

DEPTH (feet)	SAMPLES No.	Type	Blows/6" SS or RQD	DESCRIPTION NAME (USCS,USDA): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.
				Ground Surface — Depth, GW
1–4	S1	SS	WH/24	STRATUM I:Organic Silt with Sand (OH), black (10YR 2/1), wet, very soft to medium, organic odor. Mostly silt, little sand.
3–4	S2	SS	WH/24	
4				4.0
5–7	S3	SS	3-2-4-8	STRATUM II: Poorly Graded Sand with Silt (SP-SM), very dark grayish brown (10YR 3/2), wet, loose. Mostly sand, little silt. Becoming gravelly (poorly graded sand with gravel (SP)) at 6.0'
7–9	S4	SS	11-9-12-12	
9–10	S5	SS	8-14-14-16	
10				10.0

Boring terminated at 10.0 feet below the pond bed.



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LOG OF BORING: B-9

PROJECT: Wreck Pond Geotech
CLIENT: USACE
SITE ADDRESS: Wreck Pond, Spring Lake, NJ

PROJECT NUMBER: 1450.007		DATE AND TIME STARTED: 3/25/15, 1330	DATE AND TIME FINISHED: 3/25/15, 1350
DRILLING CONTRACTOR: Unitech Drilling Company Inc.		DRILLING METHOD: Continuous Split Spoon	
DRILLING EQUIPMENT: Barge Rig		DRILLER/HELPER: Cunard, Jay, Dave	PLUNGE/TREND: 90
SAMPLING METHOD: Split Spoon		LOGGED BY: B. Achey	
NORTHING: 476641.997	EASTING: 621974.735 ELEV.: -1.406	TOTAL DEPTH (ft.): 8.0	
DATUM (H,V): NJ State Plane NAD83, NAVD88		BORING LOCATION: See plan location	

DEPTH (feet)	SAMPLES No.	Type	Blows/6" SS or RQD	DESCRIPTION NAME (USCS,USDA): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.	ELEVATION (feet)	bpf 1 10 100	REMARKS
				Ground Surface	Depth, GW		
1	S1	SS	WH/24	STRATUM I: Organic Silt with Sand (OH), black (10YR 2/1), wet, very soft to medium, organic odor. Mostly silt, little sand.	-2	WH	
2					-3		
3	S2	SS	WH-WH-6-6		-4		
				3.0			
4				STRATUM II: Poorly Graded Sand with Silt and Gravel (SP-SM), very dark grayish brown (10YR 3/2), wet, medium dense. Mostly sand, some gravel, some silt.	-5	12	
5	S3	SS	14-17-20-16		-6	37	
6					-7		
7	S4	SS	11-16-18-20		-8	34	
				8.0			
8				Boring terminated at 8.0 feet below the pond bed.	-9		
9					-10		
10					-11		
11					-12		
12					-13		
13					-14		
14					-15		
15					-16		
					-17		
					-18		

Princeton Hydro

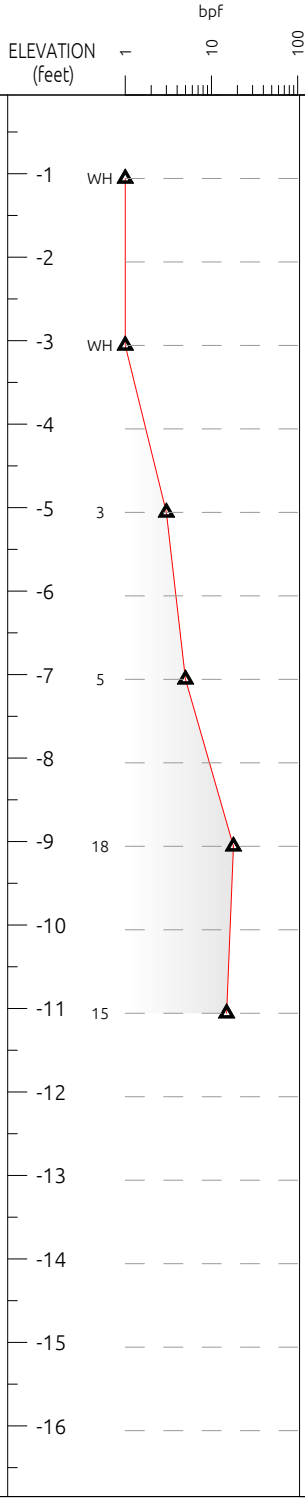
PRINCETON HYDRO LLC
LAKESIDE BUSINESS PARK
1200 LIBERTY PLACE
SICKLERVILLE, NJ 08081
(p)856.629.8889 (f)856.629.8866

LOG OF BORING: B-10

PROJECT: Wreck Pond Geotech
CLIENT: USACE
SITE ADDRESS: Black Creek, Spring Lake, NJ

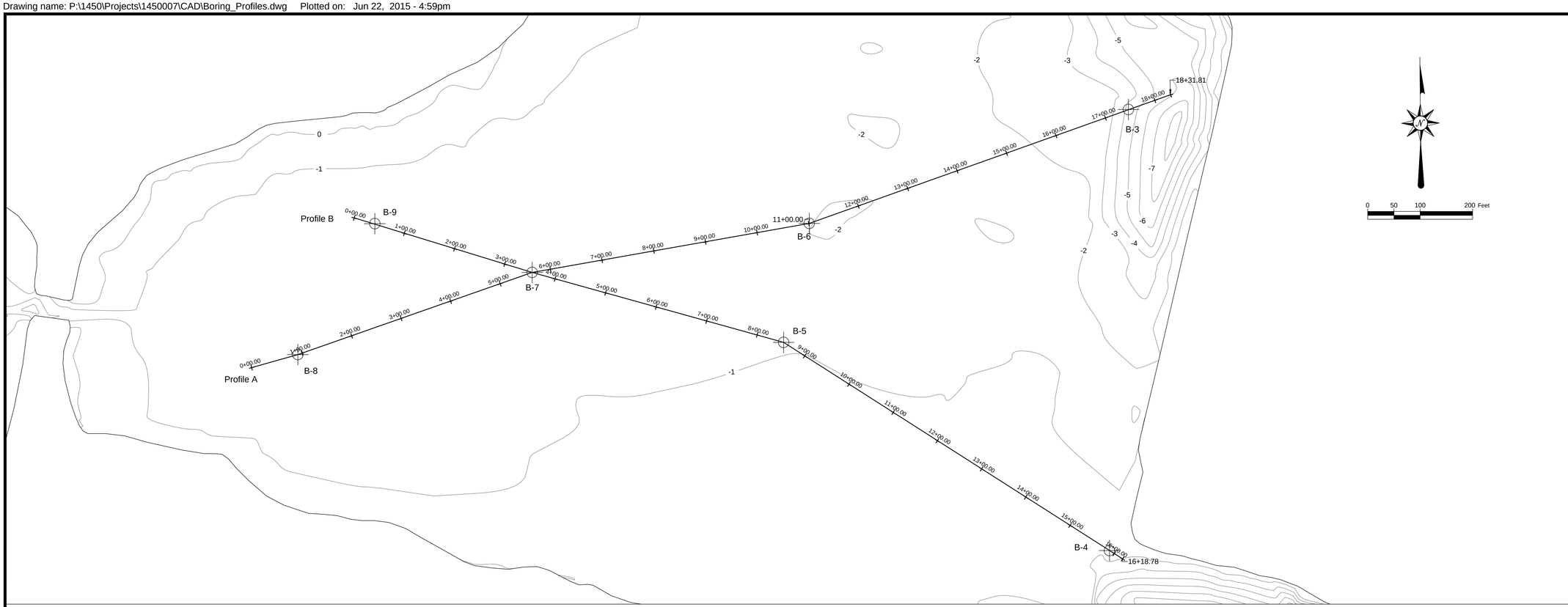
PROJECT NUMBER: 1450.007		DATE AND TIME STARTED: 3/27/15, 1300	DATE AND TIME FINISHED: 3/27/15, 1330
DRILLING CONTRACTOR: Unitech Drilling Company Inc.		DRILLING METHOD: Continuous Split Spoon	
DRILLING EQUIPMENT: Barge Rig		DRILLER/HELPER: Cunard, Jay, Dave	PLUNGE/TREND: 90
SAMPLING METHOD: Split Spoon		LOGGED BY: B. Achey	
NORTHING: 477609.528	EASTING: 622304.674 ELEV.: -0.057	TOTAL DEPTH (ft.): 12.0	
DATUM (H,V): NJ State Plane NAD83, NAVD88		BORING LOCATION: See plan location	

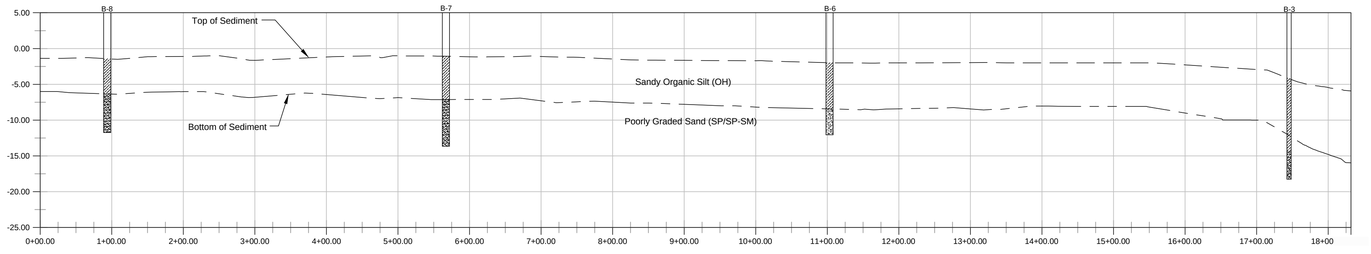
DEPTH (feet)	SAMPLES No.	Type	Blows/6" SS or RQD	DESCRIPTION NAME (USCS,USDA): color, moist, % by wt., plast. density, structure, cementation, react. w/HCl, geo. inter.
				Ground Surface — Depth, GW
1	S1	SS	WH/24	STRATUM I: Organic Silt with Sand (OH), black (10YR 2/1), wet, very soft to medium, organic odor. Mostly silt, little sand.
2				
3	S2	SS	WH/24	
4				
5	S3	SS	1-1-2-1	
6				
7	S4	SS	2-1-4-8	
7.5				Peat, dark brown (10YR 3/3).
7.7				STRATUM II: Poorly Graded Sand with Silt (SP-SM), grayish brown (10YR 5/2), wet, medium dense. Mostly sand, trace silt, trace gravel.
8				
9	S5	SS	10-9-9-9	
10				
11	S6	SS	5-5-10-14	
12				12
13				Boring terminated at 12.0 feet below the pond bed.
14				
15				



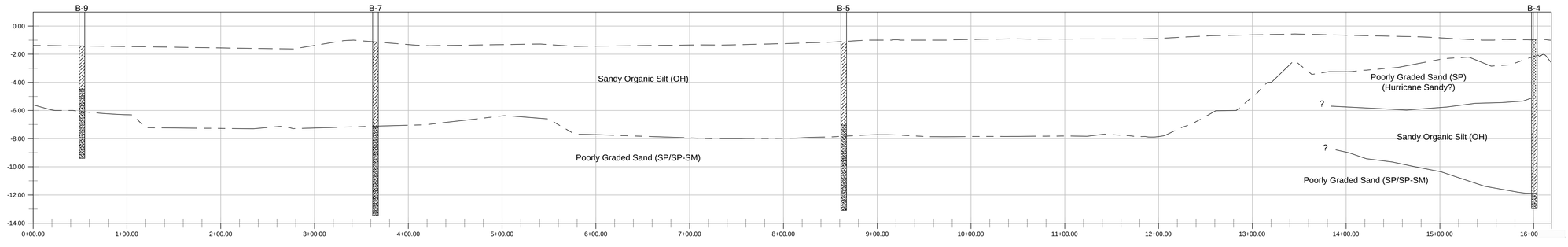
REMARKS

Drawing name: P:\1450\Projects\1450007\CAD\Boring_Profiles.dwg Plotted on: Jun 22, 2015 - 4:59pm





Profile: A



Profile: B

Note: Top and bottom of sediment between boring logs obtained from the bathymetric survey completed by Princeton Hydro, LLC from June 16 through 20, 2014, contract W912DS-14-D-0001, Delivery Order 0002. Where a stratum interface in a boring log does not coincide with the bathymetric survey generated interface between the OH and SP/SM-SM stratums, the difference is due to inherent differences in data interpretation between the test boring investigation and bathymetric survey.. The exception is at the boring B-43, where accumulated sandy sediment, likely deposited during the tidal surge of Hurricane Sandy, limited the depth of sediment detection of the bathymetric survey.

All elevations listed are referenced to North American Vertical Datum of 1988 (NAVD88)

Horizontal Scale: 1" = 100'
Vertical Scale: 1" = 10'

Stratum I: Sandy Organic Silt (OH), black (10YR 2/1), wet, very soft to soft, organic odor.

Stratum II: Poorly Graded sands with varying amounts minor constituents of silts and gravels (SP), wet, medium dense to dense.

Stratum IV: Poorly Graded Sand (SP), black (2.5Y 2.5/1), wet, very loose, organic odor.

Horizontal Scale: 1" = 60'
Vertical Scale: 1" = 4'

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DAYS IN DESIGN STAGE – STOP CALL
NEW JERSEY ONE CALL SYSTEM, INC.
REFERENCE NEW JERSEY TITLE 48, CHPT. 2, ARTICLE 9
1-800-272-1000

PROJECT NOTES

DATE	DESCRIPTION

REVISIONS

STATE OF NEW JERSEY CERTIFICATE OF AUTH. NO.: 24GA27976800

DATE

PRINCETON HYDRO, LLC
SCIENTISTS AND ENGINEERS
1108 OLD YORK ROAD, SUITE 1
P.O. BOX 720
RINGOES, NEW JERSEY 08551
PHONE. 908.237.5660
FAX. 908.237.5666
WWW.PRINCETONHYDRO.COM

PROJECT NAME/LOCATION:
BATHYMETRIC SURVEY OF
WRECK POND
SPRING LAKE BOROUGH
MONMOUTH COUNTY, NJ

DRAWING NAME:
PROFILE AND BORING DATA

DATE:	6/4/15
PROJECT NO.:	1450.008
SCALE:	AS SHOWN
DRAWN BY:	JPB
CHECKED BY:	GMG

SHEET NO.
1 OF 1

Appendix C

Laboratory Use Plan – HTRW Analyses

Memo

Date:	Friday, February 13, 2015
Project:	HTRW & Geotechnical Boring Studies, Wreck Pond
To:	USACE
From:	Andrew Wadden, HDR Engineering, Inc.
Subject:	Laboratory Use Plan – HTRW Analyses

Proposed analytical laboratory for HTRW sample analysis:

Hampton-Clarke/Veritech
175 Route 46 West, Unit D
Fairfield, New Jersey 07004
NJ Laboratory Certification Number 07071 (attached)

The following table summarizes the HTRW sample analyses:

Analysis	**Analytical Method**	**Sample Container**	**Preservation**	**Hold Time**
TCL VOCs + 15	EPA Method 8260C	5-g encore (3)	4^0C	48 hour freeze, 14 days analysis
TCL SVOCs + 25 (with SIM analysis)	EPA Method 8270D	4 oz. glass*	4^0C	14 days
Pesticides	EPA Method 8081B	4 oz. glass*	4^0C	14 days
PCBs	EPA Method 8082A	4 oz. glass*	4^0C	14 days
RCRA Metals	EPA Methods 6010C/6020A/7471B	4 oz. glass*	4^0C	180 days

*Analyses for the same sample may be placed in one larger size container per laboratory specifications.

TCL – Target Compound List
VOCs – Volatile organic compounds
SVOCs – Semi-volatile organic compounds
PCBs – Polychlorinated biphenyls
RCRA – Resource Conservation and Recovery Act

Appendix D

NJDEP Surface Water Quality Standards

Map Printed On {2015-04-30 15:31}

Legend

GeoWeb

Surface Water Quality Classification

- DRBC-Zone-1C
- DRBC-Zone-1D
- DRBC-Zone-1E
- DRBC-Zone-2
- DRBC-Zone-3
- DRBC-Zone-4
- DRBC-Zone-5
- FW1
- FW1-TM
- FW1-TP
- FW2-NT
- FW2-NT/SE1
- FW2-NT/SE2
- FW2-NT/SE3
- FW2-NTC1
- FW2-NTC1/SE1
- FW2-NTC1/SE1/SC
- FW2-TM
- FW2-TM/SE1
- FW2-TMC1
- FW2-TP
- FW2-TPC1
- PL
- PL-TM
- SE1
- SE1C1
- SE2
- SE3
- Counties

Mid-Atlantic States

- New Jersey
- Other Mid-Atlantic States

N. J. A. C. 7:9B

Surface Water Quality Standards

Statutory Authority: N.J.S.A. 58:10A-1 et seq., 58:11A-1 et seq., and 13:1D-1 et seq.

Re-adopted: November 16, 2009 (41 N.J.R. 4735(a))
Last Amended – April 4, 2011 (43 N.J.R. 833(a))
For regulatory history and effective dates, see the New Jersey Administrative Code

Table of Contents

CHAPTER 9B SURFACE WATER QUALITY STANDARDS

SUBCHAPTER 1. SURFACE WATER QUALITY STANDARDS

7:9B-1.1 Scope of subchapter

Unless otherwise provided by rule or statute, this subchapter shall constitute the rules of the Department of Environmental Protection governing matters of policy with respect to the protection and enhancement of surface water resources, class definitions and quality criteria, use designation and quality criteria for the mainstem of the Delaware River including the Delaware Bay, the classification of surface waters of the State, procedures for establishing water quality-based effluent limitations, modification of water quality-based effluent limitations, procedures for reclassifying specific segments for less restrictive uses and procedures for reclassifying specific segments for more restrictive uses pursuant to N.J.S.A. 13:1D-1 et seq., the New Jersey Water Pollution Control Act, N.J.S.A. 58:10A-1 et seq., and the Water Quality Planning Act, N.J.S.A. 58:11A-1 et seq.

7:9B-1.2 Construction

This subchapter shall be liberally construed to permit the Department and its various divisions to discharge their statutory functions.

7:9B-1.3 Severability

If any subchapter, section, subsection, provision, clause, or portion of this chapter, or the application thereof to any person, is adjudged unconstitutional or invalid by a court of competent jurisdiction, such judgment shall be confined in its operation to the subchapter, section, subsection, clause, portion, or application directly involved in the controversy in which such judgment shall have been rendered and it shall not affect or impair the remainder of this chapter or the application thereof to other persons.

7:9B-1.4 Definitions

The following words and terms, when used in this subchapter, shall have the following meanings, unless the context clearly indicates otherwise.

"Acute toxicity" means a lethal or severe adverse sublethal effect (for example, immobilization of daphnids) to an organism exposed to a toxic substance for a relatively short period of time. Acute toxicity is measured by short-term bioassays, generally of 48 or 96 hour duration.

"Agricultural water supply" means water used for field crops, livestock, horticulture, and silviculture.

"Aquatic substrata" means soil material and associated biota underlying the water.

"Best management practices" or "BMPs" means the methods, measures or practices to prevent or reduce the amount of pollution from point or nonpoint sources including structural and nonstructural controls and operation and maintenance procedures.

"Bioaccumulation" means the increase of the concentration of a substance within the tissues of an organism, to levels in excess of that substance's ambient environmental concentration, directly from the water or through the ingestion of food (usually other organisms).

"Bioassay" means a toxicity test using aquatic organisms to determine the concentration or amount of a toxic substance causing a specified response in the test organisms under stated test conditions.

"Biota" means the animal and plant life of an ecosystem; flora and fauna collectively.

"Calculable changes" means changes to water quality characteristics as demonstrated by any acceptable mathematical, predictive method.

"Carcinogen" means a toxic substance capable of inducing a cancer response, including Group A (human carcinogen), Group B (probable human carcinogen) or Group C (possible human carcinogen) categorized in accordance with the USEPA Guidelines for Carcinogen Risk Assessment, 51 Fed. Reg. 33992, 1986 incorporated herein by reference, as amended or supplemented.

"C1" means Category One waters.

"C2" means Category Two waters.

"Category one waters" means those waters designated in the tables in N.J.A.C. 7:9B-1.15(c) through (i), for purposes of implementing the antidegradation policies set forth at N.J.A.C. 7:9B-1.5(d), for protection from measurable changes in water quality based on exceptional ecological significance, exceptional recreational significance, exceptional water supply significance or exceptional fisheries resource(s) to protect their aesthetic value (color, clarity, scenic setting) and ecological integrity (habitat, water quality and biological functions).

"Category two waters" means those waters not designated as Outstanding National Resource Waters or Category One at N.J.A.C. 7:9B-1.15 for purposes of implementing the antidegradation policies set forth at N.J.A.C. 7:9B-1.5(d).

"Chlorine produced oxidants" means the sum of free and combined chlorine and bromine as measured by the methods approved under N.J.A.C. 7:18. In fresh waters the oxidants measured are comprised predominantly of hypochlorous acid (HOCl), hypochlorite ion (OCl^-), monochloramine and dichloramine. In saline waters the oxidants measured are comprised predominantly of the oxidants listed for fresh waters plus hypobromous acid (HOBr), hypobromite ion (OBr^-) and bromamines.

"Chronic toxicity" means death or other adverse impacts that affect the growth, survival, or reproductive success of an organism or its progeny after a relatively long exposure period to toxic substances. Chronic toxicity is measured using intermediate-term or long-term bioassays.

“Complete mix” means a twenty five percent (25%) or less variation in concentration across the transect of the water body.

"Criteria" means those elements of the Surface Water Quality Standards, expressed as constituent concentrations, levels, or narrative statements, representing a quality of water that supports a particular use. When the criteria are met, water quality will generally protect the designated use.

"Department" means the New Jersey Department of Environmental Protection.

"Designated use" means those surface water or ground water uses, both existing and potential, that have been established by the Department for waters of the State.

"Diadromous fish" means fish that spend most of their life in one type of water, either fresh or saline, and migrate to the other type to spawn.

"Disinfection" means the removal, destruction, or inactivation of pathogenic and indicator organisms.

“Dissolved metal” means the concentration of metal that passes through a 0.45 μm membrane filter (as defined in “Methods for Chemical Analysis of Water and Wastes,” EPA-600/4-79-020, March 1979).

"DRBC" means Delaware River Basin Commission.

“DRBC Water Quality Regulations” means the DRBC Administrative Manual – Part III Water Quality Regulations dated September 27, 2006, including all amendments and supplements thereto.

“EC50” means the median effective concentration of a toxic substance expressed as a statistical estimate of the concentration that has a specified adverse effect on 50 percent of the test organisms under specified test conditions, based on the results of an acute bioassay.

“Exceptional ecological significance” means:

1. Waterbodies with suitable habitat verified by the Department to support Bog Turtle, Brook Floater, Dwarf Wedgemussel, Eastern Pondmussel, Eastern Lampmussel, Green Floater, and/or Triangle Floater and documented occurrence(s) of at least one of these species verified by the Department for inclusion in the Natural Heritage Program; or
2. A waterbody supporting an exceptional aquatic community as demonstrated by a nonimpaired benthic macroinvertebrate community as measured by the Department’s

Rapid Bioassessment Protocol (see http://www.state.nj.us/dep/wms/bfbm/rbpinfo.html) and at least two of the following factors:

i. Optimal habitat as measured by the Department's Stream Habitat Assessment (see http://www.state.nj.us/dep/wms/bfbm/rbpinfo.html);
ii. Excellent fish community as measured by the Fish Index of Biotic Integrity (see http://www.state.nj.us/dep/wms/bfbm/fishibi.html);
iii. Water quality data that demonstrates compliance with aquatic life criteria pursuant to N.J.A.C. 7:9B-1.14(d) for dissolved oxygen, temperature, total phosphorus, and total suspended solids; or
iv. Impervious surface that is:
    (1) less than two percent for a HUC 14 of five square miles; or
    (2) less than or equal to 10 percent for a HUC 14 of greater than or equal to five square miles.

"Exceptional fisheries resource(s)" means waterbodies confirmed by the Department as supporting trout production and classified as FW2-TP or waterbodies approved by the Department for unrestricted shellfish harvest pursuant to Shellfish Growing Water Classification rules at N.J.A.C 7:12.

"Exceptional water supply significance" means a water supply system that serves a population greater than 100,000, including any reservoirs and their natural tributaries from source to the reservoir.

"Existing uses" means those uses actually attained in the waterbody on or after November 28, 1975, whether or not they are included in the Surface Water Quality Standards.

"Federal Act" means the "Federal Water Pollution Control Act" (33 U.S.C. § 1251 et seq.), commonly referred to as the Clean Water Act, including all subsequent supplements and amendments.

"Fresh water(s)" means all nontidal and tidal waters generally having a salinity, due to natural sources, of less than or equal to 3.5 parts per thousand at mean high tide.

"FW" means the general surface water classification applied to fresh waters.

"FW1" means those fresh waters, as designated in N.J.A.C. 7:9B-1.15(j), that are to be maintained in their natural state of quality (set aside for posterity) and not subjected to any man-made wastewater discharges or increases in runoff from anthropogenic activities. These waters are set aside for posterity because of their clarity, color, scenic setting, other characteristic of aesthetic value, unique ecological significance, exceptional recreational significance, exceptional water supply significance or exceptional fisheries resource(s).

"FW2" means the general surface water classification applied to those fresh waters that are not designated as FW1 or Pinelands Waters.

“Groundwater” means that portion of water beneath the land surface that is within the zone of saturation (below the water table) where pore spaces are filled with water.

“Heat dissipation area” means a mixing zone, as may be designated by the Department, into which thermal effluents may be discharged for the purpose of mixing, dispersing, or dissipating such effluents without creating nuisances, hazardous conditions, or violating the provisions of this chapter, the Surface Water Quality Standards.

HUC 14” or “hydrologic unit code 14” means an area within which water drains to a particular receiving surface water body, also known as a subwatershed, which is identified by a 14 digit hydrologic unit boundary designation, delineated within New Jersey by the United States Geological Survey.

“Important species” means species that are commercially valuable (for example, within the top 10 species landed, by dollar value); recreationally valuable; threatened or endangered; critical to the organization and/or maintenance of the ecosystem; or other species necessary in the food web for the well-being of the species identified in this definition.

“Industrial water supply” means water used for processing or cooling.

“Intermittent stream” means a stream with a MA7CD10 flow of less than one-tenth (0.1) cubic foot per second.

“Lake, pond, or reservoir” means any impoundment, whether naturally occurring or created in whole or in part by the building of structures for the retention of surface water, excluding sedimentation control and stormwater retention/detention basins and ponds designed for treatment of wastewater. Lakes, ponds, and reservoirs are characterized by a long term or permanent downgradient restriction of surface water flow from the impoundment and areas of quiescent water within the body of the impoundment. Lakes, ponds, and reservoirs are frequently characterized by greater water depths within the impoundment than either the upgradient or downgradient surface water flow and by shallow water lateral edges containing emergent or submerged plant species. For regulatory purposes, the upgradient boundary of a lake, pond, impoundment, or reservoir shall be considered to be the point at which areas of greater depth and relatively quiescent water can be differentiated from the upgradient surface water input into the impoundment under average flow conditions.

“LC50” means the median lethal concentration of a toxic substance, expressed as a statistical estimate of the concentration that kills 50 percent of the test organisms under specified test conditions, based on the results of an acute bioassay.

“Load allocation” means the portion of a receiving water’s total maximum daily load (TMDL) for a specific pollutant that is allocated to existing or future nonpoint sources of pollution.

“MA1CD10” means the minimum average one day flow with a statistical recurrence interval of 10 years.

“MA7CD10” means the minimum average seven consecutive day flow with a statistical recurrence interval of 10 years.

“MA30CD10” means the minimum average 30 consecutive day flow with a statistical recurrence interval of ten years.

“Measurable changes” means changes measured or determined by a biological, chemical, physical, or analytical method, conducted in accordance with USEPA approved methods as identified in 40 C.F.R. 136 or other analytical methods (for example, mathematical models, ecological indices) approved by the Department, that might adversely impact a water use (including, but not limited to, aesthetics).

“Natural flow” means the water flow that would exist in a waterway without the addition of flow of artificial origin.

“Natural water quality” means the water quality that would exist in a waterway or a waterbody without the addition of water or waterborne substances from artificial origin.

“NJPDES” means New Jersey Pollutant Discharge Elimination System.

“Non-carcinogen” means a toxic substance not categorized as a carcinogen, including Group D (not classifiable as to human carcinogenicity) or Group E (evidence of non-carcinogenicity for humans) categorized in accordance with the USEPA Guidelines for Carcinogen Risk Assessment, 51 Fed. Reg. 33992, 1986 incorporated herein by reference, as amended or supplemented.

“Nondegradation waters” means those waters set aside for posterity because of their clarity, color, scenic setting, other characteristic of aesthetic value, unique ecological significance, exceptional recreational significance, or exceptional water supply significance. These waters include all waters designated as FW1 in this subchapter.

“Nonpersistent” means degrading relatively quickly, generally having a half-life of less than 96 hours.

“Nonpoint source” or “NPS” means:

1. Any man-made or man-induced activity, factor, or condition, other than a point source, from which pollutants are or may be discharged;
2. Any man-made or man-induced activity, factor, or condition, other than a point source, that may temporarily or permanently change any chemical, physical, biological, or radiological characteristic of waters of the State from what was or is the natural, pristine condition of such waters, or that may increase the degree of such change; or
3. Any activity, factor, or condition, other than a point source, that contributes or may contribute to water pollution.

“Nontrout waters” means fresh waters that have not been designated in N.J.A.C. 7:9B-1.15I through (i) as trout production or trout maintenance. These waters are generally not suitable for trout because of their physical, chemical or biological characteristics, but are suitable for a wide variety of other fish species.

“NPDES” means National Pollutant Discharge Elimination System.

“NT” means nontrout waters.

“Nutrient” means a chemical element or compound, such as nitrogen or phosphorus, which is essential to and promotes the growth and development of organisms.

“Outstanding National Resource Waters” or “ONRW” means high quality waters that constitute an outstanding national resource (for example, waters of National/State Parks and Wildlife Refuges and waters of exceptional recreational or ecological significance). Waters classified as FW1 waters and Pinelands waters are Outstanding National Resource Waters.

“Persistent” means relatively resistant to degradation, generally having a half life of over 96 hours.

“Pinelands waters” means all waters within the boundaries of the Pinelands Area, except those waters designated as FW1 in N.J.A.C. 7:9B-1.15(j), as established in the Pinelands Protection Act (N.J.S.A. 13:18A-1 et seq.) and shown on Plate 1 of the “Comprehensive Management Plan” adopted by the New Jersey Pinelands Commission in November 1980.

“PL” means the general surface water classification applied to Pinelands Waters.

“Point source” or “PS” means any discernible, confined, and discrete conveyance, including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel, or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture.

“Pollutant” means any dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, refuse, oil, grease, sewage sludge, munitions, chemical wastes, biological materials, medical wastes, radioactive substance (except those regulated under the Atomic Energy Act of 1954, as amended (42 U.S.C. § 2011 et. Seq.)), thermal waste, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, agricultural and construction waste or runoff or other residue discharged directly or indirectly to the land, ground waters or surface waters of the State, or to a domestic treatment works as defined at N.J.A.C. 7:14A-1.2. “Pollutant” includes both hazardous and nonhazardous pollutants.

“Potable surface water intake” means any structure or apparatus used to withdraw surface waters directly or indirectly that is conveyed to a potable treatment plant or is used for other potable purposes.

"Primary contact recreation" means water related recreational activities that involve significant ingestion risks and includes, but is not limited to, wading, swimming, diving, surfing, and water skiing.

"Public hearing" means a legislative type hearing before a representative or representatives of the Department providing the opportunity for public comment, but does not include cross-examination.

"Regulatory mixing zones" means areas of surface waters established pursuant to this chapter for the purpose of initial mixing, dispersion, or dissipation of wastewater effluent at or near the discharge point. Regulatory mixing zones may be established for applicable criteria.

"River mile" or "R.M." means the distance, measured in statute miles, between two locations on a stream, with the first location designated as mile zero. For example, mile zero for the Delaware River is located at the intersection of the center line of the navigation channel and a line between the Cape May Light, New Jersey, and the tip of Cape Henlopen, Delaware.

"Saline waters" means waters having salinities generally greater than 3.5 parts per thousand at mean high tide.

"SC" means the general surface water classification applied to coastal saline waters.

"SE" means the general surface water classification applied to saline waters of estuaries.

"Secondary contact recreation" means recreational activities where the probability of water ingestion is minimal and includes, but is not limited to, boating and fishing.

"Shellfish" means those mollusks commonly known as clams, oysters, or mussels.

"Shellfish waters" means waters classified as Approved, Seasonally Approved, Special Restricted, Seasonally Special Restricted or Condemned in accordance with the Shellfish Growing Water Classification rules N.J.A.C. 7:12.

"Site-specific criteria" means an alternative criterion established, at N.J.A.C. 7:9B-1.14(g), in place of an existing Statewide criterion, to protect existing or designated uses for specified waterbody(ies).

"State Act" means the New Jersey "Water Pollution Control Act," N.J.S.A. 58:10A-1 et seq., as amended.

"Stream temperature" means the temperature of a stream outside of a designated heat dissipation area.

"Surface water classifications" means names assigned by the Department as set forth at N.J.A.C. 7:9B-1.15I through (j) to waters having the same designated uses and water quality criteria (for example, FW1, PL, FW2-NT, SE1, SC).

"Surface Water Quality Standards" (SWQS) means the rules, in this chapter, N.J.A.C. 7:9B, which set forth, designated uses, use classifications, and water quality criteria for the State's waters based upon such uses, and the Department's policies concerning these uses, classifications and criteria.

"Surface waters" means water at or above the land's surface which is neither groundwater nor contained within the unsaturated zone, including, but not limited to, the ocean and its tributaries, all springs, streams, rivers, lakes, ponds, wetlands, and artificial waterbodies.

"Thermal alterations" means the increase or decrease in the temperature of surface waters, above or below the natural temperature, that may be caused by the activities of man.

"Tidal waters" means fresh or saline water under tidal influence, up to the head of tide.

"TM" means trout maintenance.

"Total maximum daily load" or "TMDL" means a total maximum daily load formally established pursuant to Section 7 of the Water Quality Planning Act (N.J.S.A. 58:11A-7) and Section 303(d) of the Clean Water Act, 33 U.S.C. §§1251 et seq. A TMDL is the sum of individual wasteload allocations for point sources, load allocations for nonpoint sources of pollution, other sources such as tributaries, or adjacent segments, and allocations to a reserve or margin of safety for an individual pollutant.

"Total recoverable metal" means the concentration of metal in an unfiltered sample following treatment with hot dilute mineral acid (as defined in "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1979, incorporated herein by reference).

"Toxic substance" or "toxic pollutant" means any pollutant identified pursuant to the Federal Act, or any pollutant or combination of pollutants, including disease causing agents, which after discharge and upon exposure, ingestion, inhalation or assimilation into any organism, either directly or indirectly by ingestion through food chains, may, on the basis of the information available to the Department, cause death, disease, behavioral abnormalities, cancer, genetic mutations, physiological malfunctions, including malfunctions in reproduction, or physical deformation, in such organisms or their offspring. Toxic pollutants shall, include but not be limited, to those pollutants identified pursuant to Section 307 of the Federal Act or Section 4 of the State Act, or in the case of "sludge use or disposal practices," any pollutant identified pursuant to Section 405(d) of the Federal Act.

"TP" means trout production.

"Trout maintenance waters" means waters designated at N.J.A.C. 7:9B-1.15I through (i) for the support of trout throughout the year.

"Trout production waters" means waters designated at N.J.A.C. 7:9B-1.15I through (i) for use by trout for spawning or nursery purposes during their first summer.

"Unsaturated zone" means the subsurface volume between the land's surface and the top of the saturated zone (water table), where moisture does not fill all the pore spaces in the formation or soil.

"USEPA" means the United States Environmental Protection Agency.

"Wasteload allocation" or "WLA" means the portion of a receiving water's total maximum daily load for a specific pollutant that is allocated to one of its existing or future point sources of pollution. WLAs constitute a type of water quality-based effluent limitation.

"Water effect ratio" or "WER" means the ratio of an acute (or chronic) toxicity value derived from a site study to the acute (or chronic) toxicity value derived from a laboratory study for a particular toxic substance. The WER is multiplied by the aquatic life protection criterion for a given toxic substance to derive a site-specific aquatic life protection criterion.

"Water quality-based effluent limitations" means effluent limitations established so that the quality of the waters receiving a discharge will meet the surface water quality criteria and policies of this chapter after the introduction of the effluent.

"Watershed-specific translators" means numeric translators developed, as part of a total maximum daily load (TMDL) in accordance with N.J.A.C. 7:15-6, to demonstrate compliance with the narrative criterion pursuant to N.J.A.C. 7:9B-1.14(d)4i. to protect existing or designated uses for specified watershed(s).

"Waters of the State" means the ocean and its estuaries, all springs, streams, wetlands, and bodies of surface or ground water, whether natural or artificial, within the boundaries of the State of New Jersey or subject to its jurisdiction.

"Wetlands" means those areas that are inundated or saturated by surface water or groundwater 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, commonly known as hydrophytic vegetation. The Department shall evaluate the parameters of hydrology, soils, and vegetation to determine the presence and extent of wetlands.

"Zone" means the general surface water classification applied to the mainstem Delaware River and Delaware Bay.

7:9B-1.5 Statements of policy

(a) General policies are as follows:

1. These Surface Water Quality Standards apply to all surface waters of the State.
2. Water is vital to life and comprises an invaluable natural resource which is not to be abused by any segment of the State's population or economy. It is the policy of the State to restore, maintain and enhance the chemical, physical and biological integrity of its waters, to protect the public health, to safeguard the aquatic biota, protect scenic and ecological values, and to enhance the domestic, municipal, recreational, industrial, agricultural and other reasonable uses of the State's waters.
3. The restoration, maintenance and preservation of the quality of the waters of the State for the protection and preservation of public water supplies is a paramount interest of the citizens of New Jersey. In order to provide adequate, clean supplies of potable water, it is the policy of the State that all fresh waters be protected as potential sources of public water supply. Therefore, point and nonpoint sources of pollutants shall be regulated to attain compliance with the Surface Water Quality Standards human health criteria outside of regulatory mixing zones.
4. Toxic substances in waters of the State shall not be at levels that are toxic to humans or the aquatic biota, or that bioaccumulate in the aquatic biota so as to render them unfit for human consumption.
5. The introduction of carcinogenic, mutagenic, or teratogenic substances into the environment is of particular concern to the Department. Human health-based ambient criteria have been established in freshwaters due to consumption of fish and water, and in saline water due to consumption of fish. For carcinogens, the criteria have been established at levels which would result in no greater than a one-in-one-million lifetime excess cancer risk. For non-carcinogens, the criteria have been established which would result in no appreciable risk of deleterious effect.
6. Existing uses shall be maintained and protected. Designated uses shall, as soon as technically and economically feasible, be attained wherever these uses are not precluded by natural conditions. Where existing criteria are inadequate to support the existing or designated uses, the criteria shall be changed to support the existing uses.
7. The restoration of saline waters to levels which permit unrestricted shellfish harvesting is an objective of the Department.
8. The Department encourages the use of reclaimed water for beneficial reuse to help preserve the highest quality water and reduce the export of freshwater out of basins in support of meeting water supply needs and natural resource protection.
9. The Department uses the Integrated Water Quality Monitoring and Assessment Methods developed pursuant to N.J.A.C. 7:15-6.2 to evaluate water quality data and identify waters where water quality does not meet the Surface Water Quality Standards at N.J.A.C. 7:9B as required by Section 303(d) and 305(b) of the Federal Clean Water Act.

(b) Interstate waters policies are as follows:

1. The designated uses and water quality criteria for the fresh and saline waters under the jurisdiction of the Delaware River Basin Commission shall be as established in accordance with N.J.A.C. 7:9B-1.13 and 1.14I through (g).
2. The designated uses and water quality criteria for waters under the jurisdiction of the Interstate Environmental Commission in the New Jersey/New York metropolitan area shall be as established in this subchapter, or in accordance with the prevailing Water Quality Regulations of the Interstate Environmental Commission, including all amendments and future supplements thereto, whichever are more stringent.

(c) General technical policies are as follows:

1. The natural water quality shall be used in place of the promulgated water quality criteria of N.J.A.C. 7:9B-1.14 for all water quality characteristics that do not meet the promulgated water quality criteria as a result of natural causes.
2. Water quality criteria are expected to be maintained during periods when nontidal or small tidal stream flows are at or greater than the MA7CD10 flow, except as provided below:
   i. For acute aquatic life protection criteria, the design flow shall be the MA1CD10 flow;
   ii. For chronic aquatic life protection criteria for ammonia, the design flow shall be the MA30CD10 flow; and
   iii. For human health criteria for carcinogens listed at N.J.A.C. 7:9B-1.14(f)7, the design flow shall be the flow which is exceeded 75 percent of the time for the appropriate “period of record” as determined by the United States Geological Survey.
3. Water quality criteria are expected to be maintained in intermittent streams during all natural flow conditions. When an intermittent stream does not contain natural flow of sufficient magnitude to determine water quality, the criteria to be maintained in the intermittent stream will be those pertaining to the measurable natural flow immediately downstream of the intermittent stream.
4. All analytical data to be incorporated by the Department in water quality monitoring or other activities shall be from laboratories approved or certified by the Department for the analysis of those specific parameters. If certification is not offered for the specific parameter, the laboratory performing the analysis shall, at a minimum, hold certification in the category of certification covering that type of parameter.
5. The Department shall utilize the parameter specific criteria contained in N.J.A.C. 7:9B-1.14 in the development of chemical specific water quality-based effluent limitations for point source discharges. Whenever parameter specific criteria have not been adopted, the Department will utilize the best available scientific information in the development of chemical specific water quality-based effluent limitations for point source discharges. Ambient criteria published by the United States Environmental Protection Agency pursuant to section 304(a) of the Federal Clean Water Act represent the minimum acceptable best scientific information to be

used in the development of water quality-based effluent limitations for point source discharges.

6. When the Department promulgates a new or revised maximum contaminant level (MCL) in the Safe Drinking Water Act rules at N.J.A.C. 7:10 for a parameter for which there is an established human health based criterion at N.J.A.C. 7:9B-1.14(f)7, the Department shall modify the human health based criterion based on the toxicity factor used to establish the MCL and shall incorporate the modified criterion into N.J.A.C. 7:9B-1.14(f)7. The Department shall publish a notice of administrative change in the New Jersey Register.
7. The Department shall utilize a geometric mean to assess compliance with the bacterial quality indicators at N.J.A.C.7:9B-1.14(d)1ii-iii. The geometric mean shall be calculated using a minimum of five samples collected over a thirty-day period. The single sample maximum shall be used for beach notification in accordance with N.J.A.C. 8:26 and to identify where additional ambient water quality sampling is needed to calculate a geometric mean.
8. Temperature criteria at N.J.A.C. 7:9B-1.14(d) apply unless an alternative effluent limitation is approved in accordance with Section 316(a) of the Clean Water Act, 33 U.S.C. 1326(a).
   i. Properly treated wastewater discharge shall be deemed in compliance with the temperature criteria if the ambient stream temperature measured outside the regulatory heat dissipation area does not increase by more than:
      (1) 0.6 degrees Celsius in FW2-TP waters
      (2) 1.2 degrees Celsius in FW2-TM waters
      (3) 2.8 degrees Celsius in FW2-NT waters
      (4) 2.2 degrees Celsius in SE and SC waters from September through May
      (5) 0.8 degrees Celsius in SE and SC waters from June through August
   ii. Thermal alterations to lakes, ponds, or reservoirs shall not be permitted unless it can be shown to be beneficial to the designated and existing uses.

(d) Antidegradation policies applicable to all surface waters of the State are as follows:

1. Existing uses shall be maintained and protected. Designated uses shall be maintained or, as soon as technically and economically feasible, be attained wherever these uses are not precluded by natural conditions.
   i. The maintenance, migration, and propagation of threatened or endangered species (as defined under the Federal Endangered Species Act of 1973 as amended, 16 U.S.C. 1531 *et seq*., and/or the New Jersey Endangered and Nongame Species Conservation Act N.J.S.A. 23:2A-1 et seq.) is considered an existing use that must be maintained.
   ii. No irreversible changes may be made to existing water quality that would impair or preclude attainment of the designated uses of a waterway.
   iii. No changes shall be allowed in waters which constitute an outstanding National or State resource or in waters that may affect these outstanding resource waters.

iv. Where water quality exceeds levels necessary to support the designated uses, including but not limited to, propagation of fish, shellfish, and wildlife and recreation in and on the water, that quality shall be maintained and protected unless the Department finds, after full satisfaction of the intergovernmental coordination and public participation provisions of the Department's continuing planning process as set forth in the Statewide Water Quality Management Plan (see N.J.A.C. 7:15), which includes, but is not limited to, the NJPDES Regulations (N.J.A.C. 7:14A), that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located.

v. Where a lower classification of water (including the antidegradation designation) may impinge upon a higher classification/antidegradation designation of water, the Department shall ensure that the quality and uses of the higher classification/antidegradation water are protected.

vi. A waterway or waterbody from which water is transferred to another waterway or waterbody shall be treated as a tributary to the waterway or waterbody receiving the transferred water.

vii. Modifications of water quality-based effluent limitations established to implement the antidegradation policy may be granted pursuant to N.J.A.C. 7:9B-1.8 and 1.9.

2. Antidegradation policies applicable to a waterbody are as follows:

i. The quality of nondegradation waters shall be maintained in their natural state (set aside for posterity) and shall not be subject to any manmade wastewater discharges. The Department shall not approve any activity which, alone or in combination with any other activities, might cause changes, other than toward natural water quality, in the existing surface water quality characteristics.

ii. For Pinelands waters, the Department shall not approve any activity which alone or in combination with any other activities, might cause changes, other than toward natural water quality, in the existing surface water quality characteristics. This policy shall apply as follows:

(1) This policy is not intended to interfere with water control in the operation of cranberry bogs or blueberry production.

(2) New or expanded discharges are not allowed, unless authorized by the Pinelands Commission in accordance with Pinelands Comprehensive Management Plan, N.J.A.C. 7:50-4.61 through 4.70.

iii. Category One Waters shall be protected from any measurable changes (including calculable or predicted changes) to the existing water quality. Water quality characteristics that are generally worse than the water quality criteria, except as due to natural conditions, shall be improved to maintain or provide for the designated uses where this can be accomplished without adverse impacts on organisms, communities, or ecosystems of concern.

iv. For Category Two Waters, water quality characteristics that are generally better than, or equal to the water quality standards shall be maintained within a range of quality that shall protect the existing/designated uses as determined by studies acceptable to the Department, relating existing/designated uses to

water quality. Where such studies are not available or are inconclusive, water quality shall be protected from changes that might be detrimental to the attainment of the designated uses or maintenance of the existing uses. Water quality characteristics that are generally worse than the water quality criteria shall be improved to meet the water quality criteria.

v. For waters of mainstem of the Delaware River designated as Special Protection Waters pursuant to the DRBC Water Quality Regulations Article 3 Section 3.10.3A2, the antidegradation policies are as specified in the DRBC Water Quality Regulations.

(e) Water quality-based effluent limitation policies are as follows:

1. Water quality-based effluent limitations may be established so as to minimize total expenditures, subject to social and environmental constraints, so that the provisions of the water quality standards (which includes the antidegradation policies) are met. This policy may result in the assignment of different levels of treatment to different dischargers where this proves more beneficial on a study area basis.
2. Modifications of water quality-based effluent limitations established to implement the water quality standards (which includes the antidegradation policies) granted pursuant to N.J.A.C. 7:9B-1.8 and 1.9, shall provide for effluent limits at least as stringent as those required pursuant to sections 301, 306, and 307 of the Federal Clean Water Act or the minimum BOD5 effluent standards at N.J.A.C. 7:14A-12.4, where applicable, whichever are more stringent.
3. Water quality-based effluent limitations developed in accordance with N.J.A.C. 7:14A-13.6 shall not interfere with the attainment of the Surface Water Quality Standards, including the antidegradation policies.
4. When a discharge is made to a tidal waterway in the reach where the salinity varies from less than 3.5 ppt. to greater than 3.5 ppt., or the salinity data are inconclusive, the Department shall establish as water quality-based effluent limitations the more stringent of the limitations, on a parameter specific basis, required for the upstream FW waters or the downstream SE waters.
5. Where the effluent limitations developed pursuant to N.J.A.C. 7:14A-13.6 are below the level of detectability of the procedures in N.J.A.C. 7:18 the Department will use an effluent limitation of nondetectable in any NJPDES permit.
6. Compliance schedules may be issued in accordance with N.J.A.C. 7:14A-6.4 when it is demonstrated by a discharger that new or revised water quality-based effluent limitations, based on ambient criteria adopted or revised after July 1, 1977, cannot be consistently met with the facility's existing treatment process. No schedule of compliance may be allowed for parameter specific water quality-based effluent limitations where the parameter specific ambient water quality criterion, which was the basis for developing that limitation, was adopted prior to July 1, 1977, and has not been revised since adoption.
7. The Department may require characterization monitoring in NJPDES permits for mercury and PCBs using the USEPA approved method 1631 for mercury (Guidelines Establishing Test Procedures for the Analysis of Pollutants;

Measurement of Mercury in Water; Revisions to EPA Method 1631, 40 C.F.R. 136, Fed. Reg. 67:65876, October 29, 2002) incorporated herein by reference, as amended and supplemented, available at http://www.epa.gov/waterscience/methods/1631.html, as supplimented and amended and 1668A for PCBs (Method 1668, Revision A: Chlorinated Biphenyl Congeners in Water, Soil, Sediment, and Tissue by HRGC/HRMS. EPA-821-R-00-002, December 1999) incorporated herein by reference, as amended and supplemented, available at http://www.epa.gov/Region8/water/wastewater/biohome/biosolidsdown/methods/1668a5.pdf.

(f) Whole Effluent Toxicity Requirements shall be established for NJPDES point sources in accordance with N.J.A.C. 7:14A–13.6(d).

(g) Nutrient policies are as follows:

1. These policies apply to all waters of the State.
2. The Department may develop watershed-specific translators or site-specific criteria through a Total Maximum Daily Load (TMDL). Site specific criteria shall be incorporated at N.J.A.C. 7:9B-1.14(g).
3. The Department shall establish water quality-based effluent limits for nutrients, in addition to or more stringent than the effluent standard in N.J.A.C. 7:14A-12.7, as necessary to meet a wasteload allocation established through a TMDL, or to meet the criteria at N.J.A.C. 7:9B-1.14(d)4.
4. Activities resulting in the nonpoint discharge of nutrients shall implement the best management practices determined by the Department to be necessary to protect the existing or designated uses.

(h) A permittee may request that a regulatory mixing zone be established by the Department for applicable criteria except as otherwise provided in this section. Regulatory mixing zones may be evaluated as part of the development of water quality-based effluent limitation(s) to provide for the initial dispersion of the effluent in the receiving water body at or near the discharge point.

1. The following are the general conditions for establishing regulatory mixing zones:
   i. Regulatory mixing zones shall be established in accordance with this subsection;
   ii. Water quality criteria may be exceeded within the regulatory mixing zone; however, surface water quality criteria must be met at the edge of the regulatory mixing zone;
   iii. The regulatory mixing zone shall be no larger than that portion of the receiving water where complete mixing occurs;
   iv. Regulatory mixing zones shall not be used for, or considered as a substitute for, minimum treatment technology required by the Federal and State Acts or other applicable Federal or State laws or regulations;

v. Regulatory mixing zones shall be established to assure that significant mortality does not occur to free swimming or drifting organisms;
   (1) In individual regulatory mixing zones, discharges which meet acute effluent toxicity of $LC_{50} \geq 50\%$ shall be deemed to comply with this requirement.
   (2) In cases of extended regulatory mixing zones resulting from multiple, conjoined individual regulatory mixing zones, site-specific studies to demonstrate no significant mortality shall be required, taking into account factors including, time of travel, concentration, and the toxicity of the parameters in question;

vi. The existing and designated uses outside the regulatory mixing zone shall not be adversely affected;

vii. The total area and volume of a waterbody assigned to a regulatory mixing zone shall be limited to that which will not adversely affect beneficial uses or interfere with biological communities or populations of important species (for example, commercially or recreationally significant species; or threatened or endangered species);

viii. Regulatory mixing zones, including those for shore hugging plumes, shall not extend into recreational areas, potable surface water intakes (1,500 feet upstream and 500 feet downstream or to the farthest point of backwatering due to the intake, whichever is more protective), shellfish harvesting areas, threatened or endangered species habitat, and other important biological or natural resource areas;

ix. The regulatory mixing zone shall not inhibit or impede the passage of aquatic biota; and

x. Overlapping regulatory mixing zones shall not inhibit or impede the passage of aquatic biota.

2. Spatial limitations for regulatory mixing zones delineate the maximum area in which the initial mixing may occur. A site-specific study performed in accordance with (h)3 below will be used to determine dilution in tidal water bodies and in nontidal water bodies where mixing is not shown to be rapid and complete. A maximum area shall be applied in any one of the following four situations:

i. Heat dissipation areas shall be established as follows:
   (1) For discharges to FW2-NT, FW2-TM, and SE waters, not more than one-quarter (1/4) of the cross section and/or volume of the water body at any time or more than two-thirds (2/3) of the surface from shore to shore at any time.
   (2) For discharges to lakes, ponds, reservoirs, bays or coastal waters, the heat dissipation areas shall be developed on a case-by-case basis.
   (3) A discharger may be granted a larger heat dissipation area pursuant to 33 U.S.C. 1326(a) Section 316(a) of the Clean Water Act.

ii. For discharges to tidal water bodies:
   (1) Regulatory mixing zones for chronic and human health criteria are limited to one fourth of the distance between the discharge port closest to the

shoreline and the shoreline during average tidal conditions, or 100 meters, whichever is greater; and

(2) Regulatory mixing zones for acute criteria are limited by the distances calculated in accordance with the USEPA "Technical Support Document For Water Quality-Based Toxics Control" USEPA, EPA/505/2-90-001, March 1991, incorporated herein by reference. In no case shall a regulatory mixing zone for acute criteria extend more than 100 meters from the discharge point or include more than five percent of the total surface area of a water body based on critical ambient tidal conditions during low slack, astronomical spring tide for the applicable exposure period.

iii. For discharges to non-tidal water bodies:

(1) Regulatory mixing zones for chronic and human health criteria shall be based on the design flows at (c)2 above. If rapid, complete mix is demonstrated, the entire available design flow may be used in dilution calculations. If rapid, complete mix is not demonstrated, only that portion of the design flow that can be demonstrated to mix with the effluent within 100 meters from the discharge point may be used in dilution calculations; and

(2) Regulatory mixing zones for acute criteria shall be based on the MA1CD10 design flow. If rapid, complete mix is demonstrated, the entire available design flow may be used in dilution calculations. If rapid, complete mix is not demonstrated, only that portion of the design flow that can be demonstrated to mix with the effluent within a downstream distance calculated in accordance with the USEPA "Technical Support Document For Water Quality-Based Toxics Control" USEPA, EPA/505/2-90-001, March 1991 may be used. In no case shall a regulatory mixing zone for acute criteria extend more than 100 meters from the discharge point or include more than five percent of the total surface area of a water body based on the design flow.

iv. Site-specific spatial dimensions of the regulatory mixing zone for an approved multiport diffuser shall be determined by the Department. The dimensions of the site-specific regulatory mixing zone and the allowable dilution at the edge of the regulatory mixing zone may be established using appropriate diffuser models (for example, CORMIX, PLUMES), tracer studies, or other field studies approved by the Department in accordance with (h)3 below.

3. A regulatory mixing zone study shall be conducted in accordance with a workplan pre-approved by the Department. General protocols for conducting mixing zone studies are described in the USEPA "Technical Support Document For Water Quality-Based Toxics Control" USEPA, EPA/505/2-90-001, March 1991. In addition, the following principles apply:

i. The design flows to be used in calculating available dilution in nontidal waters shall be based on the design flows specified at (c)2 above; and

ii. In tidal waters, the regulatory mixing zone for an acute criteria shall be based on critical ambient tidal conditions during low slack, astronomical spring tide

for the applicable exposure period. Regulatory mixing zones for chronic and human health criteria shall be based on average conditions during a normal tidal cycle.

4. In order to determine waste load allocations and NJPDES/DSW permit effluent limitations that will comply with the regulatory mixing zone requirements, instream pollutant concentrations at the boundary of the regulatory mixing zone shall be determined as follows:
   i. The instream concentrations shall be determined using either a general mass balance equation or a mathematical model, if available; or the information generated during the course of a study as described at (h)2 above.
   ii. If the regulatory mixing zone is based upon the guidance and procedures in the USEPA "Technical Support Document For Water Quality-Based Toxics Control" USEPA, EPA/505/2-90-001, March 1991, the Technical Support Document will also be used to determine instream concentrations at the boundary of the regulatory mixing zone.
5. Regulatory mixing zones are prohibited as follows:
   i. For indicators of pathogenic quality, including fecal coliform, E. Coli and enterococci;
   ii. In intermittent streams;
   iii. For new or increased discharges to lakes, ponds, and reservoirs;
   iv. For discharges to areas of waters with documented occurrences of any threatened or endangered species listed pursuant to the Federal or State Threatened and Endangered Species Acts (Endangered Species Act of 1973, 16 U.S.C. § 1531 et seq.; New Jersey Endangered and Non Game Species Conservation Act of 1973, N.J.S.A. 23:2A-1 et seq.; Endangered Plant Species List Act, N.J.S.A. 13:1B-15.151 et seq.), if those discharges would likely have an adverse effect on the species or its associated habitat;
   v. For heat dissipation areas in FW2-TP waters;
   vi. For heat dissipation areas within 1,500 feet of the shoreline in SC waters;
   vii. For new discharges of the following pollutants:
      (1) alpha-BHC (alpha-HCH);
      (2) beta-BHC (beta-HCH);
      (3) gamma-BHC (gamma HCH / Lindane);
      (4) Chlordane;
      (5) 4,4'-DDD (p,p'-TDE);
      (6) 4,4'-DDE;
      (7) 4,4'-DDT;
      (8) Dieldrin;
      (9) Hexachlorobenzene;
      (10) Hexachlorobutadiene;
      (11) Mercury;
      (12) Mirex;
      (13) Pentachlorobenzene;
      (14) Polychlorinated biphenyls (PCBs);
      (15) 1,2,4,5-Tetrachlorobenzene;

(16) 2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD); and
(17) Toxaphene; and

viii. For new or expanded discharges, within 1,500 feet upstream of a potable surface water intake (including any reservoir) and 500 feet downstream or to the farthest point of backwatering due to the intake, whichever is more protective.

7:9B-1.6 Establishment of water quality-based effluent limitations

(a) Water quality-based effluent limitations shall be established for NJPDES point sources in accordance with N.J.A.C. 7:14A.

(b) For new and/or expanding NJPDES point sources, the water quality-based effluent limitations shall comply with the antidegradation policies at N.J.A.C. 7:9B-1.5(d) above.

(c) Water quality-based effluent limits for chlorine produced oxidants based on the criteria in N.J.A.C. 7:9B-1.14(f) are not applicable where:
1. The aquatic community of a waterbody is exposed to one or more point source discharges of non-contact cooling water that is intermittently chlorinated to control condenser biofouling;
2. The total period of such exposure to chlorinated wastewater is two hours per day or less; and
3. The maximum concentration of chlorine produced oxidants in the effluents of such discharges shall not exceed 200 μg/L.

(d) The Department may authorize compliance schedules in accordance with individual NJPDES permits to allow the permittee time to comply with new effluent limitations.

7:9B-1.7 Waterway loadings in areawide water quality management plans

Any total maximum daily load, wasteload allocation, or load allocation established as an amendment to an areawide water quality management plan under N.J.A.C. 7:15-3.4 shall be consistent with all of the provisions of this subchapter.

7:9B-1.8 Procedures for modifying water quality-based effluent limitations for individual dischargers to Category One waters

(a) An applicant requesting modification of a water quality-based effluent limitation, established on a case-by-case basis, must demonstrate, to the satisfaction of the Department, after public notice (including notice to affected municipalities) and a public hearing (where sufficient public interest exists), that:
1. Some change in ambient water quality should be allowed because of necessary and justifiable social or economic development;
2. Alternative effluent limitations, at least as stringent as the technology-based effluent limitations required by either sections 301, 306, and 307 of the Federal Clean Water Act, or the effluent limitations resulting from application of the minimum BOD5 effluent standards in N.J.A.C. 7:14A-12.4 (where applicable),

whichever are more stringent, will not interfere nor be injurious to the existing or designated uses; and

3. Where the requested modified effluent limitations would result in contravention of the water quality criteria or the degradation of the natural water quality, whichever is less stringent:
   i. The water quality criteria are not attainable because of natural background; or
   ii. The water quality criteria are not attainable because of irretrievable man-induced conditions; or
   iii. Natural, ephemeral, intermittent, or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
   iv. Controls more stringent than those required by Sections 301(b) and 306 of the Federal Clean Water Act would result in substantial and widespread adverse social and economic impact.

(b) It is the responsibility of the applicant to provide the Department with all the information needed to evaluate the requested modification(s).

(c) Modified effluent limitations may be renewed if the discharger demonstrates, to the Department's satisfaction, after public notice (including notice to affected municipalities) and a public hearing (where sufficient interest exists), that the basis for issuing the modification still exists and there have been no adverse impacts on the existing uses.

(d) Where water quality criteria are not currently met the Department shall not grant a modification, as set forth in this section, establishing an effluent limitation less stringent than the limitation(s) in the existing permit, unless the criteria are not met because of natural conditions.

7:9B-1.9 Procedures for modifying water quality-based effluent limitations for individual dischargers to Category Two waters.

(a) The criteria for modifying water quality-based effluent limitations established on a case-by-case basis are:

1. The applicant for modification of effluent limitations for parameters that are currently better than the water quality criteria must demonstrate, to the satisfaction of the Department, after public notice (including notice to affected municipalities) and a public hearing (where sufficient public interest exists), that:
   i. Some degradation of water quality parameters currently better than the water quality criteria should be allowed because of necessary and justifiable social or economic development; and
   ii. Alternative effluent limitations, at least as stringent as the technology-based effluent limitations required by either sections 301, 306, and 307 of the Federal Clean Water Act, or the effluent limitations resulting from application of the effluent standards (where applicable) in N.J.A.C. 7:14A-12, whichever are more stringent, will not interfere with nor be injurious to the existing or designated uses.

2. The applicant for modification of effluent limitations for parameters that are currently equal to or currently do not meet the water quality criteria in this subchapter must demonstrate, to the satisfaction of the Department, after public notice (including notice to affected municipalities) and a public hearing (where sufficient public interest exists), that:
   i. The water quality criteria are not attainable because of natural background; or
   ii. The water quality criteria are not attainable because of irretrievable man-induced conditions; or
   iii. Natural, ephemeral, intermittent, or low flow conditions or water levels prevent the attainment of the water quality criteria, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
   iv. Controls more stringent than those required by Section 301(b) and 306 of the Federal Clean Water Act would result in substantial and widespread adverse social and economic impact.

(b) Where water quality criteria are not currently met the Department shall not grant a modification, as set forth in this section, establishing an effluent limitation less stringent than the limitation(s) in the existing permit, unless the criteria are not met because of natural conditions.

(c) Modified effluent limitations may be renewed if the discharger demonstrates, to the satisfaction of the Department, after public notice (including notice to affected municipalities) and a public hearing (where sufficient interest exists), that the basis for issuing the modification still exists and there have been no adverse impacts on the existing uses.

7:9B-1.10 Procedures for reclassifying specific segments for less restrictive uses

(a) The Department will entertain petitions, for reclassification of specific segments to less restrictive uses, or may decide to initiate reclassification proceedings on its own, at any time.

(b) Any reclassification proceedings will include full documentation of the items contained in (d) and (e) below. The documentation will be prepared by either the Department (where the Department has initiated the reclassification on its own) or the petitioner for the reclassification.

(c) The Department shall issue public notice to all interested parties (including affected municipalities) and shall hold public hearing(s) as part of any reclassification proceeding.

(d) The Department or the petitioner, as indicated in (b) above, shall include in the reclassification documentation appropriate water quality studies and analyses, biological studies and analyses, environmental, social, and economic studies as are necessary to demonstrate the satisfaction of (e)1 and 2 below, in addition to at least one of the remaining criteria in (e) below.

(e) The Department may establish less restrictive uses than the designated uses only after it has been demonstrated to the satisfaction of the Department that:
   1. None of the uses being removed are existing uses; and

2. The uses to be removed will not be attained by implementing effluent limits required by Sections 301(b) and 306 of the Federal Clean Water Act in conjunction with implementation of cost-effective and reasonable best management requirements for nonpoint source pollution control; and
3. The existing designated use is not attainable because of natural background; or
4. The existing designated use is not attainable because of irretrievable man-induced conditions; or
5. Natural, ephemeral, intermittent, or low flow conditions or water levels prevent the attainment of the use, unless these conditions may be compensated for by the discharge of sufficient volume of effluent discharges without violating State water conservation requirements to enable uses to be met; or
6. Physical conditions related to the natural features of the water body, such as the lack of a proper substrate, cover, flow, depth, pools, riffles, and the like, unrelated to water quality, preclude attainment of aquatic life protection uses; or
7. Controls more stringent than those required by Sections 301(b) and 306 of the Federal Clean Water Act would result in substantial and widespread adverse social and economic impact.

(f) Any reclassification for less restrictive uses, established pursuant to this section shall be reviewed during each review of water quality standards pursuant to Section 303 of the Federal Clean Water Act (at least once every three years). Either the Department or the original petitioner, as indicated in (b) above, shall be responsible for supplying documentation showing that the bases for the reclassification still exist.

(g) In those cases in which a thermal discharge is involved, the procedures for reclassifying segments for less restrictive use shall be consistent with section 316 of the Federal Clean Water Act.

7:9B-1.11 Procedures for reclassifying specific segments for more restrictive uses

(a) The Department will entertain petitions, for reclassification of specific segments, pursuant to (e) below, or may decide to initiate reclassification proceedings on its own, at any time.

(b) The Department may entertain petitions for reclassification of specific segments, pursuant to (f) below, at any time.

(c) Documentation supporting the petition for reclassification for more restrictive use(s) shall be prepared by the petitioner for such reclassification, where one exists, or by the Department, where it decides to initiate such reclassification on its own.

(d) The Department shall issue public notice to all interested parties (including affected municipalities and dischargers) and shall hold public hearing(s) as part of any reclassification proceeding.

(e) A reclassification for more restrictive uses shall be made whenever:
1. It is demonstrated to the satisfaction of the Department that there are existing uses of the specific segment that are not included in the designated uses; or
2. Where a reclassification for less restrictive uses has been granted pursuant to N.J.A.C. 7:9B-1.10, the bases for the reclassification no longer exist; or

3. It is demonstrated to the satisfaction of the Department that any uses in Section 101(a)(2) of the Federal Clean Water Act, protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water, which are not included in the designated uses listed in this subchapter are attainable.

(f) A reclassification for more restrictive uses may be made when:

1. It is demonstrated to the satisfaction of the Department that the waters should be set aside to represent the natural aquatic environment and its associated biota; or
2. It is demonstrated to the satisfaction of the Department that a more restrictive use is necessary to protect a unique ecological system or threatened/endangered species.

(g) In those cases in which a thermal discharge is involved, the procedures for reclassifying segments for more restrictive uses shall be consistent with section 316 of the Federal Clean Water Act.

7:9B-1.12 Designated uses of FW1, PL, FW2, SE1, SE2, SE3, and SC waters

(a) In all FW1 waters the designated uses are:

1. Set aside for posterity to represent the natural aquatic environment and its associated biota;
2. Primary contact recreation;
3. Maintenance, migration and propagation of the natural and established aquatic biota; and
4. Any other reasonable uses.

(b) In all PL waters the designated uses are:

1. Cranberry bog water supply and other agricultural uses;
2. Maintenance, migration and propagation of the natural and established biota indigenous to this unique ecological system;
3. Public potable water supply after conventional filtration treatment (a series of processes including filtration, flocculation, coagulation, and sedimentation, resulting in substantial particulate removal but no consistent removal of chemical constituents) and disinfection;
4. Primary contact recreation; and
5. Any other reasonable uses.

(c) In all FW2 waters the designated uses are:

1. Maintenance, migration and propagation of the natural and established biota;
2. Primary contact recreation;
3. Industrial and agricultural water supply;
4. Public potable water supply after conventional filtration treatment (a series of processes including filtration, flocculation, coagulation, and sedimentation, resulting in substantial particulate removal but no consistent removal of chemical constituents) and disinfection; and
5. Any other reasonable uses.

(d) In all SE1 waters the designated uses are:
1. Shellfish harvesting in accordance with N.J.A.C. 7:12;
2. Maintenance, migration and propagation of the natural and established biota;
3. Primary contact recreation; and
4. Any other reasonable uses.

(e) In all SE2 waters the designated uses are:
1. Maintenance, migration and propagation of the natural and established biota;
2. Migration of diadromous fish;
3. Maintenance of wildlife;
4. Secondary contact recreation; and
5. Any other reasonable uses.

(f) In all SE3 waters the designated uses are:
1. Secondary contact recreation;
2 Maintenance and migration of fish populations;
3 Migration of diadromous fish;
4. Maintenance of wildlife; and
5. Any other reasonable uses.

(g) In all SC waters the designated uses are:
1. Shellfish harvesting in accordance with N.J.A.C. 7:12;
2. Primary contact recreation;
3. Maintenance, migration and propagation of the natural and established biota; and
4. Any other reasonable uses.

7:9B-1.13 Designated uses of mainstem Delaware River and Delaware Bay

(a) The designated uses for the mainstem Delaware River and Delaware Bay are those contained in the DRBC Water Quality Regulations.

(b) The designated uses for other waters under the jurisdiction of the DRBC are as set forth at N.J.A.C. 7:9B-1.12.

7:9B-1.14 Surface water quality criteria

(a) Surface water quality criteria for FW1 waters shall be maintained as to quality in their natural state.

(b) Surface water quality criteria for PL waters are as follows:
1. These waters shall be maintained as to quality in their existing state or that quality necessary to attain or protect the designated uses, whichever is more stringent.
   i. For Nitrate-Nitrogen a level of 2 mg/L shall be maintained in the surface waters unless it is shown that a lower level must be maintained to protect the existing surface water quality.

ii. A pH level between 3.5 and 5.5 shall be maintained unless it is demonstrated that a pH level outside of that range is necessary to protect the existing/ designated uses.

2. The water quality criteria for existing discharges are the water quality criteria contained in "Surface Water Quality Standards" as adopted in March 1981, except that:

i. The criteria for Nitrate-Nitrogen and pH promulgated in N.J.A.C. 7:9B-1.14(b)1 for PL waters apply instead of the 1981 criteria, and;

ii. The criteria for phosphorous, bacterial quality, and toxic substances promulgated in N.J.A.C. 7:9B-1.14(c) through (g) apply instead of the 1981 criteria, as though the freshwater portions of the PL waters were classified as FW2 and the saline portions were classified as SE1.

(c) Unless site-specific criteria are established at (g) below, State-wide criteria apply for FW2, SE, and SC waters as listed in accordance with (d) through (f) below.

(d) Surface Water Quality Criteria for FW2, SE and SC Waters:

7:9B-1.14(d) General Surface Water Quality Criteria for FW2, SE and SC Waters:
(Expressed as Maximum concentrations unless otherwise noted)

Substance	Criteria			Classifications
1. Bacterial quality (Counts/100 ml)	i.	Shellfish Harvesting: Bacterial Indicators shall not exceed, in all shellfish waters, the standard for approved shellfish waters as established by the National Shellfish Sanitation Program as set forth in its current manual of operations.		Shellfish Waters
	ii.	Primary Contact Recreation:		
		(1)	Enterococci levels shall not exceed a geometric mean of 35/100 ml, or a single sample maximum of 104/100 ml.	SE1 and SC
		(2)	E. Coli levels shall not exceed a geometric mean of 126/100 ml or a single sample maximum of 235/100 ml.	All FW2
	iii.	Secondary Contact Recreation:		
		(1)	Fecal coliform levels shall not exceed a geometric mean of 770/100 ml.	SE2
		(2)	Fecal coliform levels shall not exceed a geometric mean of 1500/100ml.	SE3
2. Dissolved oxygen (mg/L)	i.	Not less than 7.0 at any time;		FW2-TP
	ii.	24 hour average not less than 6.0. Not less than 5.0 at any time (see paragraph viii below);		FW2-TM
	iii.	24 hour average not less than 5.0, but not less than 4.0 at any time (see paragraph viii below);		FW2-NT (except as in iv below), SE1

7:9B-1.14(d) General Surface Water Quality Criteria for FW2, SE and SC Waters:
(Expressed as Maximum concentrations unless otherwise noted)

	Substance		Criteria	Classifications
		iv.	Not less than 4.0 at any time;	Tidal portions of FW2-NT tributaries to the Delaware River, between Rancocas Creek and Big Timber Creek inclusive.
		v.	Not less than 5.0 at any time;	SC
		vi.	Not less than 4.0 at any time;	SE2
		vii.	Not less than 3.0 at any time; and	SE3
		viii.	Supersaturated dissolved oxygen values shall be expressed as their corresponding 100 percent saturation values for purposes of calculating 24 hour averages.	FW2-TM, FW2-NT, SE1
3.	Floating, colloidal, color and settleable solids; petroleum hydrocarbons and other oils and grease	i.	None noticeable in the water or deposited along the shore or on the aquatic substrata in quantities detrimental to the natural biota. None which would render the waters unsuitable for the designated uses.	All Classifications
4.	Nutrients	i.	Except as due to natural conditions, nutrients shall not be allowed in concentrations that render the waters unsuitable for the existing or designated uses due to objectionable algal densities, nuisance aquatic vegetation, diurnal fluctuations in dissolved oxygen or pH indicative of excessive photosynthetic activity, detrimental changes to the composition of aquatic ecosystems, or other indicators of use impairment caused by nutrients.	All Classifications

7:9B-1.14(d) General Surface Water Quality Criteria for FW2, SE and SC Waters:
(Expressed as Maximum concentrations unless otherwise noted)

Substance	Criteria			Classifications
	ii.	Phosphorus (mg/L)		
		(1)	Non Tidal Streams: Concentrations of total P shall not exceed 0.1 in any stream, unless watershed-specific translators are established pursuant to N.J.A.C. 7:9B-1.5(g)2 or if the Department determines that concentrations do not render the waters unsuitable in accordance with (d)4i. above.	FW2
		(2)	Lakes: Concentrations of total P shall not exceed 0.05 in any lake, pond or reservoir, or in a tributary at the point where it enters such bodies of water, unless watershed-specific translators are developed pursuant to N.J.A.C. 7:9B-1.5(g)2 or if the Department determines that concentrations do not render the waters unsuitable in accordance with (d)4i. above.	FW2
5. pH (Standard Units)	i.	6.5-8.5		FW2 waters listed at 1.15(d), (f), (g) and (i), All SE
	ii.	4.5 – 7.5		FW2 waters listed at 1.15(c), (e) and (h)
	iii.	Natural pH conditions shall prevail.		SC

7:9B-1.14(d) General Surface Water Quality Criteria for FW2, SE and SC Waters:
(Expressed as Maximum concentrations unless otherwise noted)

	Substance		Criteria	Classifications
6.	Radioactivity	i.	Prevailing regulations including all amendments and future supplements thereto adopted by the U.S. Environmental Protection Agency pursuant to Sections 1412, 1445, and 1450 of the Public Health Services Act, as amended by the Safe Drinking Water Act (PL 93-523)	All Classifications
7.	Solids, Suspended (mg/L) (Non-filterable residue)	i.	25.0	FW2-TP, FW2-TM
		ii.	40.0	FW2-NT
		iii.	None of which would render the water unsuitable for the designated uses.	All SE, SC
8.	Solids, Total Dissolved (mg/L) (Filterable Residue)	i.	No increase in background which may adversely affect the survival, growth or propagation of the aquatic biota. Compliance with water quality-based WET limitations or $LC_{50} \geq 50$ percent, whichever is more stringent, shall be deemed to meet this requirement.	FW2
		ii.	No increase in background which would interfere with the designated or existing uses, or 500 mg/L, whichever is more stringent.	FW2
		iii.	None which would render the water unsuitable for the designated uses.	All SE
9.	Sulfate (mg/L)	i.	250	FW2

7:9B-1.14(d) General Surface Water Quality Criteria for FW2, SE and SC Waters:
(Expressed as Maximum concentrations unless otherwise noted)

	Substance		Criteria	Classifications
10.	Taste and odor producing substances	i.	None offensive to humans or which would produce offensive taste or odors in water supplies and biota used for human consumption. None which would render the water unsuitable for the designated uses.	All Classifications
11.	Temperature	i.	Temperatures shall not exceed a daily maximum of 22 degrees Celsius or rolling seven-day average of the daily maximum of 19 degrees Celsius, unless due to natural conditions	FW2-TP
		ii.	Temperatures shall not exceed a daily maximum of 25 degrees Celsius or rolling seven-day average of the daily maximum of 23 degrees Celsius, unless due to natural conditions	FW2-TM
		iii.	Temperatures shall not exceed a daily maximum of 31 degrees Celsius or rolling seven-day average of the daily maximum of 28 degrees Celsius, unless due to natural conditions	FW2-NT
		iv.	Temperatures shall not exceed 29.4 degrees Celsius Summer seasonal average	SE
		v.	Temperatures shall not exceed 26.7 degrees Celsius Summer seasonal average	SC
12.	Toxic Substances (general)	i.	None, either alone or in combination with other substances, in such concentrations as to affect humans or be detrimental to the natural aquatic biota, produce undesirable aquatic life, or which would render the waters unsuitable for the designated uses.	All Classifications

7:9B-1.14(d) General Surface Water Quality Criteria for FW2, SE and SC Waters:
(Expressed as Maximum concentrations unless otherwise noted)

	Substance		Criteria	Classifications
		ii.	None which would cause standards for drinking water to be exceeded after appropriate treatment.	FW2
		iii.	Toxic substances shall not be present in concentrations that cause acute or chronic toxicity to aquatic biota, or bioaccumulate within an organism to concentrations that exert a toxic effect on that organism or render it unfit for consumption.	All Classifications
		iv.	The concentrations of nonpersistent toxic substances in the State's waters shall not exceed one-twentieth (0.05) of the acute definitive LC_{50} or EC_{50} value, as determined by appropriate bioassays conducted in accordance with N.J.A.C. 7:18.	All Classifications
		v.	The concentration of persistent toxic substances in the State's waters shall not exceed one-hundredeth (0.01) of the acute definitive LC_{50} or EC_{50} value, as determined by appropriate bioassays conducted in accordance with N.J.A.C. 7:18.	All Classifications
13.	Turbidity (Nephelometric Turbidity Unit-NTU)	i.	Maximum 30-day average of 15 NTU, a maximum of 50 NTU at any time.	FW2, SE3
		ii.	Maximum 30-day average of 10 NTU, a maximum of 30 NTU at any time.	SE1, SE2
		iii.	Levels shall not exceed 10.0 NTU.	SC

(e) Surface Water Quality Criteria for Ammonia are derived in accordance with the formulas set forth below. Acute criteria are expressed as three-hour average using MA1CD10 flow and chronic criteria are expressed as 30-day average using MA30CD10 flow. No exceedance of criteria shall be permitted at or above the design flows specified.

	CAS Number		Criteria	Classification
Ammonia, un-ionized (mg NH_3-N/L)	7664-41-7	(1)	at pH < 8.30 $0.179*10^{0.026(Temp-20) + 0.41 (pH-7.80)}$(a) $0.046*10^{0.026(Temp-20) + 0.41 (pH-7.80)}$(c) at pH ≥ 8.30 $0.179*10^{0.026(Temp-20) + 0.20}$(a) $0.046*10^{0.026(Temp-20) + 0.20}$(c)	FW2-TP, FW2-TM
		(2)	at pH < 8.30 $0.201*10^{0.026(Temp-20) + 0.41 (pH-7.80)}$(a) (Summer[1]) $0.054*10^{0.026(Temp-20) + 0.41 (pH-7.80)}$(c) (Summer[1]) $0.232*10^{0.026(Temp-20) + 0.41 (pH-7.80)}$(a) (Winter[2]) $0.060*10^{0.026(Temp-20) + 0.41 (pH-7.80)}$(c) (Winter[2]) at pH ≥ 8.30 $0.201*10^{0.026(Temp-20) + 0.20}$(a) (Summer[1]) $0.054*10^{0.026(Temp-20) + 0.20}$(c) (Summer[1]) $0.232*10^{0.026(Temp-20) + 0.20}$(a) (Winter[2]) $0.060*10^{0.026(Temp-20) + 0.20}$(c) (Winter[2])	FW2-NT
		(3)	at pH < 8.30 $0.238*10^{0.026(Temp-20) + 0.41 (pH-7.80)}$(a) $0.061*10^{0.026(Temp-20) + 0.41 (pH-7.80)}$(c)	PL
		(4)	0.115(a); 0.030(c)	All SE
		(5)	0.094(a); 0.024(c)	SC

1 Summer spawning period from March 1st through October 31st.

2 Winter non-spawning period from November 1st through February 28/29th.

(a) Acute aquatic life protection criterion

(c) Chronic aquatic life protection criterion

(f) Surface Water Quality Criteria for Toxic Substances are as follows:

1. Acute aquatic life protection criteria are determined with no exceedance at or above the MA1CD10 flow and expressed as one-hour average except,
   i. for copper the criteria are expressed as 24-hour average, and
   ii. for cadmium, chromium, lead, mercury, nickel, silver, and zinc the criteria are expressed as 6-hour average.
2. Chronic aquatic life protection criteria are determined with no exceedance at or above the MA7CD10 flow and expressed as four-day average.
3. Freshwater aquatic criteria for cadmium, chromium III, copper, nickel, silver, and zinc are expressed as a function of water hardness. Criteria can be calculated at any hardness using these equations as listed below. Criteria thus calculated are multiplied by appropriate conversion factor (CF) to convert total recoverable metal into dissolved metal and by the default Water Effect Ratio (WER) of 1.0.

General formula $WER\ [e^{(V[\ln(\text{hardness})] + \ln A - V[\ln Z])}]\ CF$

where:

V = pooled slope
A = FAV at given hardness
Z = selected value of hardness

Cadmium:

Acute dissolved criterion $WER\ [e^{(1.0166\ (\ln [\text{hardness}])-3.924)}]\ 0.651$

Chronic dissolved criterion $WER\ [e^{(0.7409\ (\ln [\text{hardness}])-4.719)}]\ 0.651$

Chromium III:

Acute dissolved criterion $WER\ [e^{(0.819\ (\ln [\text{hardness}])+3.7256)}]\ 0.277$

Chronic dissolved criterion $WER\ [e^{(0.819\ (\ln [\text{hardness}])+0.6848)}]\ 0.277$

Copper:

Acute dissolved criterion $WER\ [e^{(0.9422\ (\ln [\text{hardness}])-1.7)}]\ 0.908$

Chronic dissolved criterion $WER\ [e^{(0.8545\ (\ln [\text{hardness}])-1.702)}]\ 0.908$

Nickel:

Acute dissolved criterion $WER\ [e^{(0.846\ (\ln [\text{hardness}])+2.255)}]\ 0.846$

Chronic dissolved criterion $WER\ [e^{(0.846\ (\ln [\text{hardness}])+0.0584)}]\ 0.846$

Silver:

Acute dissolved criterion	*WER* $[e^{(1.72\ (\ln\ [hardness])-6.59)}]\ 0.85$

Zinc:

Acute or dissolved criterion	*WER* $[e^{(0.8473\ (\ln\ [hardness])+0.884)}]\ 0.950$
Chronic dissolved criterion	*WER* $[e^{(0.8473\ (\ln\ [hardness])+0.884)}]\ 0.950$

4. Freshwater criteria for pentachlorophenol are expressed as a function of pH. Criteria are derived in accordance with the formula set forth below:
   Acute criterion $= e^{(1.005[pH]-4.869)}$
   Chronic criterion $= e^{(1.005[pH]-5.134)}$
5. Human health noncarcinogenic effect-based criteria are expressed as a 30-day average with no frequency of exceedance at or above the MA7CD10 flow.
6. Human health carcinogenic effect-based criteria are based on a risk level of one-in-one-million and are expressed as a 70-year average with no frequency of exceedance at or above the design flow as specified at N.J.A.C. 7:9B-1.5(c)2iii.

7. SURFACE WATER QUALITY CRITERIA FOR TOXIC SUBSTANCES:

(μg/L)

Toxic Substance	CAS Number	Fresh Water (FW2) Criteria			Saline Water (SE & SC) Criteria		
		Aquatic		HumanHealth	Aquatic		Human Health
		Acute	Chronic		Acute	Chronic	
Acenaphthene	83-32-9			670(h)			990(h)
Acrolein	107-02-8			6.1(h)			9.3(h)
Acrylonitrile	107-13-1			0.051(hc)			0.25(hc)
Aldrin	309-00-2	3.0		0.000049(hc)	1.3		0.000050(hc)
Ammonia, un-ionized	7664-41-7	See N.J.A.C. 7:9B-1.14(e)			See N.J.A.C. 7:9B-1.14(e)		
Anthracene	120-12-7			8,300(h)			40,000(h)
Antimony	7440-36-0			5.6(h)(T)			640(h)(T)
Arsenic	7440-38-2	340(d)(s)	150(d)(s)	0.017(hc)(T)	69(d)(s)	36(d)(s)	0.061(hc)(T)
Asbestos	1332-21-4			$7x10^6$fibers/L >10μm(h)			
Barium	7440-39-3			2,000(h)(T)			
Benz(a)anthracene	56-55-3			0.038(hc)			0.18(hc)
Benzene	71-43-2			0.15(hc)			3.3(hc)
Benzidine	92-87-5			0.000086(hc)			0.00020(hc)
3,4-Benzofluoranthene (Benzo(b)fluoranthene)	205-99-2			0.038(hc)			0.18(hc)
Benzo(k)fluoranthene	207-08-9			0.38(hc)			1.8(hc)
Benzo(a)pyrene (BaP)	50-32-8			0.0038(hc)			0.018(hc)
Beryllium	7440-41-7			6.0(h)(T)			42(h)(T)
alpha-BHC (alpha-HCH)	319-84-6			0.0026(hc)			0.0049(hc)
beta-BHC (beta-HCH)	319-85-7			0.0091(hc)			0.017(hc)
gamma-BHC (gamma-HCH/Lindane)	58-89-9	0.95		0.98(h)	0.16		1.8(h)
Bis(2-chloroethyl) ether	111-44-4			0.030(hc)			0.53(hc)
Bis(2-chloroisopropyl) ether	108-60-1			1,400(h)			65,000(h)
Bis(2-ethylhexyl) phthalate	117-81-7			1.2(hc)			2.2(hc)
Bromodichloromethane (Dichlorobromomethane)	75-27-4			0.55(hc)			17(hc)
Bromoform	75-25-2			4.3(hc)			140(hc)
Butyl benzyl phthalate	85-68-7			150(h)			190(h)
Cadmium	7440-43-9	(a)	(a)	3.4(h)(T)	40(d)(s)	8.8(d)(s)	16(h)(T)
Carbon tetrachloride	56-23-5			0.33(hc)			2.3(hc)
Chlordane	57-74-9	2.4	0.0043	0.00010(hc)	0.09	0.0040	0.00011(hc)

Toxic Substance	CAS Number	Fresh Water (FW2) Criteria			Saline Water (SE & SC) Criteria		
		Aquatic		Human Health	Aquatic		Human Health
		Acute	Chronic		Acute	Chronic	
Chloride	16887-00-6	860,000	230,000	250,000(ol)			
Chlorine Produced Oxidants (CPO)	7782-50-5	19	11		13	7.5	
Chlorobenzene	108-90-7			210(h)			2,500(h)
Chloroform	67-66-3			68(h)			2,100(h)
2-Chloronaphthalene	91-58-7			1,000(h)			1,600(h)
2-Chlorophenol	95-57-8			81(h)			150(h)
Chlorpyrifos	2921-88-2	0.083	0.041		0.011	0.0056	
Chromium	7440-47-3			92(h)(T)			750(h)(T)
Chromium^{+3}	16065-83-1	(a)	(a)				
Chromium^{+6}	18540-29-9	15(d)(s)	10(d)(s)		1,100(d)(s)	50(d)(s)	
Chrysene	218-01-9			3.8(hc)			18(hc)
Copper	7440-50-8	(a)	(a)	1,300(h)(T)	4.8(d)(s)	3.1(d)(s)	
Cyanide (Total)	57-12-5	22(fc)	5.2(fc)	140(h)	2.7(fc)	2.7(fc)	140(h)
4,4'-DDD (p,p'-TDE)	72-54-8			0.00031(hc)			0.00031(hc)
4,4'-DDE	72-55-9			0.00022(hc)			0.00022(hc)
4,4'-DDT	50-29-3	1.1	0.0010	0.00022(hc)	0.13	0.0010	0.00022(hc)
Demeton	8065-48-3		0.1			0.1	
Dibenz(a,h)anthracene	53-70-3			0.0038(hc)			0.018(hc)
Dibromochloromethane (Chlorodibromomethane)	124-48-1			0.40(hc)			13(hc)
Di-n-butyl phthalate	84-74-2			2,000(h)			4,500(h)
1,2-Dichlorobenzene	95-50-1			2,000(h)			6,200(h)
1,3-Dichlorobenzene	541-73-1			2,200(h)			8,300(h)
1,4-Dichlorobenzene	106-46-7			550(h)			2,200(h)
3,3'-Dichlorobenzidine	91-94-1			0.021(hc)			0.028(hc)
1,2-Dichloroethane	107-06-2			0.29(hc)			28(hc)
1,1-Dichloroethylene	75-35-4			4.7(h)			100(h)
trans-1,2-Dichloroethylene	156-60-5			590(h)			43,000(h)
2,4-Dichlorophenol	120-83-2			77(h)			290(h)
1,2-Dichloropropane	78-87-5			0.50(hc)			15(hc)
1,3-Dichloropropene (cis and trans)	542-75-6			0.34(hc)			21(hc)

Toxic Substance	CAS Number	Fresh Water (FW2) Criteria			Saline Water (SE & SC) Criteria		
		Aquatic		Human Health	Aquatic		Human Health
		Acute	Chronic		Acute	Chronic	
Dieldrin	60-57-1	0.24	0.056	0.000052(hc)	0.71	0.0019	0.000054(hc)
Diethyl phthalate	84-66-2			17,000(h)			44,000(h)
2,4-Dimethyl phenol	105-67-9			380(h)			850(h)
4,6-Dinitro-o-cresol	534-52-1			13(h)			280(h)
2,4-Dinitrophenol	51-28-5			69(h)			5,300(h)
2,4-Dinitrotoluene	121-14-2			0.11(hc)			3.4(hc)
1,2-Diphenylhydrazine	122-66-7			0.036(hc)			0.20(hc)
Endosulfans (alpha and beta)	115-29-7	0.22	0.056	62(h)	0.034	0.0087	89(h)
Endosulfan sulfate	1031-07-8			62(h)			89(h)
Endrin	72-20-8	0.086	0.036	0.059(h)	0.037	0.0023	0.060(h)
Endrin aldehyde	7421-93-4			0.059(h)			0.060(h)
Ethylbenzene	100-41-4			530(h)			2,100(h)
Fluoranthene	206-44-0			130(h)			140(h)
Fluorene	86-73-7			1,100(h)			5,300(h)
Guthion	86-50-0		0.01			0.01	
Heptachlor	76-44-8	0.52	0.0038	0.000079(hc)	0.053	0.0036	0.000079(hc)
Heptachlor epoxide	1024-57-3	0.52	0.0038	0.000039(hc)	0.053	0.0036	0.000039(hc)
Hexachlorobenzene	118-74-1			0.00028(hc)			0.00029(hc)
Hexachlorobutadiene	87-68-3			0.44(hc)			18(hc)
Hexachlorocyclopenta-diene	77-47-4			40(h)			1,100(h)
Hexachloroethane	67-72-1			1.4(hc)			3.3(hc)
Indeno(1,2,3-cd)pyrene	193-39-5			0.038(hc)			0.18(hc)
Isophorone	78-59-1			35(hc)			960(hc)
Lead	7439-92-1	38(d)(s)	5.4(d)(s)	5.0(h)(T)	210(d)(s)	24(d)(s)	
Malathion	121-75-5		0.1			0.1	
Manganese	7439-96-5						100(h)(T)
Mercury	7439-97-6	1.4(d)(s)	0.77(d)(s)	0.050(h)(T)	1.8(d)(s)	0.94(d)(s)	0.051(h)(T)
Methoxychlor	72-43-5		0.03	40(h)		0.03	
Methyl bromide (bromomethane)	74-83-9			47(h)			1,500(h)
Methyl t-butyl ether (MTBE)	1634-04-4			70(h)			

Toxic Substance	CAS Number	Fresh Water (FW2) Criteria			Saline Water (SE & SC) Criteria		
		Aquatic		Human Health	Aquatic		Human Health
		Acute	Chronic		Acute	Chronic	
Methylene chloride	75-09-2			2.5(hc)			310(hc)
Mirex	2385-85-5		0.001			0.001	
Nickel	7440-02-0	(a)	(a)	500(h)(T)	64(d)(s)	22(d)(s)	1,700(h)(T)
Nitrate (as N)	14797-55-8			10,000(h)			
Nitrobenzene	98-95-3			17(h)			690(h)
N-Nitrosodi-n-butylamine	924-16-3			0.0063(hc)			0.22(hc)
N-Nitrosodiethylamine	55-18-5			0.00023(hc)			0.13(hc)
N-Nitrosodimethylamine	62-75-9			0.00069(hc)			3.0(hc)
N-Nitrosodiphenylamine	86-30-6			3.3(hc)			6.0(hc)
N-Nitrosodi-n-propylamine (Di-n-propylnitrosamine)	621-64-7			0.0050(hc)			0.51(hc)
N-Nitrosopyrrolidine	930-55-2			0.016(hc)			34(hc)
Parathion	56-38-2	0.065	0.013				
Pentachlorobenzene	608-93-5			1.4(h)			1.5(h)
Pentachlorophenol	87-86-5	(b)	(b)	0.27(hc)	13	7.9	3.0(hc)
Phenol	108-95-2			10,000(h)			860,000(h)
Phosphorous (yellow)	7723-14-0					0.1	
Polychlorinated biphenyls (PCBs)	1336-36-3		0.014	0.000064(hc)		0.030	0.000064(hc)
Pyrene	129-00-0			830(h)			4,000(h)
Selenium	7782-49-2	20(s)	5.0(s)	170(h)(T)	290(d)(s)	71(d)(s)	4,200(h)(T)
Silver	7440-22-4	(a)		170(h)(T)	1.9(d)(s)		40,000(h)(T)
Sulfide-hydrogen sulfide (undissociated)	7783-06-4		2			2	
1,2,4,5-Tetrachlorobenzene	95-94-3			0.97(h)			1.1(h)
2,3,7,8-Tetrachlorodibenzo -p-dioxin (TCDD)	1746-01-6			0.0000000050(hc)			0.0000000051(hc)
1,1,2,2-Tetrachloroethane	79-34-5			4.7(h)			110(h)
Tetrachloroethylene	127-18-4			0.34(hc)			1.6(hc)
Thallium	7440-28-0			0.24(h)(T)			0.47(h)(T)
Toluene	108-88-3			1,300(h)			15,000(h)
Toxaphene	8001-35-2	0.73	0.0002	0.00028(hc)	0.21	0.0002	0.00028(hc)
1,2,4-Trichlorobenzene	120-82-1			21(h)			42(h)

Toxic Substance	CAS Number	Fresh Water (FW2) Criteria			Saline Water (SE & SC) Criteria		
		Aquatic		Human Health	Aquatic		Human Health
		Acute	Chronic		Acute	Chronic	
1,1,1-Trichloroethane	71-55-6			120(h)			2,600(h)
1,1,2-Trichloroethane	79-00-5			13(h)			350(h)
Trichloroethylene	79-01-6			1.0(hc)			12(hc)
2,4,5-Trichlorophenol	95-95-4			1,800(h)			3,600(h)
2,4,6-Trichlorophenol	88-06-2			0.58(hc)			1.0(hc)
Vinyl chloride	75-01-4			0.082(hc)			8.1(hc)
Zinc	7440-66-6	(a)	(a)	7,400(h)(T)	90(d)(s)	81(d)(s)	26,000(h)(T)

(a) Criteria as listed at (f)3 above as formula

(b) Criteria as listed at (f)4 above as formula

(d) Criterion is expressed as a function of the Water Effect Ratio (WER). For criterion in the table, WER equates to the default value of 1.0.

(fc) Criteria expressed as free cyanide (as CN)/L

(h) Human health noncarcinogen

(hc) Human health carcinogen

(ol) Organoleptic effect-based criterion with no frequency of exceedance at or above the MA7CD10 flow

(s) Dissolved criterion

(T) Total recoverable criterion

(g) Site-specific surface water quality criteria listed below apply to specific waterbodies that supersede the State-wide criteria listed at (d) through (f) above. Any site-specific criterion developed through a Total Maximum Daily Load (TMDL) adopted as an amendment to the Statewide Water Quality Management Plan or the applicable Areawide Water Quality Management Plan in accordance with N.J.A.C. 7:15-6.4 shall be incorporated into this section. The Department shall publish a notice of administrative change in the New Jersey Register.

Toxic Substance	CAS Number	Freshwater Criteria			Saline water Criteria			Waterbodies
		Aquatic		Human Health	Aquatic		Human Health	
		Acute	Chronic		Acute	Chronic		
Copper (μg/L dissolved)	7440508				7.9	5.6		Newark Bay, Raritan Bay, Arthur Kill, Kill Van Kull, saline portions of the Passaic, Hackensack, and Hudson Rivers and saline portions of tributaries to all of these waters.

(h) Surface water quality criteria for waters under the jurisdiction of the DRBC:

1. Mainstem Delaware River and Delaware Bay:
   i. For parameters with criteria in the DRBC Water Quality Regulations, the criteria contained therein are the applicable criteria.
   ii. For parameters without criteria in the DRBC Water Quality Regulations, the criteria at (c) above are the applicable criteria and shall be applied as follows:
      (1) Criteria applicable to FW2-NT waters apply where salinities are less than or equal to 3.5 parts per thousand (ppt) at mean high tide;
      (2) Criteria applicable to SE waters apply where salinities are greater than 3.5 ppt at mean high tide; and
      (3) Where salinities vary from 3.5 ppt or less, to greater than 3.5 ppt, at mean high tide, the more stringent of the FW2-NT or SE criteria apply.
2. Tributaries to the mainstem Delaware River and Delaware Bay:
   i. The applicable criteria are those contained in the DRBC Water Quality Regulations; or
   ii. The criteria at (c) above, whichever are more stringent.
3. For all waters under the jurisdiction of the DRBC where criteria are not established in the DRBC Water Quality Regulations, or at (c) above, the Department shall use criteria based upon the best available scientific information, in accordance with (h)1ii above and N.J.A.C. 7:9B-1.5(c)5, to establish water quality-based effluent limitations.

7:9B-1.15 Surface water classifications for the waters of the State of New Jersey

(a) This section contains the surface water classifications for the waters of the State of New Jersey. Surface water classifications are presented in tabular form. Subsections (c) through (i) contain surface water classifications by major drainage basin. Subsection (j) lists FW1 waters by tract within basins and subsection (k) identifies the Outstanding National Resource Waters of the State. Interstate waters of the mainstem Delaware River are under the jurisdiction of the DRBC and the designations are contained in the DRBC Water Quality Regulations.

(b) The following are instructions for the use of N.J.A.C. 7:9B-1.15(c) through (j) respectively:
1. The surface water classification subsections give the surface water classifications and antidegradation designations for waters of the State.
2. Within each basin the waters are listed alphabetically and segment descriptions begin at the headwaters and proceed downstream.
3. To find a stream:
   i. Determine which major drainage basin the stream is in;
   ii. Look for the name of the stream in the appropriate table and find the classification;
   iii. For unnamed or unlisted streams, find the stream or other waterbody that the stream of interest flows into and look for the classification of that stream or

waterbody. The classification of the stream of interest may then be determined by referring to (b)5 below. If the second stream or waterbody is also unlisted, repeat the process until a listed stream or waterbody is found. Use (b)5iv below to classify streams entering unlisted lakes.

4. To find a lake or other non-stream waterbody:
   i. Determine which major drainage basin the waterbody is in;
   ii. Look for the waterbody name in the appropriate table;
   iii. If the waterbody is not listed, use (b)5ii, 5iii, 5vi, and 5vii below to determine the appropriate classification.
5. To find waterways or waterbodies not listed at N.J.A.C. 7:9B-1.15(c) through (i), use the following instructions:
   i. Unnamed or unlisted freshwater streams that flow into streams classified as FW2-TP, FW2-TM, or FW2-NT take the classification of the classified stream they enter, unless the unlisted stream is a PL water which is covered in (b)5vii below. If the stream could be a C1 water, see (b)5vi below.
   ii. All freshwater lakes, ponds and reservoirs that are five or more acres in surface area, that are not located entirely within the Pinelands Area boundaries (see (b)5vii below) and that are not specifically listed as FW2-TP or FW2-TM are classified as FW2-NT. This includes lakes, ponds and reservoirs on segments of streams which are classified as FW2-TM or FW2-TP such as Saxton Lake on the Musconetcong River. If the waterbody could be a C1 water, also check (b)5vi below.
   iii. All freshwater lakes, ponds and reservoirs, that are less than five acres in surface area, upstream of and contiguous with FW2-TP or FW2-TM streams, and which are not located entirely within the Pinelands Area boundaries (see(b)5vii below) are classified as FW2-TM. All other freshwater lakes, ponds and reservoirs that are not otherwise classified in this subsection or the following tables are classified as FW2-NT. If the waterbody could be a C1 water, also check (b)5vi below.
   iv. Unnamed or unlisted streams that enter FW2 lakes, ponds and reservoirs take the classification of either the listed tributary stream flowing into the lake with the highest classification or the listed tributary stream leaving the lake with the highest classification, whichever has the highest classification, or, if there are no listed tributary or outlet streams to the lake, the first listed stream downstream of the lake. If the stream is located within the boundaries of the Pinelands Area, see (b)5.vii. below; if it could be a C1 water, also see (b)5vi below.
   v. Unlisted saline waterways and waterbodies are classified as SE1 in the Atlantic Coastal Basin. Unlisted saline waterways which enter SE2 or SE3 waters in the Passaic, Hackensack and New York Harbor Complex basin are classified as SE2 unless otherwise classified in (f) below. Freshwater portions of unlisted streams entering SE1, SE2, or SE3 waters are classified as FW2-NT. This only applies to waters that are not PL waters (see (b)5vii below). If the waterbody or waterway could be a C1 water, also see (b)5vi below.

vi. All waterbodies that have been designated by the Department as Category One are specifically listed in 1.15(c) through (i).

vii. All waterways or waterbodies, or portions of waterways or waterbodies, that are located within the boundaries of the Pinelands Area established at N.J.S.A. 13:18A-11a are classified as PL unless they are listed as FW1 waters in (j) below. A tributary entering a PL stream is classified as PL only for those portions of the tributary that are within the Pinelands Area. Lakes are classified as PL only if they are located entirely within the Pinelands Area.

6. The following 10 classifications are used for the sole purpose of identifying the water quality classification of the waters listed in the tables in (c) through (j) below:

i. "FW1" means those fresh waters, as designated in N.J.A.C. 7:9B-1.15(j), and as defined at N.J.A.C. 7:9B-1.4.

ii. "FW2-TP" means FW2 trout production.

iii. "FW2-TM" means FW2 trout maintenance.

iv. "FW2-NT" means FW2 non trout.

v. "PL" means Pinelands Waters.

vi. "SE1" means saline estuarine waters whose designated uses are listed in N.J.A.C. 7:9B-1.12(d).

vii. "SE2" means saline estuarine waters whose designated uses are listed in N.J.A.C. 7:9B-1.12(e).

viii. "SE3" means saline estuarine waters whose designated uses are listed in N.J.A.C. 7:9B-1.12(f).

ix. "SC" means the general surface water classification applied to saline coastal waters.

x. FW2-NT/SE1 (or a similar designation that combines two classifications) means a waterway in which there may be a salt water/fresh water interface. The exact point of demarcation between the fresh and saline waters must be determined by salinity measurements and is that point where the salinity reaches 3.5 parts per thousand at mean high tide. The stream is classified as FW2-NT in the fresh portions (salinity less than or equal to 3.5 parts per thousand at mean high tide) and SE1 in the saline portions.

7. The following water quality designations are used in (c) through (i), respectively, below:

i. "(C1)" means Category One waters;

ii. "(tp)" indicates trout production in waters which are classified as FW1. This is for information only and does not affect the water quality criteria for those waters;

iii. "(tm)" indicates trout maintenance in waters which are classified as PL or FW1. For FW1 waters this is for information only and does not affect the water quality criteria for those waters.

(c) The following surface water classifications are for waters of the Atlantic Coastal Basin:

Waterbody	Classification
ABRAMS CREEK	
(Marmora) - Entire length, except portion outside the boundaries of the MacNamara Wildlife Management Area	FW2-NT/SE1(C1)
(Griscom) - Portions of the Creek and tributaries outside of the MacNamara Wildlife Management Area	FW2-NT/SE1
ABSECON BAY (Absecon) - All waters within Absecon Wildlife Management Area	SE1(C1)
ABSECON CREEK	
(Egg Harbor) - North and South Branches from their origins downstream to the boundary of the Pinelands Protection and Preservation Area	PL
(Absecon) – Boundary of the Pinelands Protection and Preservation Area to Mill Road Dam	FW2-NT
(Absecon) - Mill Road Dam to Absecon Bay, except portions within Absecon Wildlife Management Area	SE1
ARNOLD POND (Barnegat)	FW2-NT/SE1(C1)
ATLANTIC OCEAN	
(Offshore) - Waters from the shoreline out to the three mile limit, except areas described below	SC
(Beach Haven) - Waters of the Atlantic Ocean out to the State's three mile limit from Beach Haven Inlet to Cape May Point, excluding waters classified as Prohibited in accordance with N.J.A.C. 7:12	SC(C1)
TRIBUTARIES, ATLANTIC OCEAN	
(New Jersey Coast) - All those streams or segments of streams that flow directly into the Atlantic Ocean or into back bays of the Ocean which are not included elsewhere in this list, are not within the boundaries of the Pinelands Protection or Preservation Areas and are not mapped as C1 waters by the Department	FW2-NT/SE1
(Pinelands) - All streams or segments of streams which flow directly into the Atlantic Ocean or into back bays of the Ocean, are within the boundaries of the Pinelands Protection and Preservation Areas and are not classified as FW1 in this Table	PL
(New Jersey Coast) - All streams or segments of streams which flow directly into the Atlantic Ocean or into back bays of the Ocean, are mapped as C1 waters	

by the Department, are not trout maintenance waters, and are not classified as FW1 in this Table	FW2-NT/SE1(C1)
BABCOCK CREEK (Marmora) - Entire length	FW2-NT/SE1(C1)
BALLANGER CREEK	
(New Gretna) - Source to Pollys Ditch	FW2-NT/SE1
(New Gretna) - Pollys Ditch to Bay	SE1(C1)
BANKS CREEK (Marmora) - Entire length	SE1(C1)
BARNEGAT BAY	
(Barnegat National Wildlife Refuge) - All waters within the boundaries of the Barnegat National Wildlife Refuge	SE1(C1)
(Barnegat Bay) - All waters of the Bay	SE1(C1)
(Island Beach State Park) - All freshwater ponds within the boundaries of Island Beach State Park	FW1
(Island Beach State Park) - All waters in the Park, not classified as FW1 above	FW2-NT/SE1(C1)
BARNEGAT BAY TRIBUTARIES - See ATLANTIC OCEAN, TRIBUTARIES	
BASS RIVER	
(Oswego Lake) - Source to Pineland Protection and Preservation Area boundary at the Garden State Parkway, except those branches described separately below	PL
(New Gretna) - Pineland Protection and Preservation Area boundary to the boundary of shellfish waters	FW2-NT/SE1
(New Gretna) - Boundary of shellfish waters to Mullica River	SE1(C1)
(Bass River State Forest) - Tommy's Branch from its headwaters to the Bass River State Forest Recreation Area service road	FW1
(Bass River State Forest) - Falkenburg Branch of Lake Absegami from its headwaters to the Lake	FW1
BATSTO RIVER	
(Browns Mills) - Entire length, except waters described separately below	PL
(Wharton) - Skit Branch and tributaries from their headwaters to the confluence with Robert's Branch	FW1
(Wharton) - The easterly branches of the Batsto River from Batsto Village upstream to the confluence with Skits Branch	FW1
BEACH THOROFARE (Margate) - Entire length	SE1(C1)
BEAR SWAMP BROOK	
(Howell)- Entire Length	FW2-NT(C1)
BIG ELDER CREEK	
(Sea Isle City) - Segment within the boundaries of Marmora Wildlife Management Area	SE1(C1)

(Sea Isle City) - Segment outside the boundaries of Marmora Wildlife Management Area	SE1
BIG GRAVELING CREEK (Great Bay) - Entire length	SE1(C1)
BIG GREAVES CREEK	
(MacNamara) - Segment of the Creek outside the boundaries of MacNamara Wildlife Management Area	SE1
(MacNamara) - Creek and tributaries within the boundaries of MacNamara Wildlife Management Area	SE1(C1)
BIG THOROFARE	
(Tuckerton) - Source to boundary of Great Bay Blvd. Wildlife Management Area	SE1
(Tuckerton) - Segment within the boundaries of Great Bay Blvd. Wildlife Management Area	SE1(C1)
BLUEFISH BROTHERS (Stone Harbor) - Entire length	SE1(C1)
BLUEFISH CREEK (Stone Harbor) - Entire length	SE1(C1)
BOG BRANCH CREEK (Middletown) - Entire length, except portions within the Pinelands Protection and Preservation Area	SE1(C1)
(Middletown) - Portions within the Pinelands Protection and Preservation Area	PL
BRIGANTINE (Edwin B. Forsythe National Wildlife Refuge) - All waters within the boundaries of the Edwin B. Forsythe National Wildlife Refuge, except portions of Cedar Creek and Cedar Run	FW2-NT/SE1(C1)
BRISBANE LAKE	
(Allaire State Park) - The Lake and its tributaries	FW2-NT(C1)
BROAD CREEK (New Gretna) - Entire length	SE1(C1)
BROAD THOROFARE	
(Longport) - South of Rt. 152	SE1
(Longport) - North of Rt. 152	SE1(C1)
BROTHERS CREEK (Burleigh) - Entire length	SE1(C1)
CABBAGE THOROFARE (Great Bay) - Entire length	SE1(C1)
CEDAR BRIDGE BRANCH (Lakewood) - Entire length	FW2-NT
CEDAR CREEK	
(Manahawkin) - Source to boundaries of the Manahawkin Wildlife Management Area	FW2-NT/SE1
(Manahawkin) - Creek and tributaries within the boundaries of the Manahawkin Wildlife Management Area	FW2-NT/SE1(C1)
CEDAR CREEK	
(Cedar Crest) - Source to the boundaries of the Pinelands Protection and Preservation Area at the Garden State Parkway, except branches described separately below	PL

(Berkeley) - Garden State Parkway to US Highway 9, except portions within Edwin B. Forsythe National Wildlife Refuge	FW2-NT
(Berkeley) – Portions within Edwin B. Forsythe National Wildlife Refuge	FW2-NT(C1)
(Berkeley) - US Highway 9 to Barnegat Bay, except portions within Edwin B. Forsythe National Wildlife Refuge	FW2-NT/SE1
(Greenwood Forest) - Webbs Mill Branch and tributaries located entirely within the boundaries of Greenwood Forest Wildlife Management Area	FW1
(Greenwood Forest) - Chamberlain's Branch from its origins to a point 1000 feet west of Route 539	FW1
(Greenwood Forest) - Those portions of the tributaries to Chamberlain's Branch originating and wholly contained within the boundaries of the Greenwood Forest Wildlife Management Area	FW1
CEDAR HAMMOCKS CREEK (English Creek Landing) - Entire length	SE1(C1)
CEDAR RUN	
(Stafford) - Source to the boundaries of the Pinelands Protection and Preservation Area at the Garden State Parkway	PL
(Cedar Run) - Garden State Parkway to US Highway 9, except portions within Edwin B. Forsythe National Wildlife Refuge	FW2-NT
(Cedar Run) – portions within Edwin B. Forsythe National Wildlife Refuge upstream of US Highway 9	FW2-NT(C1)
(Cedar Run) - US Highway 9 to the boundaries of the Barnegat National Wildlife Refuge, except portions within Edwin B. Forsythe National Wildlife Refuge	FW2-NT/SE1
(Cedar Run) – portions within Edwin B. Forsythe National Wildlife Refuge downstream of US Highway 9	FW2-NT/SE1(C1)
(Barnegat) - National Wildlife Refuge boundaries to Barnegat Bay	FW2-NT/SE1(C1)
CEDAR SWAMP CREEK	
(Cedar Spring) - Entire length, except segment described separately below	FW2-NT/SE1
(Marmora) - Creek and tributaries within the boundaries of the MacNamara Wildlife Management Area	FW2-NT/SE1(C1)
CHAMBERLAIN BRANCH - See CEDAR CREEK	
CHANNEL CREEK (Barnegat Bay) - Entire length	SE1(C1)
CHARLEY CREEK (Marmora) - Entire length	FW2-NT/SE1(C1)
CLEAR STREAM (JACKSON) - Entire length	FW2-TM(C1)
COLLINS TIDE PONDS (Barnegat)	FW2-NT/SE1(C1)
COMMANDO CREEK (Marmora) - Entire length	SE1(C1)

CRANBERRY BROOK (Monmouth) - Entire length	FW2-NT/SE1
DAVENPORT BROOK	
(Berkeley) - Source to the boundaries of the Pinelands Protection and Preservation Area at the Penn Central railroad tracks	PL
(Toms River) - Railroad tracks to confluence with Wrangel Brook	FW2-NT
DEEP CREEK (Herbertsville) - Entire length	FW2-NT
DEEP RUN (Wharton) - Run and tributaries from their sources to Springer's Brook	FW1
DICKS BROOK (Larrabee's Crossing) - Entire length	FW2-NT(C1)
DINNER POINT CREEK (Staffordsville) - Entire length	SE1(C1)
DOCK THOROFARE (Northfield) - Entire length	SE1(C1)
DOUGHTY RESERVOIR (Atlantic city)	FW2-NT(C1)
DOVE MILL BRANCH - See TOMS RIVER	
EDWARD CREEK	
(Ocean City) - Source to the boundary of Marmora Wildlife Management Area	SE1
(Ocean City) - Boundary of Marmora Wildlife Management Area to Horn Creek	SE1(C1)
FALKENBURG BRANCH - See BASS RIVER	
FLAT CREEK (Marmora) - Entire length	FW2-NT/SE1(C1)
FLATTERAS CREEK (Beach Haven Heights) - Entire length	SE1(C1)
FORKED RIVER	
(Lacey) - River and branches from their sources to the boundaries of the Pinelands Protection and Preservation Area at the Garden State Parkway	PL
(Forked River) - Garden State Parkway to Barnegat Bay	FW2-NT/SE1
FORTESCUE (Fortescue) - All waters within the Fortescue Wildlife Management Area	FW2-NT/SE1(C1)
GIBSON CREEK	
(Gibson Landing) - Entire length, except segment described below	PL
(Marmora) - Segment and tributaries within the MacNamara Wildlife Management Area	FW2-NT/SE1(C1)
GLENDOLA RESERVOIR (Glendola)	FW2-NT(C1)
GO THROUGH CREEK	
(Burleigh) - Entire length, except segment described below	SE1
(Burleigh) - Segment within the boundaries of the Marmora Wildlife Management Area	SE1(C1)
GOING THROUGH CREEK (English Creek Landing)	SE1(C1)
GREAT BAY (Brigantine) - All waters of the Bay and all natural waterways which are tributary to the Bay and all waters, including both natural and manmade channels and ponds within the boundaries of the	

Edwin B. Forsythe National Wildlife Refuge and the Great Bay Wildlife Management Area	FW2-NT/SE1(C1)
GREAT EGG HARBOR RIVER	
(Berlin) - Source to confluence with Tinker Branch	FW2-NT
(Berlin) - Tinker Branch, the River from its confluence with Tinker Branch, and all tributaries within the Pinelands Protection and Preservation Area, downstream to the boundary at the Rt. 40 bridge in Mays Landing	PL
(Winslow) - All tributaries or segments of tributaries outside of the boundaries of the Pinelands Protection and Preservation Area, downstream to Rt. 40 at Mays Landing	FW2-NT
(Mays Landing) - Rt. 40 bridge to Great Egg Harbor, except those tributaries described separately below	SE1
(Mays Landing) - All tributaries or segments of tributaries within the boundaries of the Pinelands Protection and Preservation Areas	PL
(Egg Harbor) - Tributaries and all other waters within MacNamara Wildlife Management Area, except tributary described below	FW2-NT/SE1(C1)
(Tuckahoe) - Hawkins Creek and the stream adjacent to and north of Hawkin's Creek, and their tributaries, from their origins to the point where the influence of impoundment begins	FW1
GREAT SOUND (Avalon) - All waters within Great Sound State Park	SE1(C1)
GREAT THOROFARE	
(Ventnor) - West of Rt. 40	SE1(C1)
(Ventnor) - East of Rt. 40	SE1
GRISCOM CREEK (Gibson Landing) - Entire length	FW2-NT/SE1(C1)
GUNNING RIVER	
(Barnegat) - Entire length, except segment described below	FW2-NT/SE1
(Barnegat) - Stream and tributaries within the boundaries of Barnegat National Wildlife Refuge	FW2-NT/SE1(C1)
HALFWAY CREEK	
(Middletown) - Source to the boundary of the MacNamara Wildlife Management Area	FW2-NT/SE1
(MacNamara) - Creek and tributaries within the boundaries of the MacNamara Wildlife Management Area	SE1(C1)
HARRY POND (Barnegat)	FW2-NT/SE1(C1)
HATFIELD CREEK (Beach Haven Heights) - Entire length	SE1(C1)
HAWKINS CREEK	
(Tuckahoe) - Source to the point where the influence of impoundment begins	FW1

(Tuckahoe) - Downstream of the influence of impoundment	SE1(C1)
HAY STACK BROOK (Howell) - Entire length	FW2-NT(C1)
HOSPITALITY CREEK (Longport) - Entire length	SE1(C1)
JACOVY CREEK (Stone Harbor) - Entire length	SE1(C1)
JAKES BRANCH	
(Berkeley) - Source to the boundaries of the Pinelands Protection and Preservation Area at the Garden State Parkway	PL
(Beachwood) - Garden State Parkway to Toms River	FW2-NT/SE1
JAY CREEK	SE1(C1)
JIMMIES CREEK	
(Great Bay) - Source to the boundary of Great Bay Wildlife Management Area	SE1(C1)
(Parkers Landing) - Segments of the Creek outside the boundaries of Great Bay Wildlife Management Area	SE1
JOSH CREEK (Stone Harbor) - Entire length	SE1(C1)
JUDIES CREEK	
(Great Bay) - Source to widening of creek	SE1
(Great Bay) - Widening of creek to mouth	SE1(C1)
JUMPING BROOK (Neptune) - Entire length	FW2-NT/SE1
KNOLL POND (Barnegat)	FW2-NT/SE1(C1)
LAKES BAY (Ventnor)	SE1(C1)
LAKES CHANNEL (Ventnor) - Entire length	SE1(C1)
LITTLE GREAVES CREEK (MacNamara) - Entire length	SE1(C1)
LITTLE SCOTCH BONNET	
(Stone Harbor) - Entire length, except segment described below	SE1
(Stone Harbor) - Segment within the boundaries of Marmora Wildlife Management Area	SE1(C1)
LITTLE THOROFARE (Tuckerton) - Entire length	SE1(C1)
LONG BROOK (JACKSON) - Entire length	PL
LONG POINT CREEK (Marmora) - Entire length	FW2-NT/SE1(C1)
LONG SWAMP BROOK	
(Squankum) - Entire length	FW2-NT(C1)
LOWER LONG REACH (Stone Harbor) - Entire length	SE1(C1)
LUDLAM CREEK (Marmora) - Entire length	SE1(C1)
MAIN MARSH CREEK (Brigantine) - Entire length	SE1(C1)
MANAHAWKIN CREEK	
(Manahawkin) - Source to the boundaries of Manahawkin Wildlife Management Area	FW2-NT/SE1
(Manahawkin) - Within the boundaries of the Wildlife Management Area	FW2-NT/SE1(C1)
MANASQUAN RESERVOIR (Oak Glen)	FW2-NT(C1)
TRIBUTARIES	

(Oak Glen) -All tributaries upstream of Manasquan Reservoir from source to the Reservoir	FW2-NT(C1)
MANASQUAN RIVER	
MAIN STEM	
(Freehold) - Source to Rt. 9 bridge, except tributaries described separately under Tributaries, below	FW2-NT
(Howell) - Rt. 9 bridge to the West Farms Road Bridge in Howell Township, except tributaries described separately under Tributaries, below	FW2-TM
(Howell) - West Farms Road Bridge in Howell Township to the downstream boundary of Manasquan River Wildlife Management Area, except tributaries described separately	FW2-TM(C1)
(Brick) - Downstream boundary of Manasquan River Wildlife Management Area to surf waters	SE1
TRIBUTARIES, MANASQUAN RIVER	
(Adelphia) - Entire length	FW2-NT
(Allaire) - Those portions of the first and second southerly tributaries west of the Hospital Rd. which are located entirely within the boundaries of Allaire State Park	FW1(tm)
(Mill Run) - Entire length of Mill Run, including Brisbane Lake and its tributaries, except easterly tributary to Mill Run described as FW1 below	FW2-NT(C1)
(Allaire State Park) - The easterly tributary to Mill Run upstream of Brisbane Lake, located entirely within the Allaire State Park boundaries	FW1
(Freehold) - Tributaries within the boundaries of Turkey Swamp Wildlife Management Area	FW2-NT(C1)
MARMORA WILDLIFE MANAGEMENT AREA	
(Strathmere) - All waters within the boundaries of Marmora Wildlife Management Area	FW2-NT/SE1(C1)
MARSH BOG BROOK	
(Farmingdale) - Entire length	FW2-NT(C1)
MASONS CREEK (Marmora) - Entire length	SE1(C1)
MCNEALS BRANCH - See TUCKAHOE RIVER	
METEDECONK RIVER	
SOUTH BRANCH	
(Lakewood) - Entire length, including all tributaries	FW2-NT(C1)
NORTH BRANCH METEDECONK RIVER	
(Freehold) - Source to Aldrich Rd., including all tributaries	FW2-NT(C1)
(Lakewood) - Aldrich Rd. to Lanes Mills, except Haystack Brook listed separately	FW2-TM(C1)
(Brick) - Lanes Mills to confluence with Metedeconk River, South Branch, including the westerly tributary	FW2-NT(C1)

MAIN STEM METEDECONK RIVER	
(Brick) - Confluence of North and South branches to Forge Pond	FW2-NT(C1)
(Brick) - Forge Pond to Barnegat Bay	FW2-NT/SE1
MIDDLE RIVER	
(Tuckahoe) - Entire length, except the segment described below	FW2-NT/SE1
(Middletown) - Segment within the boundaries of MacNamara Wildlife Management Area	FW2-NT/SE1(C1)
MILE THOROFARE (Brigantine) - Entire length	SE1(C1)
MILL RUN (Allaire) - See BRISBANE LAKE	
MINGAMAHONE BROOK	
MAINSTEM	
(Farmingdale) - Entire length, except East Branch described separately below	FW2-TM(C1)
EAST BRANCH	
(Farmingdale) - Source to confluence with mainstem north of Farmingdale	FW2-NT(C1)
MIREY RUN	
(MacNamara) – Entire length, outside the boundaries of Pinelands Protection and Preservation Area	FW2-NT/SE1(C1)
(MacNamara) – Portion of the Run within the boundaries of the Pinelands Protection and Preservation Area	PL
MIRY RUN	
(Thelma) – Source to boundaries of the Pinelands Protection and Preservation Area	PL
(Catowba) – Boundaries of the Pinelands Protection and Preservation Area to Thelma Ave.	FW2-NT
(Catowba) – Thelma Ave. to Great Egg Harbor River	FW2-NT/SE1
MOTT CREEK (Brigantine) - Entire length	SE1(C1)
MUD CREEK (MacNamara) - Entire length	SE1(C1)
MUDDY FORD BROOK (Larrabee's Crossing) - Entire length	FW2-TM(C1)
MULBERRY THOROFARE (Northfield) - Entire length	SE1(C1)
MULLICA RIVER	
(Berlin) - Source to Pinelands Protection and Preservation Area boundaries at the Garden State Parkway, except branches and tributaries described below	PL
(Wharton) - Stream in the southeasterly corner of the Wharton State Forest located between Ridge Rd. and Seaf Weeks Rd., downstream to the boundaries of the Wharton State Forest	FW1
(Wharton) - Gun Branch from its headwaters to US Rt. 206	FW1
(New Gretna) - River and tributaries from the Pinelands Protection and Preservation Area boundary to Great Bay	SE1(C1)

(Wharton) - Brooks and tributaries between and immediately to the west of Tylertown and Crowleytown, from their headwaters to the head of tide at mean high water	FW1
NARROWS CREEK (Middletown) - Entire length	SE1(C1)
NORTH CHANNEL POND (Stone Harbor)	FW2-NT/SE1(C1)
OLDMAN CREEK (Stone Harbor) - Entire length	SE1(C1)
OTTER CREEK (Middletown) - Entire length	SE1(C1)
OYSTER CREEK	
(Brookville) - Source to the boundaries of the Pinelands Protection and Preservation Area at the Garden State Parkway	PL
(Forked River) - Garden State Parkway to Barnegat Bay	FW2-NT/SE1
OYSTER CREEK (Great Bay) - Entire length	SE1(C1)
REEVY BRANCH - See SHARK RIVER	
RING ISLAND CREEK (Stone Harbor) - Entire length	SE1(C1)
RISLEY CHANNEL (Margate) - Entire length	SE1(C1)
ROUNDABOUT CREEK (New Gretna) - Entire length	SE1(C1)
SALT CREEK (Stone Harbor) - Entire length	SE1(C1)
SCULL BAY (Linwood)	SE1(C1)
SEDGE CREEK (MacNamara) - Entire length	SE1(C1)
SHARK CREEK (Stone Harbor) - Entire length	SE1(C1)
SHARK RIVER (See also SHARK RIVER BROOK)	
(Glendola) - Remsen Mill Road to Atlantic Ocean	SE1
SHARK RIVER BROOK (See also SHARK RIVER)	
(Colts Neck) - Source to Rt. 33	FW2-NT(C1)
(Neptune) - Rt. 33 to Remsen Mill Road, including all unnamed tributaries	FW2-TM(C1)
TRIBUTARIES	
REEVY BRANCH (Reevytown) - Source to confluence with Shark River Brook	FW2-NT(C1)
ROBINS SWAMP BROOK (Neptune) - Source to confluence with Shark River Brook	FW2-TM(C1)
SARAH GREEN BROOK (Neptune) - Source to confluence with Shark River Brook	FW2-TM(C1)
SOUTH BROOK (Wall) - Source to confluence with Shark River Brook	FW2-TM(C1)
WEBLYS BROOK (Wall) - Source to confluence with Shark River Brook	FW2-NT(C1)
SHELL THOROFARE (Wildwood Gables) - Entire length	SE1(C1)
SHELTER ISLAND BAY (Margate)	SE1(C1)
SHELTER ISLAND WATERS (Margate) - Entire length	SE1(C1)
SKIT BRANCH - See BATSTO RIVER	
SOD THOROFARE (Linwood) - Entire length	SE1(C1)
SOUTHEAST CREEK (Stone Harbor) - Entire length	SE1(C1)
SQUANKUM BROOK	

(Squankum) - Entire length	FW2-NT(C1)
STEELMAN BAY (Somers Point)	SE1(C1)
SWAN POND (Marmora)	FW2-NT/SE1(C1)
SWAN POND RACE (Marmora) - Entire length	FW2-NT/SE1(C1)
TAUGH CREEK	
(Whitesboro) - Entire length, except segment described below	SE1(C1)
(Whitesboro) - Portions outside the boundaries of Marmora Wildlife Management Area	SE1
TIMBER SWAMP BROOK	
(Oak Glen) - Manasquan Reservoir dam to its confluence with the Manasquan River	FW2-NT(C1)
TINKER BRANCH - See GREAT EGG HARBOR RIVER	
TITMOUSE BROOK (Howell) - Entire length	FW2-TM(C1)
TOMMYS BRANCH - See BASS RIVER	
TOMS RIVER	
MAIN STEM	
(Holmeson) - Source to Cassville Road bridge except those tributaries described separately under Tributaries below	FW2-NT
(Cassville) – Cassville Road bridge to the Route 528 bridge, including all tributaries	FW2-NT(C1)
(Whitesville) - Route 528 bridge to Pinelands Protection and Preservation Area boundaries at the NJ Central Railroad tracks, except tributaries described separately, under Tributaries below	PL(tm)
(Manchester) - NJ Central Railroad tracks to the Route 571 bridge, except tributaries described separately, under Tributaries below	FW2-TM(C1)
(Toms River) - Route 571 bridge to the Route 37 bridge, except tributaries described separately, under Tributaries below	FW2-NT(C1)
(Toms River) - Route 37 bridge to Barnegat Bay, except tributaries described separately, under Tributaries below	FW2-NT/SE1
TRIBUTARIES, TOMS RIVER	
(Holmeson) - Tributaries within the boundaries of the Pinelands Protection and Preservation Area	PL
(West of Pleasant Grove) – Source to the Pinelands Protection and Preservation Area boundary, including all tributaries	FW2-TM(C1)
(Toms River) - All tributaries within the boundaries of the Pinelands Protection and Preservation Area	PL
(Archer's Corners) - All tributaries outside the boundaries of the Pinelands Protection Area and within the	

boundaries of Colliers Mills Wildlife Management Area	FW2-NT(C1)
DOVE'S MILL BRANCH	
(Van Hiseville) - Source to Bunker Hill Lake, including all tributaries	FW2-NT(C1)
MAPLE ROOT BRANCH (Jackson) - Source to confluence with Toms River	PL
WRANGEL BROOK	
(Whiting) – Source to Green Branch, including all tributaries but not including Green Branch and portions within the boundaries of the Pinelands Protection and Preservation Area	FW2-NT(C1)
(Manchester) – Green Branch to the confluence with Davenport Branch, except portions within the boundaries of the Pinelands Protection and Preservation Area	FW2-NT
(Berkeley) – Davenport Branch to Toms River, except portions within the boundaries of the Pinelands Protection and Preservation Area	FW2-NT/SE1
TUCKAHOE LAKE (Tuckahoe)	FW2-NT(C1)
TUCKAHOE RIVER	
(Milmay) - Source to Pinelands Protection and Preservation Area boundary at Rt. 49	PL
(Head of River) - McNeals Branch and the River within the boundaries of the Peaselee Wildlife Management Area, except tributaries within the boundaries of the Pinelands Protection and Preservation Area, described separately below	FW2-NT/SE1(C1)
(Head of River) - Tributaries within the Pinelands Protection and Preservation Area boundaries	PL
(Tuckahoe) - Edge of Fish and Wildlife Management Area at confluence with Warners Mill Stream to Great Egg Harbor, except segment described separately below	FW2-NT/SE1(C1)
(Tuckahoe) - River, tributaries and all other waters within boundaries of the MacNamara Wildlife Management Area	FW2-NT/SE1(C1)
TULPEHOCKEN CREEK	
(Wharton) - Creek and tributaries from their origin to the confluence with Featherbed Branch	FW1
(Wharton) - The westerly tributaries and those natural ponds within the lands bounded by Hawkins (Bulltown-Hawkins) Rd., Hampton Gate (Tuckerton) Rd., and Sandy Ridge Rd.	FW1
TURTLE GROUND CREEK (Jeffers Landing) - Entire length	SE1(C1)
TURTLE GUT (Ventnor) - Entire length	SE1(C1)

WADING RIVER	
(Chatsworth) - Entire length, except tributaries described separately below	PL
(Greenwood Forest) - Westerly tributary to Howardsville Cranberry Bog Reservoir and other tributaries located entirely within the boundaries of the Greenwood Forest Wildlife Management Area	FW1
WARNERS MILL STREAM	
(Head of River) - Source to Pinelands Protection and Preservation Area boundary at Aetna Dr.	PL
(Head of River) - Aetna Dr. to boundary of the Peaselee Wildlife Management Area	FW2-NT/SE1
(Head of River) - Within the boundaries of the Peaselee Wildlife Management Area to the Tuckahoe River	FW2-NT/SE1(C1)
WEBBS MILL BRANCH - See CEDAR CREEK	
WIGWAM CREEK	
(Great Bay) - Source to Rt. 9	FW2-NT/SE1
(Great Bay) - Rt. 9 to Mott Creek	SE1(C1)
WINTER CREEK (New Gretna) - Entire length	SE1(C1)
WHIRLPOOL CHANNEL (Margate) - Entire length	SE1(C1)
WORLDS END CREEK (New Gretna) - Entire length	SE1(C1)
WRANGLE CREEK (Forked River) - Entire length and all waters within Forked River Game Farm	FW2-NT/SE1(C1)
WRECK POND BROOK (Wall) - Entire length	FW2-NT

(d) The following surface water classifications are for waters of the Upper Delaware River Basin:

Waterbody	Classification
ALEXAUKEN CREEK (Lambertville) - Entire length, including all tributaries	FW2-TM(C1)
ALLAMUCHY CREEK (Allamuchy) - Entire length	FW2-NT(C1)
ALLAMUCHY POND (Allamuchy)	FW2-NT(C1)
ALLAMUCHY POND TRIBUTARIES (Allamuchy) - All tributaries that are located entirely within the boundaries of Allamuchy State Park and that flow into Allamuchy Pond	FW1
ALMS HOUSE BROOK	
(Hampton) - Source to, but not including, County Farm Pond	FW2-TM
(Frankford) - County Farm Pond to Paulins Kill	FW2-NT
AMWELL LAKES (Lambertville)	FW2-NT(C1)
ANDOVER JUNCTION BROOK	
(Andover) - Source to Valentines Pond	FW2-TM
(Andover) - Valentines Pond to Kymer Brook	FW2-TM(C1)
ANDOVER JUNCTION BROOK LAKES (Andover) – All unlisted lakes greater than five acres	FW2-NT(C1)
ASHROE LAKE (Stokes State Forest)	FW2-NT(C1)
ASHROE LAKE TRIBUTARIES	
(Stokes State Forest) -Tributary to the Lake from Deer Lake and portion of southernmost tributary to Ashroe Lake outside of the Stokes State Forest boundary	FW2-TP(C1)
(Stokes State Forest) - Southernmost tributary to the Lake from its source to the Stokes State Forest boundary	FW1(tp)
ASSUNPINK CREEK	
(Trenton) - Source to confluence with the Delaware River, except segments described separately below	FW2-NT
(Roosevelt) - Creek and those tributaries within the boundaries of the Assunpink Wildlife Management Area	FW2-NT(C1)
(Quaker Bridge) - Portions of the creek within the boundaries of Van Ness Refuge	FW2-NT(C1)
BARKERS MILL BROOK (Independence) - Entire length	FW2-TP(C1)
BEAR BROOK (Johnsonburg) - Entire length	FW2-TP(C1)
BEAR CREEK	
(Johnsonburg) - Mud Pond to the Erie-Lackawanna Railroad trestle north of Johnsonburg	FW1(tm)

(Frelinghuysen) - Erie-Lackawanna Railroad trestle to confluence with Trout Brook, including all unnamed and unlisted tributaries	FW2-TM(C1)
(Frelinghuysen) - Confluence with Trout Brook to Pequest River	FW2-TM
BEATTY'S BROOK (Penwell) - Entire length	FW2-TP(C1)
BEAVER BROOK (Hope) - Entire length, except tributary described below	FW2-NT
(East of Mununka Chunk) – Entire length, including all tributaries	FW2-TM
BEAVER BROOK (Jefferson) - Source to, but not including, Lake Shawnee	FW2-NT
BEERSKILL	
(High Point State Park) - Source to boundary of High Point State Park at 41°15'48" N, 74°45'49" W	FW1(tp)
(Shaytown) - Boundary of High Point State Park to confluence with Little Flat Brook	FW2-TP(C1)
BIG FLAT BROOK	
(Montague) - Sawmill Pond to confluence with Parker Brook, except segments described under the listing for Flat Brook, below	FW2-NT(C1)
(Sandyston) - Confluence with Parker Brook, through the Blewitt Tract, to the confluence with Flat Brook, except tributaries described under the listing for Flat Brook, below	FW2-TP(C1)
(Tuttles Corner) - Outlet stream from Lake Ashroe to its confluence with Big Flat Brook	FW2-TP(C1)
BLAIR CREEK	
(Hardwick) - Source to Bass Lake	FW2-NT
(Hardwick Center) - Bass Lake outlet to Paulins Kill	FW2-TM
BOWERS BROOK	
(Hackettstown) - Source downstream to Rt. 517	FW2-TP(C1)
(Hackettstown) - Route 517 to the confluence with Musconetcong River	FW2-TM(C1)
BRASS CASTLE CREEK (Brass Castle) - Entire length	FW2-TP(C1)
BROOKALOO SWAMP (Hope) - Entire length	FW2-TM
BUCKHORN CREEK (Hutchinson) - Entire length	FW2-TP(C1)
CLEARVIEW CREEK (Hampton) - Source to Alms House Brook	FW2-NT
CLOVE (MILL) BROOK	
(Montague) - Lake Marcia outlet to State line, except tributaries described below	FW2-TP(C1)
(High Point State Park) - The second and third northerly tributaries to Clove Brook, the tributaries to Steeny Kill Lake, and those tributaries downstream of Steeny Kill Lake that originate in High Point State	

Park downstream to their confluence with Clove Brook or to the High Point State Park Boundaries	FW1(tp)
(High Point State Park) - Those northerly tributaries to Mill Brook that are located due west of Steeny Kill Lake, within the boundaries of High Point State Park	FW1(tp)
COOPERMINE BROOK (Pahaquarry) - Entire length	FW1
CRANBERRY LAKE (Byram)	FW2-TM(C1)
CRANBERRY LAKE OUTLET STREAM	
(Byram) - Entire length within Cranberry Lake State Park	FW2-NT(C1)
(Byram) - Stream outside of Cranberry Lake State Park	FW2-NT
CRISS BROOK (Stokes State Forest) - Entire length within the boundaries of Stokes State Forest	FW1(tp)
CULVER'S CREEK (Frankford) - Entire length	FW2-TM
CULVER'S LAKE (Frankford)	FW2-TM
DEER LAKE (Sandyston)	FW2-NT(C1)
DEER PARK POND	
(Allamuchy) - Pond and tributaries to the pond within Allamuchy State Park, except those tributaries classified as FW1, below	FW2-NT(C1)
(Allamuchy) - All tributaries to the Pond and to its outlet stream that are located entirely with the boundaries of Allamuchy State Park	FW1
(Allamuchy) - Deer Park Pond outlet stream downstream to Musconetcong River	FW2-TM(C1)
DELAWANNA CREEK	
(Delaware) - Source downstream to, but not including, Delaware Lake	FW2-TM
(Delaware) – Delaware Lake dam downstream to Delaware River, including tributaries	FW2-TP(C1)
DELAWARE AND RARITAN CANAL (Lambertville) - Entire length	FW2-NT
DELAWARE RIVER TRIBUTARIES	
(Holland) - Entire length	FW2-TP(C1)
(Port Jervis) - Unnamed or unlisted direct tributaries that are north of Big Timber Creek, are outside of the Pinelands Protection and Preservation Areas, and are not mapped as C1 waters by the Department	FW2-NT
(Knowlton) - Source, north of Hope-Delaware Road, to confluence with the Delaware River 0.5 mile south of Ramseysburg	FW2-TP(C1)
(Titusville) - Unnamed tributaries through Washington Crossing State Park	FW2-NT(C1)
DONKEY'S CORNER BROOK (Delaware Water Gap) - Entire length	FW1
DRY BROOK (Branchville) - Entire length	FW2-NT

DUCK POND (Swartswood)	FW2-NT(C1)
DUNNFIELD CREEK	
(Del. Water Gap) - Source to Rt. I-80	FW1(tp)
(Del. Water Gap) - Rt. I-80 to Delaware River, except tributaries described below	FW2-TP(C1)
(Worthington) - All unnamed waters that are located entirely within the boundaries of the Worthington State Forest	FW1
FIDDLERS CREEK (Titusville) - Entire length	FW2-TM
FLAT BROOK	
(Flatbrook-Roy) - Confluence of Big Flat Brook and Little Flat Brook to the boundary of Flatbrook-Roy Wildlife Management Area, except segments described below	FW2-TP(C1)
(Walpack) - Flatbook-Roy Wildlife Management Area boundary to the Delaware River, except segments described below	FW2-TM(C1)
(Stokes State Forest) - Two tributaries to Flat Brook which originate along Struble Road in Stokes State Forest to their confluences with Flat Brook within the boundaries of Flatbrook-Roy Wildlife Management Area	FW1(tm)
(High Point) - All surface water of the Flat Brook drainage area within the boundaries of High Point State Park and Stokes State Forest, except the following waters:	FW1
1. Saw Mill Pond and Big Flat Brook downstream to the confluence with Flat Brook;	
2. Mashipacong Pond and its outlet stream (Parker Brook) to the confluence with Big Flat Brook;	
3. Lake Wapalanne and its outlet stream to the confluence with Big Flat Brook;	
4. Lake Ocquittunk and waters connecting it with Big Flat Brook;	
5. Stony Lake and its outlet stream (Stony Brook) to the confluence with Big Flat Brook;	
6. Kittatinny Lake, that portion of its inlet stream outside the Stokes State Forest boundaries, and its outlet stream, including the Shotwell Camping Area tributary, to the confluence with Big Flat Brook;	

7. Deer Lake and its outlet stream to Lake Ashroe;	
8. Lake Ashroe, portions of its tributaries outside the Stokes State Forest boundaries, and its outlet stream to the confluence with Big Flat Brook;	
9. Lake Shawanni and its outlet stream to its confluence with Flat Brook;	
10. Crigger Brook and tributary to its confluence with Big Flat Brook	
(Del. Water Gap) - All tributaries to Flat Brook that flow from the Kittatiny Ridge and are located entirely within the boundaries of the Delaware Water Gap National Recreation Area	FW1
FORKED BROOK (Stokes State Forest) - Entire length	FW2-TP(C1)
FURNACE (OXFORD) BROOK	
(Oxford) - Source to railroad bridge at Oxford	FW2-TP(C1)
(Oxford) - Railroad bridge to Pequest River	FW2-NT
FURNACE LAKE (Oxford)	FW2-TM
GARDNERS POND (Andover)	FW2-TM(C1)
HAINESVILLE POND (Hainesville)	FW2-NT(C1)
HAKIHOKAKE CREEK (Milford) - Entire length, including headwaters known as Little York Creek	FW2-TP(C1)
TRIBUTARIES	
(Wydner) - Source to confluence with Hakihokake Creek west of York Road	FW2-TP(C1)
HALFWAY HOUSE BROOK (Franklin) - Entire length	FW2-TP(C1)
HANCES BROOK (Rockport) - Entire length	FW2-TP(C1)
HARIHOKAKE CREEK	
(Alexandria) - Source to Rt. 519 bridge, including all tributaries	FW2-NT(C1)
(Frenchtown) - Rt. 519 bridge to Delaware River, including all tributaries	FW2-TM(C1)
HARRISONVILLE LAKE (Harrisonville)	FW2-NT(C1)
HATCHERY BROOK (Hackettstown) - Entire length	FW2-TM(C1)
HIDDEN VALLEY LAKE (Lake Lenape)	FW2-NT(C1)
HONEY RUN (Hope) - Entire length	FW2-TM
HOPATCONG, LAKE (Hopatcong)	FW2-TM
ILLIFF, LAKE (Andover)	FW2-TM(C1)
INDEPENDENCE CREEK	
(Alphano) - Source to Alphano Rd.	FW2-TP(C1)
(Alphano) - Alphano Rd. to Pequest River	FW2-NT
JACKSONBURG CREEK (Blairstown) - Entire length	FW2-TM
JACOBS CREEK (Hopewell) - Entire length	FW2-NT
KITTATINNY LAKE (Sandyston)	FW2-NT(C1)
KITTATINNY LAKE TRIBUTARY	

(Stokes State Forest) - Source to boundary of Stokes State Forest	FW1(tp)
(Sandyston) - State Forest boundary to Kittatinny Lake	FW2-TP(C1)
KNOWLTON BROOK (Knowlton) - Entire length	FW2-TP(C1)
KURTENBACH'S BROOK (Waterloo) - Entire length	FW2-TP(C1)
KYMER BROOK (Andover) - Entire length, including all tributaries, except tributaries immediately north and immediately south of Clearwater	FW2-NT(C1)
LAKE - See listing under Name	
LITTLE FLAT BROOK	
(High Point State Park) - Source to boundary of High Point State Park	FW1(tp)
(Layton) - State park boundary to, but not including, tributary described below, to confluence with Big Flat Brook	FW2-TP(C1)
(Flatbrook-Roy) - Tributary which originates north of Bevans-Layton Rd. downstream to the first pond adjacent to the Fish and Game headquarters building	FW1(tp)
LITTLE NISHISAKAWICK CREEK (Frenchtown) - Entire length	FW2-NT(C1)
LITTLE SHABACUNK CREEK (Lawrence) - Entire length	FW2-NT
LITTLE SWARTSWOOD LAKE (Swartswood)	FW2-NT(C1)
LITTLE YORK CREEK (Little York) - Entire length	FW2-TP(C1)
LOCKATONG CREEK	
(Kingwood) - Source to Idell Bridge	FW2-NT(C1)
(Raven Rock) - Idell Bridge to Delaware River	FW2-TM(C1)
LOMMASONS GLEN BROOK (Lommasons Glen) - Entire length	FW2-TP(C1)
LOPATCONG CREEK	
(Phillipsburg) - Source to a point 560 feet (straight line distance) upstream of the Penn Central railroad track, including all tributaries	FW2-TP(C1)
(Phillipsburg) - From a point 560 feet (straight line distance) upstream of the Penn Central railroad track downstream to the confluence with the Delaware River	FW2-TM
LUBBERS RUN	
(Byram) - Entire length, except portion described below	FW2-TM
(Byram) - Lackawanna Lake downstream to the confluence with the Cowboy Creek	FW2-TM(C1)
MARCIA LAKE	
(High Point State Park) - Entire Lake	FW2-TM(C1)
(High Point State Park) - Outlet stream from the Lake to the confluence with Clove (Mill) Brook	FW2-TP(C1)
MASHIPACONG POND (Montague)	FW2-NT(C1)

MERRILL CREEK (Harmony) - Entire length, but not including Merrill Creek Reservoir	FW2-TP(C1)
MERRILL CREEK RESERVOIR (Harmony)	FW2-TM
MILL BROOK (Montague) - See CLOVE BROOK	
MILL BROOK (Broadway) - Entire length	FW2-TP(C1)
MINE BROOK	
(Mt. Olive) - Source to, but not including, Upper Mine Brook Reservoir, downstream to Lower Mine Brook Reservoir outlet	FW2-TM
(Mt. Olive) - Lower Mine Brook Reservoir outlet downstream to Drakestown Road bridge	FW2-TP(C1)
(Hackettstown) - Drakestown Road bridge downstream to confluence with Musconetcong River	FW2-TM
TRIBUTARIES	
(Drakestown) - Source downstream to, but not including, Burd Reservoir	FW2-TP(C1)
(Drakestown) - Burd Reservoir downstream to confluence with Mine Brook	FW2-TM
(Washington) - Entire length of tributary which joins Mine Brook approximately 280 yards upstream of the confluence with the Musconetcong River	FW2-TP(C1)
MIRY RUN (Mercerville) - Entire length	FW2-NT
MOORE CREEK (Hopewell) - Entire length	FW2-TM
MOUNTAIN LAKE (Liberty)	FW2-TM
MOUNTAIN LAKE BROOK	
(Liberty) - Source to Mountain Lake	FW2-TM
(White) - Mountain Lake dam to Pequest River	FW2-NT
MUDDY BROOK (Hope) - Entire length	FW2-NT
MUD POND (Johnsonburg)	FW1
MUSCONETCONG LAKE (Byram)	FW2-NT
MUSCONETCONG RIVER	
(Hackettstown) - Lake Hopatcong dam to and including Saxton Lake, except tributaries described separately	FW2-TM
(Saxton Falls) - Saxton Lake to the Delaware River, including all unnamed and unlisted tributaries	FW2-TM(C1)
TRIBUTARIES	
(Anderson) - Entire length	FW2-TP(C1)
(Changewater) - Entire length	FW2-TP(C1)
(Deer Park Pond) - See DEER PARK POND	
(Franklin) - Entire length	FW2-TP(C1)
(N. of Hackettstown) - Entire length	FW2-TM
(Lebanon) - Entire length	FW2-TP(C1)
(Port Murray) - Entire length	FW2-TP(C1)
(S. of Point Mtn.)	FW2-TP(C1)
(S. of Schooley's Mtn. Brook) - Entire length	FW2-TP(C1)

(Waterloo) - Tributary west of Kurtenbach's Brook from source downstream to Waterloo Valley Road bridge	FW2-TP(C1)
NEW WAWAYANDA LAKE (Andover)	FW2-TM(C1)
NISHISAKAWICK CREEK (Frenchtown) - Entire length	FW2-NT(C1)
OCQUITTUNK LAKE	
(Stokes State Forest) - Entire lake	FW2-NT(C1)
(Stokes State Forest) - From the outlet of the Lake to the confluence with Big Flat Brook	FW2-TP(C1)
OCQUITTUNK LAKE TRIBUTARY (Stokes State Forest) - Source to Ocquittunk Lake	FW1(tp)
PARKER BROOK (Montague) - Entire length	FW2-TP(C1)
PAULINA CREEK (Paulina) - Entire length	FW2-TM
PAULINS KILL	
EAST BRANCH	
(Andover) - Source to Limecrest quarry	FW2-NT(C1)
(Lafayette) - Limecrest quarry to confluence with Paulins Kill, West Branch, except tributary described below	FW2-TP(C1)
TRIBUTARY EAST BRANCH	
(Sussex Mills) - Entire length of tributary to the East Branch at Sussex Mills	FW2-NT(C1)
WEST BRANCH (Newton) - Entire length	FW2-NT
MAIN STEM	
(Blairstown) - Confluence of East and West branches to Rt. 15 bridge (bench mark 507)	FW2-TM
(Hampton) - Rt. 15 bridge (bench mark 507) to Balesville dam	FW2-NT(C1)
(Hampton) - Balesville dam to Paulins Kill Lake dam	FW2-NT
(Paulins Kill Lake) - Paulins Kill Lake dam to Delaware River, except tributaries described separately below	FW2-TM
TRIBUTARIES, MAIN STEM	
(Blairstown) - Entire length of tributary east of Walnut Valley	FW2-TM
(E. of Hainesburg Station) - Entire length	FW2-TM
(E. of Vail) - Source downstream to confluence with outlet stream of Lake Susquehanna	FW2-TM
(Emmons Station) - Entire length	FW2-TP(C1)
(Stillwater) - Entire length	FW2-TM
(Stillwater Station) - Entire length	FW2-TP(C1)
PEQUEST RIVER	
(Springdale) - Source to Tranquility bridge, except FW1 segments described below	FW2-TM
(Whittingham) - Northwesterly tributaries, including Big Spring, located within the boundaries of the Whittingham Wildlife Management Area, southwest of Springdale, from their origins to their confluence with the Pequest River	FW1(tm)

(Whittingham) - Stream and tributaries within the Whittingham Wildlife Management Area, except those classified as FW1, above	FW2-TM(C1)
(Vienna) - Tranquility bridge to Lehigh and HudsonRiver railway bridge	FW2-NT
(Townsbury) - Lehigh and Hudson River railway bridge to the upstream most boundary of the Pequest Wildlife Management Area	FW2-NT(C1)
(Townsbury) - Upstream most boundary of the Pequest Wildlife Management Area boundary to the downstream most boundary of the Pequest Wildlife Management Area	FW2-TM(C1)
(Townsbury) - Downstream most Pequest Wildlife Management Area boundary to Delaware River	FW2-TM
TRIBUTARIES	
(Janes Chapel) - Headwater and tributaries downstream to the upstream boundary of Pequest Wildlife Management Area	FW2-TM
(Townsbury) - Tributaries within the Pequest Wildlife Management Area	FW2-TM(C1)
(Petersburg) - Headwaters and tributaries downstream to Ryan Road bridge	FW2-TP(C1)
PLUM BROOK (Sergeantsville) - Entire length	FW2-TM(C1)
POHATCONG CREEK	
MAIN STEM	
(Mansfield) - Source to Karrsville bridge, including all tributaries	FW2-TP(C1)
(Pohatcong) - Karrsville bridge to Rt. 519 bridge, except tributaries listed separately	FW2-TM(C1)
(Springtown) - Rt. 519 bridge to Delaware River, including all tributaries	FW2-TP(C1)
TRIBUTARIES	
(Greenwich) - Entire length	FW2-TP(C1)
(New Village) - Entire length	FW2-TP(C1)
(Willow Grove) - Entire length	FW2-TP(C1)
POND BROOK (Middleville) - Swartswood Lake outlet to Trout Brook	FW2-NT
POPHANDUSING BROOK	
(Hazen) - Source downstream to Route 519 bridge	FW2-TP(C1)
(Belvidere) - Route 519 bridge downstream to confluence with the Delaware River	FW2-TM
RUNDLE BROOK (Del. Water Gap) - Source to Sussex County Route 615	FW1
SAMBO ISLAND BROOK (Del. Water Gap) - Entire length	FW1
SAMBO ISLAND POND (Del. Water Gap)	FW1
SANDYSTON CREEK (Sandyston) - Entire length	FW2-TP(C1)

SAWMILL POND (High Point)	FW2-NT(C1)
SCHOOLEYS MTN. BROOK (Schooley's Mtn.) - Entire length	FW2-TP(C1)
SHABAKUNK CREEK (Ewing) - Entire length	FW2-NT
SHABBECONG CREEK (Washington) – Entire length	FW2-TM(C1)
SHAWANNI CREEK	
(Stokes State Forest) - Headwaters and tributaries downstream to, but not including, Shawanni Lake	FW1(tp)
(Stokes State Forest) - Outlet of Shawanni Lake downstream to confluence with Flat Brook	FW2-TP(C1)
SHAWANNI LAKE (Stokes State Forest)	FW2-NT(C1)
SHIMERS BROOK	
(Millville) - Entire length, except those segments designated FW1, below	FW2-TP(C1)
(High Point) - That segment of Shimers Brook and all tributaries within the boundaries of High Point State Park	FW1(tp)
SHIPETAUKIN CREEK (Lawrenceville) - Entire length	FW2-NT
SILVER LAKE (Hope)	FW2-TM
SMITH FERRY BROOK (Del. Water Gap) - Entire length	FW1
SPARTA JUNCTION BROOK (Sparta Junction) - Entire length	FW2-TM(C1)
SPRING MILLS BROOK (Milford) – Entire length	FW2-TP(C1)
STEELE RUN	
(Washington Crossing State Park) - Source to confluence with westerly tributary	FW1
(Titusville) - Confluence with westerly tributary to the Delaware River	FW2-NT
STEENY KILL LAKE (High Point)	FW1
STEPHENSBURG BROOK (Stephensburg) - Entire length	FW2-TP(C1)
STONY BROOK (Knowlton) - Entire length	FW2-TP(C1)
STONY BROOK	
(Stokes State Forest) - Source and tributaries, wholey contained within Stokes State Forest, from their origins to, but not including, Stony Lake	FW1(tp)
(Stokes State Forest) - Tributary originating approximately one mile west of the Branchville Reservoir to the confluence with Stony Brook	FW1(tp)
(Stokes State Forest) - Outlet of Stony Lake to the confluence with Big Flat Brook	FW2-TP(C1)
STONY LAKE (Stokes State Forest)	FW2-TM(C1)
TRIBUTARIES - See STONY BROOK	
SUNFISH POND (Worthington) - The pond and its outlet stream to the Delaware River	FW1
SWAN CREEK (Lambertville) - Entire length	FW2-NT
SWARTSWOOD CREEK (Swartswood) - Entire length	FW2-TM
SWARTSWOOD LAKE (Stillwater)	FW2-TM(C1)
TAR HILL BROOK	

(Lake Lenape) - Source to, but not including, Lake Lenape	FW2-TM(C1)
(Lake Lenape) - Lake Lenape to Andover Junction Brook	FW2-NT(C1)
TILLMAN BROOK (Walpack) - Entire length	FW1(tp)
TROUT BROOK (Hackettstown) - Entire length	FW2-TM(C1)
TROUT BROOK (Tranquility) - Entire length	FW2-TP(C1)
TROUT BROOK (Hope) - Entire length	FW2-TM
TROUT BROOK (Allamuchy) - Entire length, including all tributaries	FW2-NT
TROUT BROOK	
(Middleville) - Source to confluence with Pond Brook	FW2-TP(C1)
(Middleville) - Confluence with Pond Brook to Paulins Kill	FW2-NT
TUNNEL BROOK (Oxford Mtn.) - Entire length, including all tributaries	FW2-TP(C1)
TURKEY HILL BROOK (Bethlehem) - Entire length	FW2-TP(C1)
TUTTLES CORNER BROOK (Tuttles Corner) - Entire length	FW2-TP(C1)
VANCAMPENS BROOK (Millbrook) - Entire length	FW2-TP(C1)
WAPALANNE LAKE (Stokes State Forest)	FW2-NT(C1)
WARFORD CREEK (Barbertown) – Entire length	FW2-TP(C1)
WELDON BROOK (Jefferson Township) - From source to, but not including, Lake Shawnee	FW2-TM
WEST PORTAL CREEK (West Portal) - Entire length	FW2-TP(C1)
WHITE BROOK (Montague) - Entire length	FW2-TP(C1)
WHITE LAKE (Hardwick)	FW2-TM
WICKECHEOKE CREEK	
(Locktown) - Source to confluence with Plum Brook, including all tributaries	FW2-NT(C1)
(Stockton) - Confluence with Plum Brook to Delaware River, including all tributaries	FW2-TM(C1)
WILLS BROOK (Mt. Olive) - Entire length	FW2-TM
YARDS CREEK (Blairstown) - Entire length	FW2-TP(C1)

(e) The following surface water classifications are for waters of the Lower Delaware River Basin:

Waterbody	Classification
ALLOWAY CREEK	
(Alloways) – Source to Greenwich Street, including all tributaries and Alloway Lake	FW2-NT
(Quinton) – Greenwich Street to Delaware Bay	SE1
(Quinton) – All named and unnamed tributaries of Alloway Creek from Greenwich Street to Delaware Bay	FW2-NT/SE1
ASSISCUNK CREEK	
(Columbus) - Headwaters to confluence with Barkers Brook, including all tributaries	FW2-NT(C1)
(Burlington) - Confluence with Barkers Brook to the Delaware River	FW2-NT
BALDRIDGE CREEK	
(Salem Creek) - Entire length, except segments described below	FW2-NT/SE1(C1)
(Salem Creek) - Segments outside the boundaries of the Supawna National Wildlife Refuge	FW2-NT/SE1
BAY PONDS (Egg Island)	FW2-NT/SE1(C1)
BEADONS CREEK (Fortescue) - Entire length	SE1(C1)
BEAVERDAM BRANCH	
(Glassboro) - Source to boundary of the Glassboro Wildlife Management Area	FW2-NT
(Glassboro) - Within the boundaries of Glassboro Wildlife Management Area	FW2-NT(C1)
BIG TIMBER CREEK (Westville) - Entire length	FW2-NT
BLACKBIRD GUT (Newport) - Entire length	SE1(C1)
BLACKS CREEK (Bordentown) - Entire length	FW2-NT
BOILER DITCH (Egg Island) - Entire length	FW2-NT/SE1(C1)
BUCKS DITCH (Mad Horse Creek) - Entire length	SE1(C1)
BUCKSHUTEM CREEK	
(Centre Grove) - Entire length, except segments described separately below	FW2-NT
(Edward G. Bevan) - Creek and tributaries within the boundaries of Edward G. Bevan Wildlife Management Area, except those tributaries described separately below	FW2-NT(C1)
(Edward G. Bevan) - Joshua and Pine Branches to their confluence with Buckshutem Creek	FW1
CAT GUT (Mad Horse Creek) - Entire length	SE1(C1)

CEDAR BRANCH (Manumuskin River) - Source to Manumuskin River	FW1
CEDAR BRANCH (Edward G. Bevan) - Entire length	FW1
CEDAR BRANCH (Edward G. Bevan) - See NANTUXENT CREEK	
CEDAR CREEK	
(Dividing Creek Station) - Entire length, except portions described separately below	FW2-NT
(Edward G. Bevan) - Those tributaries to Cedar Creek that originate in and are located entirely within the boundaries of Edward G. Bevan Wildlife Management Area	FW1
CEDARVILLE POND (Cedarville)	FW2-NT(C1)
CHERRY TREE CREEK (Mad Horse Creek) - Entire length	SE1(C1)
CLARKS POND (Bridgeton)	FW2-NT(C1)
CLINT MILLPOND (Beaver Swamp)	FW2-NT(C1)
COHANSEY RIVER	
(Beals Mill) – Source to Park Drive, including all tributaries and Sunset Lake	FW2-NT
(Bridgeton) – Park Drive to the Railroad crossing	FW2-NT/SE1
(Bridgeton) – Railroad crossing to Delaware Bay	SE1
(Bridgeton) – All named and unnamed tributaries of Cohansey River from Irving Road to Delaware Bay, unless otherwise classified	FW2-NT/SE1
COOPER BRANCH - See RANCOCAS CREEK	
COOPER RIVER (Camden) - Entire length	FW2-NT
COURTENY PONDS (Egg Island)	FW2-NT/SE1(C1)
CROSSWICKS CREEK (Bordentown) - Entire length	FW2-NT
CROW CREEK (S. Dennis) - Entire length	FW2-NT/SE1(C1)
DEER PARK BRANCH - See RANCOCAS CREEK	
DELAWARE RIVER TRIBUTARIES	
(Brooklawn) - Unnamed or unlisted direct tributaries, south of Big Timber Creek and north of Oldmans Creek, that are outside of the Pinelands Protection and Preservation Areas and are not designated as C1 waters by the Department	FW2-NT/SE2
(Penns Grove) - Unnamed or unlisted direct tributaries, south of and including Oldmans Creek, that are outside of the Pinelands Protection and Preservation Areas and are not designated as C1 waters by the Department	FW2-NT/SE1
(Pinelands) - All streams or segments of streams which flow directly into the Delaware River, are within the boundaries of the Pinelands Area and are not classified FW1 waters in this Table	PL
DENNIS CREEK	

(South Dennis) - Entire length, except segments described below	FW2-NT/SE1
(Woodbine) - All tributaries within the boundaries of the Pinelands Protection and Preservation Areas	PL
(Dennis Creek) - Segment of the Creek, all tributaries, and all other surface waters within the boundaries of the Dennis Creek Wildlife Management Area	FW2-NT/SE1(C1)
DEVILS GUT	
(Mad Horse Creek) - Entire length, except tributaries described below	SE1(C1)
(Mad Horse Creek) - Tributaries outside the Mad Horse Creek Wildlife Management Area	SE1
DIVIDING CREEK	
(Lores Mill) – Source to Highland Street, except those segments described below	FW2-NT
(Dividing Creek) – Highland Street to Delaware Bay, except those segments described below	FW2-NT/SE1
(Edward G. Bevan) - Those segments of tributaries that are located entirely within the boundaries of the Edward G. Bevan Wildlife Management Area	FW1
DIVISION CREEK (Dix) - Entire length	SE1(C1)
DOCTORS CREEK	
(Red Creek) - Entire length, except segment described below	FW2-NT
(Imlaystown) - Segment within Imlaystown Lake Wildlife Management Area	FW2-NT(C1)
DRUMBO CREEK	
(Dix) - Entire length, except segment described below	FW2-NT/SE1
(Dix) - Segment within the boundaries of Dix Wildlife Management Area	FW2-NT/SE1(C1)
EAST CREEK	
(Dennis) - Source to boundaries of the Pinelands Protection and Preservation Area, except those portions described separately below	PL
(Belleplain) - A stream and tributary that originate just south of East Creek Mill Rd., 1.2+miles north-northeast of Eldora and are located entirely within the boundaries of Belleplain State Forest	FW1
(Belleplain) - All tributaries to Lake Nummi from their origins downstream to the Lake	FW1
(Eldora) - Boundary of the Pinelands Protection and Preservation Area to Delaware Bay, except segment within the boundaries of the Dennis Creek Wildlife Management Area	SE1
(Eldora) – All named and unnamed tributaries of East Creek from the boundary of Pinelands Protection	

and Preservation Area to Delaware Bay, except segment within the boundaries of the Dennis Creek Wildlife Management Area	FW2-NT/SE1
(Dennis Creek) - Segment within the boundaries of the Dennis Creek Wildlife Management Area	SE1(C1)
ELDER GUT (Egg Island) - Entire length	FW2-NT/SE1(C1)
FISHING CREEK (Egg Island) - Entire length	FW2-NT/SE1(C1)
FISHING CREEK	
(Canton) - Source to Mad Horse Creek Wildlife Management Area and all tributaries outside of the boundaries of Mad Horse Creek Wildlife Management Area	SE1
(Mad Horse Creek) - Creek and tributaries within the boundaries of Mad Horse Creek Wildlife Management Area	SE1(C1)
GOOSE POND (Mad Horse Creek)	SE1(C1)
GOSHEN CREEK	
(Woodbine) - Entire length except segment described below	SE1
(Dennis Creek) - Segment and all tributaries within the Dennis Creek Wildlife Management Area	SE1(C1)
GRAVELLY RUN (Edward G. Bevan) - Downstream to the Edward G. Bevan Wildlife Management Area boundaries	FW1
HIGBEE BEACH (Higbee Beach Wildlife Management Area) All waters within the boundaries of Higbee Beach Wildlife Management Area	FW2-NT/SE1(C1)
HIGHS BEACH (Highs Beach) - All waters within the Wildlife Management Area south of Highs Beach	FW2-NT/SE1(C1)
IMLAYSTOWN LAKE (Imlaystown)	FW2-NT(C1)
INDIAN DITCH (Egg Island) - Entire length	FW2-NT/SE1(C1)
ISLAND DITCH (Egg Harbor) - Entire length	FW2-NT/SE1(C1)
JADE RUN (Brendan T. Byrne State Forest) - Entire length	FW1
JOSHUA BRANCH - See BUCKSHUTEM CREEK	
KING POND (Egg Island)	SE1(C1)
LAHAWAY CREEK	
(Prospertown) - Entire length, except tributaries described separately below	FW2-NT
(Colliers Mills) - All tributaries which originate in the Colliers Mills Wildlife Management Area north-northeast of Archers Corners, from their sources to the boundaries of the Colliers Mills Wildlife Management Area	FW1
LITTLE EASE RUN	
(Glassboro) - Entire length, except portion described separately below	FW2-NT

(Glassboro) - Run and tributaries within the Glassboro Wildlife Management Area, except tributary described separately below	FW2-NT(C1)
(Glassboro) - The portion of a branch of Little Ease Run situated immediately north of Stanger Avenue, and entirely within the Glassboro Wildlife Management Area	FW1
(Glassboro) - The first and second easterly tributaries to Little Ease Run north of Academy Road	FW1
LOGAN POND (Repaupo)	FW2-NT(C1)
LONG POND (Mad Horse Creek)	SE1(C1)
LONE TREE CREEK (Egg Island) - Entire length	SE1(C1)
LOWER BROTHERS CREEK (Egg Island) - Entire length	SE1(C1)
LOWER DEEP CREEK (Mad Horse Creek) - Entire length	SE1(C1)
MAD HORSE CREEK	
(Canton) - Source to the boundary of Mad Horse Creek Wildlife Management Area and all tributaries outside the boundaries of the Wildlife Management Area	FW2-NT/SE1
(Mad Horse Creek) - Creek and all waters within the Mad Horse Creek Wildlife Management Area	FW2-NT/SE1(C1)
MALAPATIS CREEK	
(Mad Horse Creek) - Entire length, except segment described below	SE1(C1)
(Mad Horse Creek) - Portions of the Creek beyond the boundaries of the Mad Horse Creek Wildlife Management Area	SE1
MANANTICO CREEK	
(Millville) - Entire length, except segment described below	FW2-NT
(Manantico) - Segment within the boundaries of the Manantico Ponds Wildlife Management Area	FW2-NT(C1)
MANTUA CREEK	
(Sewell)_ - Source to Wenonah Ave., including all tributaries	FW2-NT
(Montua) - Wenonah Ave. to Delaware River	FW2-NT/SE2
MASON CREEK	
(Springville) - Entire length, except segment described below	FW2-NT
(Medford) - Segment within Medford Wildlife Management Area	FW2-NT(C1)
MASONS RUN	
(Pine Hill) - Source to Little Mill Road	FW2-TP(C1)
(Lidenwold) - Little Mill Rd. to confluence with Big Timber Creek	FW2-NT
MAURICE RIVER	
MAIN STEM	
(Willow Grove) - Source to Willow Grove Road	FW2-NT

(Willow Grove) - Willow Grove Road to the confluence with Green Branch	FW2-NT(C1)
(Brotmanville) - Confluence with Green Branch to northern boundary of the Union Lake Wildlife Management Area	FW2-NT
(Vineland) - Boundary of the Union Lake Wildlife Management Area to confluence with Blackwater Branch	FW2-NT(C1)
(Vineland) - Confluence with Blackwater Branch to the Union Lake Dam, except tributaries described under Tributaries below	FW2-NT
(Millville) - Union Lake Dam to Delaware Bay, except tributaries described under Tributaries below	SE1
(Millville) – All named and unnamed tributaries of Maurice River from Union Lake Dam to Delaware Bay, except tributaries described under Tributaries below, unless otherwise classified	FW2-NT/SE1
TRIBUTARIES, MAURICE RIVER	
(Willow Grove) - Those portion of tributaries that are within the boundaries of the Pinelands Protection and Preservation Area	PL
(Vineland) – All tributaries within the boundaries of the Union Lake Wildlife Management Area	FW2-NT(C1)
(Matts Landing) - All tributaries within the Wildlife Management Area that borders Delaware Bay	FW2-NT/SE1(C1)
MCCORMICK POND (Egg Island)	FW2-NT/SE1(C1)
MACDONALD BRANCH - See RANCOCAS CREEK	
MIDDLE BROTHERS CREEK (Egg Island) - Entire length	SE1(C1)
MIDDLE MARSH CREEK	
(Dix) - All fresh waters which originate in and are located entirely within the boundaries of the Dix Wildlife Management Area	FW1
MILE BRANCH - Entire length	FW1
MILL CREEK	
(Carmel) - Entire length, except segment described below	FW2-NT
(Union Lake) - Creek and tributaries within the boundaries of the Union Lake Wildlife Management Area	FW2-NT(C1)
MOUNT MISERY BROOK	
(Woodmansie) - Entire length, except segments described below	PL
SOUTH BRANCH, MOUNT MISERY BROOK	
(Brendan T. Byrne State Forest) - All tributaries to the South Branch that are located entirely within the boundaries of Brendan T. Byrne State Forest	FW1

(Pasadena) - The two easterly branches of the Branch which are located entirely within the boundaries of the Pasadena Wildlife Management Area	FW1
MUDDY CREEK	
(Mad Horse Creek) - Entire length, except segments described below	SE1(C1)
(Mad Horse Creek) - Segments outside of the boundaries of the Mad Horse Creek Wildlife Management Area	SE1
MUDDY RUN	
(Elmer) - Entire length, except segments described below	FW2-NT
(Elmer) - Portion of the Run within Elmer Lake Wildlife Management Area	FW2-NT(C1)
(Centerton) - Portion of the Run within Parvin State Park	FW2-NT(C1)
(Pittsgrove) - Portion of the run within Union Lake Wildlife Management Area	FW2-NT(C1)
MUSKEE CREEK	
(Port Elizabeth) - Source to boundary of Pinelands Protection and Preservation Area, except segments described separately below	PL
(Peaselee) - The Middle Branch from its origin to the boundaries of the Peaselee Wildlife Management Area	FW1
(Peaselee) - Those portions of the tributaries to Slab Branch which are located entirely within the boundaries of the Peaselee Wildlife Management Area	FW1
(Bricksboro) - Pinelands Protection and Preservation Area boundaries to Maurice River	FW2-NT
NANCY GUT	
(Nantuxent) - Source to the boundary of Nantuxent Creek Wildlife Management Area	SE1(C1)
(Newport) - Stream and all tributaries outside of the boundaries of the Nantuxent Creek Wildlife Management Area	SE1
NANTUXENT CREEK	
(Newport Landing) - Entire length, except segment described below	FW2-NT/SE1
(Nantuxent) - All waters within the boundaries of Nantuxent Creek Wildlife Management Area	FW2-NT/SE1(C1)
OLDMANS CREEK	
(Lincoln) – Source to the eastern boundary of the Harrisonville Lake Wildlife Management Area boundary	FW2-NT
(Harrisonville) – Eastern boundary of the Harrisonville Lake Wildlife Management Area to Kings Highway by Porches Mill, including all tributaries	FW2-NT(C1)

(Oldmans) – Kings Highway by Porches Mill to Main Street	FW2-NT
(Oldmans) – Main Street to the Delaware River	FW2-NT/SE1
ORANOAKEN CREEK	
(Fortescue) - Source to boundary of Egg Island Berrytown Wildlife Management Area	FW2-NT/SE1
(Egg Island) - Creek and tributaries within the boundaries of the Egg Island Berrytown Wildlife Management Area	FW2-NT/SE1(C1)
PARGEY CREEK	
(Asbury) – Source to Swedesboro Ave.	FW2-NT
(Gibbstown) - Swedesboro Avenue to Repaupo Creek, except segments described below	FW2-NT/SE2
(Logans Pond) - Segment within the boundaries of Logans Pond Wildlife Management Area	FW2-NT/SE2(C1)
PARVIN LAKE (Parvin State Park)	FW2-NT(C1)
PATTYS FORK - See MAD HORSE CREEK	
PENNSAUKEN CREEK (Cinnaminson) - Entire length	FW2-NT
PIERSONS DITCH (Egg Island) - Entire length	FW2-NT/SE1(C1)
PINE BRANCH - See BUCKSHUTEM CREEK	
POMPESTON CREEK	
(Cinnaminson) – Entire length, except portion described below	FW2-NT
(Riverton) - Route 130 bridge to Broad Street bridge	FW2-NT(C1)
RACCOON CREEK	
(Mullica Hill) – Source to Kings Highway	FW2-NT
(Grand Sprute) - Kings Highway to Delaware River	FW2-NT/SE2
RANCOCAS CREEK	
NORTH BRANCH	
(North Hanover) - Source to boundary of the Pinelands Protection and Preservation Area at Pemberton	PL
(Pemberton) - Boundary of the Pinelands Protection and Preservation Area to the Delaware River, except tributaries described below	FW2-NT
(Pemberton) - Tributaries within the boundaries of the Pinelands Protection and Preservation Areas	PL
SOUTH BRANCH RANCOCAS CREEK	
(Southhampton) - Source to Pinelands Protection and Preservation Area boundaries at Rt. 206 bridge south of Vincentown	PL
(Vincentown) - Vincentown to Delaware River, except tributaries described separately below	FW2-NT
(Vincentown) - All tributaries within the Pinelands Protection and Preservation Area	PL
COOPER BRANCH RANCOCAS CREEK	

(Woodmansie) - Entire length, except portions described separately, below	PL
(Brendan T. Byrne State Forest) - Branch and tributaries downstream to Pakim Pond, and tributaries to Cooper Branch located entirely within the Brendan T. Byrne State Forest boundaries	FW1
DEER PARK BRANCH RANCOCAS CREEK	
(Buckingham) - Stream and tributaries near Buckingham to confluence with Pole Bridge Branch	FW1
MACDONALDS BRANCH RANCOCAS CREEK	
(Woodmansie) - Entire length, except as described separately below	PL
(Brendan T. Byrne State Forest) - Branch and tributaries located entirely within Brendan T. Byrne State Forest	FW1
SHINNS BRANCH RANCOCAS CREEK	
(Brendan T. Byrne State Forest) - Branch and tributaries located entirely within the boundaries of Brendan T. Byrne State Forest, from their sources to the forest boundary	FW1
(Lebanon Lake Estates) - Forest boundary to lake	PL
ROARING DITCH	
(Heislerville) - Entire length, except segment described below	SE1
(Eldora) - Ditch and all tributaries within the Dennis Creek Wildlife Management Area boundaries	SE1(C1)
ROWANDS POND (Clementon) - Pond, inlet stream and outlet stream within Rowands Pond Wildlife Management Area	FW2-NT(C1)
SALEM RIVER	
(Upper Pittsgrove) – Source to Slabtown Road, including all tributaries	FW2-NT(C1)
(Woodstown) – Slabtown Road to the confluence with Nichomus Run	FW2-NT
(Sharptown) – Nichomus Run to Major Run, including Nichomus Run, Major Run, and their tributaries	FW2-NT(C1)
(Salem) – Major Run to the confluence with the Delaware River	FW2-NT/SE1
SAVAGES RUN (East Creek)	
(Belleplain State Forest) - Entire length, except portions described separately, below	PL
(Belleplain State Forest) - Those two tributaries and portions thereof downstream of Lake Nummi and all tributaries to Lake Nummi that are located entirely within the boundaries of Belleplain State Forest	FW1

SHAWS MILL POND (Cedarville)	FW2-NT/SE1(C1)
TRIBUTARIES	
(Edward G. Bevan) - Cedar and Mile Branches to Shaw's Mill Pond	FW1
SHINNS BRANCH - See RANCOCAS CREEK	
SHORE DITCH (Mad Horse Creek) - Entire length	SE1(C1)
SILVER LAKE FORK - See MAD HORSE CREEK	
SLAB BRANCH - See MUSKEE CREEK	
SLUICE CREEK	
(Cedar Grove) – Source to lower boundary of Clint Millpond, except segment with in Beaver Swamp Wildlife Management Area	FW2-NT
(Cedar Grove) – Segment and tributaries within the Beaver Swamp Wildlife Management Area	FW2-NT(C1)
(South Dennis) - Clint Millpond to Dennis Creek, except segment within the Dennis Creek Wildlife Management Area	SE1
(South Dennis) - All named and unnamed tributaries to Sluice Creek from Clint Millpond to Dennis Creek, except segment within the Dennis Creek Wildlife Management Area	FW2-NT/SE1
(Dennis Creek) - Segments of tributaries within the Dennis Creek Wildlife Management Area	SE1(C1)
STEEP RUN (Mauricetown) - Entire length	FW2-NT(C1)
STOW CREEK	
(Jericho) – Source to Buckhorn Road	FW2-NT
(Stow Creek Landing) - Buckhorn Road to Delaware River, except tributaries within the boundaries of the Mad Horse Creek Wildlife Management Area	SE1
(Stow Creek Landing) – Tributaries of Stow Creek from Buckhorn Road to Delaware River, except tributaries within the boundaries of the Mad Horse Creek Wildlife Management Area	FW2-NT/SE1
(Mad Horse Creek) - Tributaries within the boundaries of the Mad Horse Creek Wildlife Management Area	FW2-NT/SE1(C1)
STRAIGHT CREEK (Berrytown) - Entire length	SE1(C1)
THREE MOUTHS (Egg Island)	FW2-NT/SE1(C1)
THUNDERGUST BROOK	
(Deerfield) - Entire length, except segment described below	FW2-NT
(Deerfield) - That segment within the boundaries of Parvin State Park	FW2-NT(C1)
THUNDERGUST LAKE (Parvin State Park)	FW2-NT(C1)
TURNERS FORK - See MAD HORSE CREEK	
UPPER BROTHERS CREEK (Egg Island) - Entire length	SE1(C1)
UPPER DEEP CREEK (Mad Horse Creek) - Entire length	SE1(C1)
WEST CREEK	

(Halberton) - Source to the boundary of the Pinelands Protection and Preservation Areas, except those portions described separately, below	PL
(Belleplain) - The portion of the tributary that originates about 0.9 miles southeast of Hoffman's Mill and is located entirely within the boundaries of Belleplain State Forest	FW1
(Belleplain) - Those tributaries that originate about 0.5 miles upstream of Hoffman's Mill and are located entirely within the boundaries of Belleplain State Forest	FW1
(Belleplain) - Eastern branch of the easterly tributary to Pickle Factory Pond from its origin to its confluence with the western branch	FW1
(Delmont) - Boundary of the Pinelands Protection and Preservation Area to the Delaware Bay, except portions within the boundary of the Fish and Game lands, except tributaries described below	SE1
(Delmont) – All named and unnamed tributaries from the boundary of the Pinelands Protection and Preservation Area to the Delaware Bay, except tributaries described below	FW2-NT/SE1
(Delmont) – Portions within the Fish and Game lands	SE1(C1)
WIDGEON PONDS (Egg Island)	FW2-NT/SE1(C1)

(f) The following surface water classifications are for waters of the Passaic, Hackensack and New York Harbor Complex Basin:

Waterbody	Classification
AMES LAKE (Hibernia)	FW2-NT(C1)
APSHAWA BROOK (Macopin) - Entire length	FW2-TP(C1)
ARTHUR KILL	
(Perth Amboy) - The Kill and its saline New Jersey tributaries between the Outerbridge Crossing and a line connecting Ferry Pt., Perth Amboy to Wards Pt., Staten Island, New York	SE2
(Elizabeth) - From an east-west line connecting Elizabethport with Bergen Pt., Bayonne to the Outerbridge Crossing	SE3
(Woodbridge) - All freshwater tributaries	FW2-NT
BEAR SWAMP BROOK (Mahwah) - Entire length	FW2-TP(C1)
BEAR SWAMP LAKE (Ringwood State Park)	FW2-NT(C1)
BEAVER BROOK	
(Meriden) - From Splitrock Reservoir Dam downstream to Meriden Road Bridge	FW2-TP(C1)
(Denville) - Meriden Road Bridge to Rockaway River, including Mount Hope and White Meadow Lakes and all unnamed and unlisted tributaries	FW2-NT(C1)
TRIBUTARIES	
(Meriden) - Two tributaries located approximately three quarters of a mile southwest of Meriden	FW2-TP(C1)
BEECH BROOK	
(West Milford) - From State line downstream to Monksville Reservoir, including all tributaries	FW2-TP(C1)
BELCHER CREEK (W. Milford) - Entire length	FW2-NT
BERRYS CREEK (Secaucus) - Entire length	FW2-NT/SE2
BLACK BROOK	
(Meyersville) - Entire length, except segment described below	FW2-NT
(Great Swamp) - Segment and tributaries within the Great Swamp National Wildlife Refuge	FW2-NT(C1)
BLUE MINE BROOK	
(Wanaque) - Headwaters downstream to lower Snake Den Road bridge	FW2-TP(C1)
(Wanaque) - Lower Snake Den Road bridge to the confluence with Wanaque Reservoir	FW2-TM(C1)
BOONTON RESERVOIR - See JERSEY CITY RESERVOIR	
BRUSHWOOD POND (Ringwood State Park)	FW2-TM(C1)

BUCKABEAR POND (Newfoundland) - Pond, its tributaries and connecting stream to Clinton Reservoir	FW2-NT(C1)
BURNT MEADOW BROOK (Green Pond) - Source downstream to confluence with Green Pond Brook, including Lake Denmark and all tributaries	FW2-NT(C1)
BURNT MEADOW BROOK (Stonetown) - Entire length	FW2-TP(C1)
CANISTEAR RESERVOIR (Vernon)	FW2-TM(C1)
CANISTEAR RESERVOIR TRIBUTARY	
(Vernon) – The eastern tributary to the Reservoir	FW2-NT(C1)
(Vernon) - The southern branch of the eastern tributary to the Reservoir	FW1
CANOE BROOK (Chatham) - Entire length	FW2-NT
CEDAR POND (Postville) - Pond and all tributaries	FW1
CHARLOTTESBURG RESERVOIR (Charlottesburg)	FW2-TM(C1)
..TRIBUTARIES	
(Charlottesburg) – All unnamed tributaries	FW2-TP(C1)
(Charlottesburg) – Unnamed lake on the southeastern tributary to the Reservoir	FW2-NT(C1)
CHERRY RIDGE BROOK	
(Vernon) - Tributaries not contained within Wawayanda State Park and Newark Watershed lands	FW2-NT
(Wawayanda State Park) - Brook and tributaries upstream of Canistear Reservoir located entirely within the boundaries of Wawayanda State Park and the Newark Watershed lands	FW1
CLINTON BROOK (W. Milford) - Clinton Reservoir dam to Pequannock River	FW2-TP(C1)
CLINTON RESERVOIR (W. Milford)	FW2-TM(C1)
CLOVE BROOK - See STAG BROOK	
COOLEY BROOK	
(W. Milford) - Entire length, except segments described below	FW2-TP(C1)
(Hewitt State Forest) - Segments of the brook and all tributaries which originate and are located entirely within Hewitt State Forest	FW1(tp)
CORYS BROOK (Warren) - Entire length	FW2-NT
CRESSKILL BROOK	
(Alpine) - Source to Duck Pond Rd. bridge, Demarest	FW2-TP(C1)
(Demarest) - Duck Pond Rd. bridge to Tenakill Brook	FW2-NT(C1)
CROOKED BROOK TRIB. (East of Sheep Hill) - Entire length	FW2-TP(C1)
CUPSAW BROOK	
(Skylands) - Entire length, including all tributaries and Cupsaw Lake	FW2-NT(C1)
DEAD RIVER (Liberty Corners) - Entire length	FW2-NT
DEN BROOK (Randolph) - Entire length, including all tributaries and lakes	FW2-NT(C1)

TRIBUTARY	
(Randolph) - Tributary west of Shongum Lake	FW2-TP(C1)
DUCK POND (Ringwood)	FW2-NT(C1)
DUNKER POND BROOK (West Milford Township) - Entire length, including Dunker Pond and all tributaries, except Lud-Day Brook	FW2-NT(C1)
DURHAM POND (Rockaway)	FW2-NT(C1)
ELIZABETH RIVER	
(Elizabeth) - Source to Broad St. bridge, Elizabeth and all freshwater tributaries	FW2-NT
(Elizabeth) - Broad St. bridge to mouth	SE3
EMMA LAKE (Hibernia)	FW2-NT(C1)
ERSKINE BROOK (Ringwood) – Entire length	FW2-TM(C1)
ERSKINE LAKES (Ringwood)	FW2-NT(C1)
FOX BROOK (Mahwah) - Entire length	FW2-NT
GIRL SCOUT POND (Hibernia)	FW2-NT(C1)
GLASMERE POND (Ringwood)	FW2-NT(C1)
GOFFLE BROOK (Hawthorne) - Entire length	FW2-NT
GRANNEY BROOK - See SPRING BROOK	
GRANNIS BROOK (Morris Plains) - Entire length	FW2-NT
GREAT BROOK	
(Chatham) - Entire length, except segment described below	FW2-NT
(Great Swamp) - Segment within the boundaries of the Great Swamp National Wildlife Refuge	FW2-NT(C1)
GREEN BROOK	
(W. Milford) - Entire length, except those segments described below	FW2-TP(C1)
(Hewitt State Forest) - Those segments and tributaries which originate and are located entirely within the Hewitt State Forest boundaries	FW1(tp)
GREEN POND (Rockaway)	FW2-TM
GREEN POND BROOK	
(Picatinny Arsenal) - Green Pond outlet to, but not including, Picatinny Lake	FW2-TP(C1)
(Wharton) - Picatinny Lake and its outlet stream to the confluence with the Rockaway River, including all tributaries	FW2-NT(C1)
GREENWOOD LAKE (W. Milford)	FW2-TM
HACKENSACK RIVER	
(Oradell) - New York/New Jersey State line to Oradell dam, including Lake Tappan and all tributaries draining to the Hackensack River above Oradell Dam	FW2-NT(C1)
(Oradell) - Main stem and saline tributaries from Oradell dam to the confluence with Overpeck Creek	SE1

(Little Ferry) - Main stem and saline tributaries from Overpeck Creek to Route 1 and 9 crossing	SE2
(Kearny Point) - Main stem downstream from Route 1 and 9 crossing	SE3
TRIBUTARIES	
(Oradell) - Tributaries joining the main stem between Oradell dam and the confluence with Overpeck Creek	FW2-NT/SE1
(Little Ferry) - Tributaries joining the main stem downstream of Overpeck Creek	FW2-NT/SE2
HANKS POND (Clinton) - Pond and all tributaries	FW1
HARMONY BROOK (Brookside) - Entire length	FW2-TP(C1)
HARRISONS BROOK (Bernards) - Entire length	FW2-NT
HAVEMEYER BROOK (Mahwah) - Entire length	FW2-TP(C1)
HEWITT BROOK (W. Milford) - Entire length	FW2-TP(C1)
HIBERNIA BROOK	
(Marcella) - Source to first Green Pond Road bridge downstream of Lake Emma	FW2-TP(C1)
(Hibernia) - First Green Pond Road bridge to confluence with Beaver Brook	FW2-TM(C1)
TRIBUTARY	
(Lake Ames) - Source to, but not including, Lake Ames	FW2-TP(C1)
HIGH MOUNTAIN BROOK (Ringwood) - Source to, but not including, Skyline Lake	FW2-TP(C1)
HOHOKUS BROOK (Hohokus) - Entire length	FW2-NT
HUDSON RIVER	
(Rockleigh) - River and saline portions of New Jersey tributaries from the New Jersey-New York boundary line in the north to its confluence with the Harlem River, New York	SE1
(Englewood Cliffs) - River and saline portions of New Jersey tributaries from the confluence with the Harlem River, New York to a north-south line connecting Constable Hook (Bayonne) to St. George (Staten Island, New York)	SE2
TRIBUTARIES	
(Rockleigh) - Freshwater portions of tributaries to the Hudson River in New Jersey	FW2-NT
INDIAN GROVE BROOK (Bernardsville) - Entire length	FW2-TP(C1)
JACKSON BROOK	
(Mine Hill) - Source to the boundary of Hurd Park, Dover, including all tributaries	FW2-TP(C1)
(Dover) - Hurd Park to Rockaway River	FW2-NT(C1)
JENNINGS CREEK (W. Milford) - State line to Wanaque River	FW2-TP(C1)
JERSEY CITY RESERVOIR (Boonton)	FW2-TM(C1)
KANOUSE BROOK (Newfoundland) - Entire length	FW2-TP(C1)

KIKEOUT BROOK (Butler) - See STONE HOUSE BROOK	
KILL VAN KULL (Bayonne) - Westerly from a north-south line connecting Constable Hook (Bayonne) to St. George (Staten Island, New York)	SE3
LAKE RICKONDA OUTLET STREAM (Monks) - That segment of the outlet stream from Lake Rickonda within Ringwood State Park	FW2-TM(C1)
LAKE STOCKHOLM BROOK	
(Stockholm) - Entire length, except tributaries described separately below	FW2-TP(C1)
(Stockholm) - Portion of westerly tributary, from its origins to about 1000 feet south of the Route 23 bridge, located entirely within the boundaries of the Newark watershed	FW1(tp)
(Stockholm) - Brook between Hamburg Turnpike and Vernon-Stockholm Rd. to its confluence with Lake Stockholm Brook, north of Rt. 23	FW1(tp)
LITTLE POND BROOK (Oakland) - Entire length	FW2-TP(C1)
LOANTAKA BROOK	
(Green Village) - Entire length, except segment described below	FW2-NT
(Great Swamp) - Brook and all tributaries within the boundaries of Great Swamp National Wildlife Refuge	FW2-NT(C1)
LUD-DAY BROOK (Camp Garfield) - Source downstream to its confluence with the southwestern outlet stream from Clinton Resevoir just upstream of the confluence of the outlet stream and a tributary from Camp Garfield	FW1
MACOPIN RIVER	
(Newfoundland) - Source to Echo Lake dam, including Echo Lake	FW2-NT
(Newfoundland) - Echo Lake dam downstream to Pequannock River	FW2-TP(C1)
TRIBUTARY	
Mathews Brook (Echo Lake) - Entire length, including all tributaries	FW2-NT
MEADOW BROOK	
(Wanaque) - Skyline Lake and its outlet stream to E. Belmont Ave., including all tributaries	FW2-NT(C1)
(Wanaque) - E. Belmont Ave. downstream to Wanaque River	FW2-TP(C1)
MILL BROOK	
(Randolph) - Source to Route 10 bridge, including all tributaries	FW2-TP(C1)
(Randolph) – Route 10 bridge to Rockaway River	FW2-TM(C1)

TRIBUTARIES	
(N. of Union Hill) - Entire length	FW2-TP(C1)
MONKSVILLE RESERVOIR (Long Pond Iron Works State Park)	FW2-TM(C1)
MORSES CREEK (Linden) - Entire length	FW2-NT/SE3
MOSSMANS BROOK (West Milford) - Source to confluence with Clinton Reservoir	FW2-TP(C1)
MT. TABOR BROOK (Morris Plains) - Entire length	FW2-NT
NEWARK BAY (Newark) - North of an east-west line connecting Elizabethport with Bergen Pt., Bayonne up to the mouths of the Passaic and Hackensack Rivers	SE3
NOSENZO POND (Upper Macopin)	FW2-NT(C1)
OAK RIDGE RESERVOIR (Oak Ridge)	FW2-TM(C1)
OAK RIDGE RESERVOIR TRIBUTARIES	
(Oak Ridge) - Northwestern tributary to Reservoir	FW1(tm)
(Oak Ridge) – Southwestern tributary to Reservoir	FW2-TM(C1)
OHIO BROOK (Morris Township) - Source downstream to Morristown town line	FW2-TM
ORADELL RESERVOIR (Oradell)	FW2-NT(C1)
TRIBUTARIES	
(Oradell) - All named and unnamed tributaries that are not listed separately, that drain into Oradell Reservoir above the Oradell Dam	(FW2-NT(C1)
OVERPECK CREEK (Palisades Park) - Entire length	FW2-NT/SE2
PACOCK BROOK	
(Canistear) - Brook and tributaries upstream of Canistear Reservoir located entirely within the boundaries of the Newark Watershed	FW1
(Canistear) – Brook including Marshall Pond upstream of Canistear Reservoir located outside the boundaries of the Newark Watershed	FW2-NT(C1)
(Stockholm) - Outlet stream of Canistear Reservoir to Pequannock River	FW2-NT(C1)
PASCACK BROOK (Hackensack) - New York/New Jersey State line to confluence with the Oradell Reservoir, including Woodcliff Lake, and all tributaries	FW2-NT(C1)
PASSAIC RIVER	
(Mendham) - Source downstream to, but not including, Osborn Pond or tributaries described separately below	FW2-TP(C1)
(Paterson) - Outlet of Osborn Pond to Dundee Lake dam	FW2-NT
(Little Falls) - Dundee Lake dam to confluence with Second River	FW2-NT/SE2
(Newark) - Confluence with Second River to mouth	SE3
TRIBUTARIES	

(Great Piece Meadows State Park) - Tributaries within Great Piece Meadows State Park	FW2-NT(C1)
PECKMAN RIVER (Verona) - Entire length	FW2-NT
PEQUANNOCK RIVER	
MAIN STEM	
(Vernon) - Source to confluence with Pacock Brook	FW1(tp)
(Hardyston) - River and the easterly tributary from Pacock Brook to, but not including, Oak Ridge Reservoir	FW2-TP(C1)
(Newfoundland) - Outlet of Oak Ridge Reservoir downstream to Charlottesburg Reservoir, including all unnamed tributaries, but not including Charlottesburg Reservoir	FW2-TP(C1)
(Charlottesburg) - Outlet of Charlottesburg Reservoir to, but not including, Macopin Reservoir or the tributaries described separately below	FW2-TP(C1)
(Kinnelon) - Macopin Reservoir outlet to Hamburg Turnpike bridge in Pompton Lakes Borough	FW2-TP(C1)
(Riverdale) - Hamburg Turnpike bridge in Pompton Lakes Borough to confluence with Wanaque River	FW2-TM
(Pompton Plains) - Confluence with Wanaque River downstream to confluence with Pompton River	FW2-NT
TRIBUTARIES	
(Copperas Mtn.) - Entire length	FW2-TP(C1)
(Smoke Rise) - Entire length	FW2-TP(C1)
(Green Pond Junction) - Tributary at Green Pond Junction from its origin downstream to Route 23	FW1(tm)
(Jefferson) - Tributary joining the main stem about 3500± feet southeast of the Sussex-Passaic County line, near Jefferson from its origin to about 2000 feet upstream of the pond	FW1(tm)
(Maple Lake) – Entire length, including all tributaries	FW2-TP(C1)
(Lake Kampfe) - Source to, but not including, Lake Kampfe	FW2-TM
(Lake Kampfe) - Lake Kampfe to Pequannock River, except tributary described separately below	FW2-NT
(Lake Kampfe) - Tributary within the boundaries of Norvin Green State Forest, originating west of Torne Mtn.	FW2-NT(C1)
(Suntan Lake) – Entire length, including all tributaries	FW2-TP(C1)
PILES CREEK (Grasselli) - Entire length	SE3
POMPTON LAKE (Pompton Lakes)	FW2-NT
POMPTON RIVER (Wayne) - Entire length	FW2-NT
POND BROOK (Oakland) - Entire length	FW2-NT
POSTS BROOK	
(Bloomingdale) - Source to confluence with Wanaque River, except Wanaque Reservoir and segment described below	FW2-NT

(Norvin Green State Forest) - That segment of the stream and all tributaries within the boundaries of Norvin Green State Forest	FW2-NT(C1)
PREAKNESS (SINGAC) BROOK	
(Wayne) - Source to, but not including, Barbour Pond	FW2-TP(C1)
(Barbour Pond) - Pond to Passaic River	FW2-NT
PRIMROSE BROOK	
(Harding) - Source to Lees Hill Road bridge	FW2-TP(C1)
(Harding) - Lees Hill Road bridge to Great Swamp National Wildlife Refuge boundary	FW2-NT
(Great Swamp) - Wildlife Refuge boundary to Great Brook	FW2-NT(C1)
RAHWAY RIVER	
SOUTH BRANCH	
(Rahway) - Source to Hazelwood Ave., Rahway	FW2-NT
(Rahway) - Hazelwood Ave. to mouth	SE2
MAIN STEM	
(Rahway) - Upstream of Pennsylvania Railroad bridge	FW2-NT
(Linden) - Penn. Railroad bridge to Route 1&9 crossing	SE2
(Carteret) - Route 1&9 crossing to mouth	SE3
RAMAPO LAKE (Ramapo) - Lake and all outlet streams and tributaries within the boundaries of Ramapo Mtn. State Forest	FW2-NT(C1)
RAMAPO RIVER	
(Mahwah) - State line to confluence with Fox Brook	FW2-NT
(Mahwah) – Confluence with Fox Brook to Patriots Way bridge	FW2-NT(C1)
(Mahwah) – Patriots Way bridge to Pompton River	FW2-NT
TRIBUTARY (Oakland) - Entire length	FW2-TP(C1)
RICKONDA LAKE (Ringwood)	FW2-NT(C1)
RINGWOOD CREEK	
(Ringwood) - Entire length, including all tributaries	FW2-TM(C1)
RINGWOOD MILL POND (Ringwood)	FW2-NT(C1)
ROCKAWAY RIVER	
(Wharton) - Source to Washington Pond outlet, including all lakes and unnamed and unlisted tributaries	FW2-NT(C1)
(Dover) - Washington Pond outlet downstream to Route 46 bridge, including all tributaries	FW2-TM(C1)
(Boonton) - Route 46 bridge to, but not including Jersey City Reservoir, including all unnamed and unlisted tributaries	FW2-NT(C1)
(Boonton) - Jersey City Reservoir to Passaic River	FW2-NT
RUSSIA BROOK	
(Sparta) - Source to Lake Hartung dam, including all tributaries	FW2-NT(C1)
(Milton) - Lake Hartung dam to, but not including, Lake Swannanoa, including all tributaries	FW2-TM(C1)

(Longwood) - Lake Swannanoa and its outlet stream to the confluence with the Rockaway River	FW2-NT(C1)
TRIBUTARIES	
(S. of Mt. Paul) – Entire length	FW2-TP(C1)
SADDLE RIVER	
(Upper Saddle River) - State line to confluence with Pleasant Brook, including all tributaries	FW2-TP(C1)
(Saddle River) - Pleasant Brook to Allendale Rd. bridge	FW2-TM
(Lodi) - Allendale Rd. bridge to Marsellus Place	FW2-NT
(Lodi) - Marsellus Place to Passaic River	FW2-NT/SE3
SAWMILL CREEK (Pompton Plains) - Entire length	FW2-NT
SCARLET OAK POND (Mahwah)	FW2-TM
SHEPPARD LAKE (Ringwood)	FW2-TM(C1)
SINGAC BROOK - See PREAKNESS BROOK	
SLOUGH BROOK (Livingston) - Entire length	FW2-NT
SMITH CREEK (Woodbridge) - Entire length	FW2-NT/SE3
SPLIT ROCK RESERVOIR (Rockaway)	FW2-TM(C1)
TRIBUTARIES	
(Farny State Park)- Three tributaries within Farny State Park	FW2-NT(C1)
(Rockaway) - All tributaries that drain into Split Rock Reservoir outside Farny State Park	FW2-TP(C1)
SPRING (GRANNEY) BROOK (Mine Hill) - Entire length	FW2-TP(C1)
SPRING GARDEN BROOK (Florham) - Entire length	FW2-NT
STAG (CLOVE) BROOK (Mahwah) - Entire length	FW2-TP(C1)
STEPHENS BROOK	
(Roxbury) - Entire length, including all tributaries, except segment described separately, below	FW2-NT(C1)
(Berkshire Valley) - That segment north of the boundaries of the Berkshire Valley Wildlife Management Area	FW1
STONE HOUSE BROOK	
(Kinnelon) - Source to Valley Road bridge	FW2-NT
(Butler) - Valley Road bridge to confluence with Pequannock River	FW2-TP(C1)
STONY BROOK (Boonton) – Entire length, including all tributaries	FW2-NT(C1)
SURPRISE LAKE (Hewitt)	FW1
SWAN POND (Ringwood)	FW2-NT(C1)
TAPPAN, LAKE (Old Tappan)	FW2-NT(C1)
TELEMARK LAKE (Hibernia)	FW2-NT(C1)
TENAKILL BROOK (Demarest) - Entire length, including all tributaries, except Cresskill Brook	FW2-NT(C1)
TERRACE POND (Wawayanda)	FW2-NT(C1)
TIMBER BROOK (Kitchell) - Entire length, including all tributaries	FW2-NT(C1)
TROY BROOK (Troy Hills) - Entire length	FW2-NT

WALLACE BROOK (Randolph) - Source downstream to, but not including Hedden Park Lake	FW2-TP(C1)
WANAQUE RESERVOIR	FW2-TM(C1)
TRIBUTARIES (Wanaque Reservoir) - All unnamed and unlisted tributaries that drain into Wanaque Reservoir	FW2-TM(C1)
WANAQUE RIVER	
MAIN STEM	
(Wanaque) - Greenwood Lake outlet, through Wanaque Wildlife Management Area and Long Pond Iron Works State Park, including the Monksville Reservoir, to the Monksville Reservoir dam at Stonetown Road, except tributary south of Jennings Creek (Hewitt) described separately below	FW2-TM(C1)
(Pompton Lakes) - Wanaque Reservoir dam to Wanaque Ave. bridge including unnamed tributaries	FW2-TP(C1)
(Pompton Lakes) - Wanaque Ave. bridge downstream to Pequannock River	FW2-TM
TRIBUTARY	
(Hewitt) - Entire length of tributary south of Jennings Creek	FW2-TP(C1)
WEST BROOK (W. Milford) - Entire length	FW2-TP(C1)
WEST POND (Hewitt)	FW1
WEYBLE POND (Ringwood)	FW2-NT(C1)
WHIPANNY RIVER	
(Brookside) - Source to Whitehead Rd. bridge	FW2-TP(C1)
(Morristown) - Whitehead Rd. bridge to Rockaway River	FW2-NT
TRIBUTARIES	
(Brookside) - Entire length	FW2-TP(C1)
(E. of Brookside) - Entire length	FW2-TM
(E. of Washington Valley) - Entire length	FW2-TM
(Gillespie Hill) - Entire length	FW2-TP(C1)
(Shongum Mtn.) - Entire length	FW2-NT
WONDER LAKE (West Milford)	FW2-NT(C1)
WOODBRIDGE CREEK (Woodbridge) - Entire length	FW2-NT/SE3
WOODCLIFF LAKE (Woodcliff Lake)	FW2-NT(C1)

(g) The following surface water classifications are for waters of the Upper Raritan River and Raritan Bay Basin:

Waterbody	Classification
ALLERTON CREEK (Allerton) - Entire length	FW2-NT
AMBROSE BROOK (Piscataway) - Entire length	FW2-NT
AMWELL LAKE (Syndertown)	FW2-NT(C1)
ASSISCONG CREEK (Flemington) - Entire length	FW2-NT
BACK BROOK (Vanliew's Corners) - Entire length	FW2-NT
BALDWINS CREEK	
(Pennington) - Entire length, except segment described separately below	FW2-NT
(Baldwin) - Segment within the boundaries of Baldwin Lake Wildlife Management Area	FW2-NT(C1)
BEAVER BROOK	
(Cokesbury) - Source to Reformatory Road bridge	FW2-TP(C1)
(Annandale) - Reformatory Rd. bridge to Beaver Ave., bridge	FW2-TM
(Annandale) - Beaver Ave. bridge downstream to the lower most I-78 bridge	FW2-TP(C1)
(Clinton) - Lower most I-78 bridge downstream to, the South Branch Raritan River	FW2-TM
BEDEN BROOK (Montgomery) - Entire length	FW2-NT
BLACK BROOK (Polktown) - Entire length	FW2-TP(C1)
BLACK RIVER - See LAMINGTON RIVER	
BLUE BROOK (Mountainside) - Entire length	FW2-NT
BOULDER HILL BROOK (Tewksbury) - Entire length	FW2-TP(C1)
BOUND BROOK (Dunellen) - Entire length	FW2-NT
BUDD LAKE (Mt. Olive)	FW2-NT(C1)
TRIBUTARIES	
(E. of Budd Lake) - Entire Length	FW2-TM
(W. of Budd Lake) - Entire Length	FW2-NT
BURNETT BROOK (Ralston) - Entire length	FW2-TP(C1)
BUSHKILL BROOK	
(Flemington) – Source and tributary downstream to Rt. 31 Bridge	FW2-TM
(Flemington) – Rt. 31 bridge downstream to South Branch Raritan River	FW2-NT
CAPOOLONG (CAKEPOULIN) CREEK (Sydney) - Entire length	FW2-TP(C1)
CHAMBERS BROOK (Whitehouse) - Entire length	FW2-NT
COLD BROOK (Oldwick) - Entire length	FW2-TP(C1)
CRAMERS CREEK (Hamden) - Entire length	FW2-NT
CRUSER BROOK (Montgomery) - Entire length	FW2-NT

CUCKELS BROOK (Bridgewater) - Entire length	FW2-NT
DAWSONS BROOK (Ironia) - Entire length	FW2-TP(C1)
DRAKES BROOK	
(Ledgewood) - Source downstream to Hillside Avenue bridge	FW2-TM(C1)
(Flanders) - Hillside Avenue bridge to confluence with the South Branch Raritan River	FW2-NT(C1)
TRIBUTARY (Mt. Olive) - Source downstream to Central Railroad bridge	FW2-TP(C1)
DUCK POND RUN (Port Mercer) - Entire length	FW2-NT
DUKES BROOK (Somerville) - Entire length	FW2-NT
ELECTRIC BROOK (Schooley's Mtn.) - Entire length	FW2-TP(C1)
FLANDERS BROOK (Flanders) - Entire length	FW2-TP(C1)
FLANDERS CANAL (Flanders) - Entire length	FW2-NT(C1)
FROG HOLLOW BROOK (Califon) - Entire length	FW2-TP(C1)
GLADSTONE BROOK (St. Bernards School) - Entire length	FW2-TP(C1)
GRANDIN BROOK (see SIDNEY BROOK)	
GREEN BROOK	
(Watchung) - Source to Rt. 22 bridge	FW2-TM
(Plainfield) - Route 22 bridge to Raritan River	FW2-NT
GUINEA HOLLOW BROOK (Tewksbury)	FW2-TP(C1)
HACKLEBARNEY BROOK (Hacklebarney) - Entire length	FW2-TP(C1)
HEATHCOTE BROOK (Kingston) - Entire length	FW2-NT
HERZOG BROOK (Pottersville) - Entire length	FW2-TP(C1)
HICKORY RUN (Califon) - Entire length	FW2-TP(C1)
HOCKHOCKSON BROOK (Colts Neck) - Entire length	FW2-TM
HOLLAND BROOK (Readington) - Entire length	FW2-NT
HOLLOW BROOK (Pottersville) - Entire length	FW2-TP(C1)
HOOKS CREEK LAKE (Cheesequake State Park)	FW2-NT(C1)
HOOPSTICK BROOK (Bedminister) - Entire length	FW2-NT
INDIA BROOK (NORTH BRANCH, RARITAN RIVER)	
(Randolph) - Entire length	FW2-TP(C1)
KRUEGER'S BROOK - (Flanders) - Entire length	FW2-TP(C1)
LAMINGTON RIVER (BLACK RIVER)	
(Succasunna) - Source to Rt. 206 bridge	FW2-NT(C1)
(Milltown) - Rt. 206 bridge to confluence with Rinehart Brook	FW2-TM(C1)
(Pottersville) - Confluence with Rinehart Brook to Camp Brady bridge, Bedminister	FW2-TP(C1)
(Vliettown) - Camp Brady bridge to confluence with Cold Brook	FW2-TM
(Oldwick) – Confluence with Cold Brook to the Route 523 bridge, including all tributaries	FW2-TM(C1)
(Burnt Mills) –Route 523 bridge to North Branch, Raritan River, including all tributaries	FW2-NT(C1)

TRIBUTARY (Ironia) - Source downstream to, but not including, Bryant Pond	FW2-TP(C1)
LEDGEWOOD BROOK (Ledgewood) - Entire length	FW2-TP(C1)
LITTLE BROOK (Califon) - Entire length	FW2-TP(C1)
LOMERSON BROOK - See HERZOG BROOK	
MCVICKERS BROOK (Mendham) - Entire length	FW2-TM(C1)
MIDDLE BROOK (Greater Cross Roads) - Entire length	FW2-NT
MIDDLE BROOK	
EAST BRANCH (Springdale) - Entire length	FW2-TM
WEST BRANCH (Martinsville) - Entire length	FW2-NT
MAIN STEM (Bound Brook) - Confluence of East and West branches to Raritan River	FW2-NT
MILFORD BROOK (Lafayette Mills) - Entire length	FW2-NT
MINE BROOK (Mine Brook) - Entire length	FW2-NT
TRIBUTARIES	
(East of Mine Mt.) - Entire length	FW2-TP(C1)
(South of Mine Mt.) - Source downstream to Douglass Road Bridge	FW2-TP(C1)
MULHOCKAWAY CREEK (Pattenburg) - Entire length	FW2-TP(C1)
NESHANIC RIVER (Reaville) - Entire length	FW2-NT
NORTON BROOK (Norton) - Entire length	FW2-TP(C1)
OAKDALE CREEK (Chester) - Entire length	FW2-TP(C1)
PEAPACK BROOK (Gladstone) - Entire length	FW2-TP(C1)
PETERS BROOK (Somerville) - Entire length	FW2-NT
PIGEON SWAMP (Pigeon Swamp State Park) - All waters within the boundaries of Pigeon Swamp State Park	FW2-NT(C1)
PIKE RUN (Belle Meade) - Entire length	FW2-NT
PLEASANT RUN (Readington) - Entire length	FW2-NT
PRESCOTT BROOK (Stanton Station) - Entire length	FW2-TM
RARITAN BAY - Entire drainage	FW2-NT/SE1
RARITAN RIVER	
NORTH BRANCH (Also see INDIA BROOK)	
(Pleasant Valley) - Source to, but not including, Ravine Lake	FW2-TP(C1)
(Far Hills) - Ravine Lake dam to Rt. 512 bridge	FW2-TM
(Bedminister) - Rt. 512 bridge to confluence with South Branch, Raritan River	FW2-NT
SOUTH BRANCH RARITAN RIVER	
(Mt. Olive) - Source to the dam that is 390 feet upstream of the Flanders-Drakestown Road bridge and the two tributaries which originate north and east of the Budd Lake Airfield	FW2-NT(C1)
(Mt. Olive) - Dam to confluence with Turkey Brook	FW2-TM(C1)
(Middle Valley) - Confluence with Turkey Brook to Rt. 512 bridge	FW2-TP(C1)

(Califon) - Rt. 512 bridge to downstream end of Packers Island, except segment described separately, below	FW2-TM
(Ken Lockwood Gorge) - River and tributaries within Ken Lockwood Gorge Wildlife Management Area	FW2-TM(C1)
(Neshanic Sta.) - Downstream end of Packers Island to confluence with North Branch, Raritan River	FW2-NT
TRIBUTARIES, SOUTH BRANCH RARITAN RIVER	
(Long Valley) - Entire length	FW2-TP(C1)
(High Bridge) - Entire length	FW2-TM
(S. of Hoffmans) - Entire length	FW2-TP(C1)
(S. of Schooley's Mt.) - Entire length	FW2-TP(C1)
MAIN STEM RARITAN RIVER	
(Bound Brook) - From confluence of North and South Branches to Landing Lane bridge in New Brunswick and all freshwater tributaries downstream of Landing Lane bridge.	FW2-NT
(Sayreville) - Landing Lane bridge to Raritan Bay and all saline water tributaries	SE1
RINEHART BROOK (Hacklebarney) - Entire length	FW2-TP(C1)
ROCK BROOK (Montgomery) - Entire length	FW2-NT
ROCKAWAY CREEK	
NORTH BRANCH	
(Mountainville) - Source to Rt. 523 bridge	FW2-TP(C1)
(Whitehouse) - Rt. 523 bridge to confluence with South Branch	FW2-TM
SOUTH BRANCH	
(Clinton) - Headwaters to Readington Township boundary including all tributaries	FW2-TP(C1)
(Clinton) - Readington Township boundary to Lake Cushetunk, including all tributaries	FW2-TM(C1)
(Whitehouse) - Lake Cushetunk to its confluence with main stem Rockaway Creek	FW2-TM
MAIN STEM (Whitehouse) - Confluence of North and South Branches to Lamington River	FW2-NT
ROCKY RUN - (Lebanon) - Entire length	FW2-TP(C1)
ROUND VALLEY RESERVOIR (Clinton)	FW2-TP(C1)
ROYCE BROOK (Manville) - Entire length	FW2-NT
SIDNEY BROOK	
(Grandin) – Headwaters downstream to the Route 513 bridge, including all tributaries	FW2-TM(C1)
(Grandin) - Route 513 bridge to its confluence with the South Branch Raritan River, including all tributaries	FW2-NT(C1)
SIMONSON BROOK (Griggstown) - Entire length	FW2-NT
SIX MILE RUN	

(Franklin Church) - Entire length, except segment described below	FW2-NT
(Hillsborough) - Segment within the boundaries of Six Mile Run State Park	FW2-NT(C1)
SPOOKY BROOK (Bound Brook)	FW2-NT
SPRUCE RUN	
(Glen Gardner) - Source to, but not including, Spruce Run Reservoir	FW2-TP(C1)
(Clinton) - Spruce Run Reservoir dam to Raritan River, South Branch	FW2-TM
SPRUCE RUN RESERVOIR (Union) - Reservoir and tributaries	FW2-TM(C1)
STONY BROOK (Washington) - Entire length	FW2-TP(C1)
STONY BROOK	
(Hopewell) - Source to Old Mill Road, except that segment described below	FW2-NT
(Hopewell) - Old Mill Road to Quaker Road	FW2-NT(C1)
(Carnegie Lake) - Quaker Road to Millstone River, including Carnegie Lake	FW2-NT
(Snydertown) - Brook and tributaries within Amwell Lake Wildlife Management Area	FW2-NT(C1)
STONY BROOK (Watchung) - Entire length	FW2-NT
SUN VALLEY BROOK (Mt Olive) - Entire length	FW2-TP(C1)
TANNERS BROOK (Washington) - Entire length	FW2-NT(C1)
TEETERTOWN BROOK (Lebanon) - Entire length	FW2-TP(C1)
TEN MILE RUN (Franklin) - Entire length	FW2-NT
TROUT BROOK (Hacklebarney) - Entire length	FW2-TP(C1)
TURKEY BROOK (Mt. Olive) - Entire length	FW2-TP(C1)
TURTLEBACK BROOK (Middle Valley) - Entire length	FW2-NT
WALNUT BROOK (Flemington) - Entire length	FW2-TM
WILLOUGHBY BROOK (Buffalo Hollow) - Entire length	FW2-TP(C1)

(h) The following surface water classifications are for waters of the Lower Raritan River and Raritan Bay Basin:

Waterbody	Classification
BARCLAY BROOK (Redshaw Corners) - Entire length	FW2-NT
BEAR BROOK (West Windsor) - Entire length	FW2-NT
BIG BROOK (Vanderberg) - Entire length, including all tributaries and lakes	FW2-NT(C1)
BLACKBERRY CREEK	
(Oceanport) - Source to a line beginning on the easternmost extent of Gooseneck Point and bearing approximately 162 degrees True North to its terminus on the westernmost extent of an unnamed point of land in the vicinity of the western extent of Cayuga Ave. in Oceanport	SE1
(Oceanport) - Creek below the line described above	SE1(C1)
BRANCHPORT CREEK	
(Long Branch) - Source to a line beginning on the northernmost extent of an unnamed point of land lying north of Pocano Ave. in Oceanport and bearing approximately 055 degrees True North to its terminus on the westernmost extent of the northern bulkhead at the lagoon located between France Rd. and Lori Rd. in Monmouth Beach	FW2-NT/SE1
(Monmouth Beach) - Creek below line described above	SE1(C1)
CEDAR BROOK (Spotswood) - Entire length	FW2-NT
CHEESEQUAKE STATE PARK WATERS (S. Amboy) - Fresh waters within the park upstream of the limits of tidal influence	FW2-NT(C1)
CLAYPIT CREEK	
(Navesink) - Source to widening of the Creek near Linden Ave. and just north to the Locust Ave. bridge in Navesink	FW2-NT/SE1
(Navesink) - Widening of Creek to Navesink River	SE1(C1)
CRANBURY BROOK (Old Church) - Entire length	FW2-NT
DEEP RUN (Old Bridge) - Entire length	FW2-NT
DEVILS BROOK (Schalks) - Entire length	FW2-NT
GANDER BROOK (Manalapan) - Entire length	FW2-NT
GREAT DITCH (S. Brunswick) - That portion of Great Ditch and its tributaries within Pigeon Swamp State Park	FW2-NT(C1)
IRELAND BROOK (Paulus Corners) - Entire length	FW2-NT
IRESICK BROOK (Spotswood) - Entire length	FW2-NT
LAWRENCE BROOK	

(Deans) - Source to the intake of the New Brunswick Water Department at Weston's Mill Dam	FW2-NT
(New Brunswick) - Weston's Mill Dam to Raritan River	SE1
LITTLE SILVER CREEK	
(Shrewsbury) - Source to a line beginning on the eastern bank of that unnamed lagoon located between Wardell Ave. and Oakes Rd. in Rumson and bearing approximately 171 degrees T (True North) to its terminus on the south shore of Little Silver Creek	FW2-NT/SE1
(Rumson) - Creek below line described above	SE1(C1)
MANALAPAN BROOK	
(Jamesburg) - Source to Duhernal Lake dam, except tributary described separately below	FW2-NT
(Tennent) - That portion of the tributary at Tennent along the boundary of Monmouth Battlefield State Park	FW2-NT(C1)
MATCHAPONIX BROOK (WEAMACONK CREEK)	
(Mount Mills) - Entire length, except segments described below	FW2-NT
(Freehold) - The brook and tributaries within the boundaries of Monmouth Battlefield State Park	FW2-NT(C1)
MCGELLAIRDS BROOK	
(Englishtown) - Entire length, except tributary described separately below	FW2-NT
(Freehold) - Tributary within Monmouth Battlefield State Park	FW2-NT(C1)
MILLSTONE RIVER (Hightstown) - Entire length	FW2-NT
MINE BROOK (Colts Neck) - Entire length, including all tributaries	FW2-NT(C1)
NAVESINK RIVER	
(Red Bank) - Source to a line starting at a point at the northeast end of Blossom Cove, bearing approximately 142 degrees T (True North), through navigational aid C23 to the south bank near Riverview Hospital	SE1
(Rumson) - River southeast of the line described above, except segment described below	SE1(C1)
(Monmouth Beach) - All water south and east of a line beginning on the northwesternmost point of land on Raccoon Island (in the vicinity of the western extent of Highland Ave.) in Monmouth Beach, and bearing approximately 056 degrees T (True North) to the southernmost point of a small unnamed island, and then bearing approximately 091 degrees T (True North) to its terminus on the northernmost point of land located at the northern extent of Monmouth	

Parkway in Monmouth Beach and all waters south of a line beginning on the western shoreline (just east of Monmouth Parkway in Monmouth Beach) and bearing approximately 081 degrees T (True North), intersecting Channel Marker Flashing Red 4 and Channel Marker Flashing Red 2 and terminating on the eastern shoreline of the Galilee section of Monmouth Beach.	SE1
OAKEYS BROOK (Deans) - Entire length	FW2-NT
OCEANPORT CREEK	
(Fort Monmouth) - Source to a line beginning on the easternmost extent of Horseneck Point and bearing approximately 140 degrees T (True North) to its terminus on the westernmost extent of an unnamed point of land located at the westernmost extent of Monmouth Boulevard in Oceanport	FW2-NT/SE1
(Oceanport) - Creek downstream of line described above	SE1(C1)
PARKERS CREEK	
(Fort Monmouth) - Source to a line beginning on the easternmost extent of Horseneck Point and bearing approximately 000 degrees T (True North) to its terminus on Breezy Point on the Little Silver side (north) side of the creek	FW2-NT/SE1
(Fort Monmouth) - Creek downstream of line described above	SE1(C1)
PINE BROOK (Clarks Mills) - Entire length	FW2-NT
PINE BROOK (Cooks Mill) - Entire length	FW2-TM
RAMINESSIN (HOP) BROOK (Holmdel) - Entire length, including all tributaries	FW2-TM(C1)
SANDY HOOK BAY (Sandy Hook)	SE1
SHREWSBURY RIVER	
(Little Silver) - Source to Rt. 36 highway bridge	SE1(C1)
(Highlands) - Rt. 36 bridge to Sandy Hook Bay	SE1
SOUTH RIVER	
(Old Bridge) - Duhernal Lake to intake of the Sayreville Water Department	FW2-NT
(Sayreville) - Below the intake of the Sayreville Water Department	SE1
SWIMMING RIVER RESERVOIR (Red Bank)	FW2-NT(C1)
TRIBUTARIES (Swimming River Reservoir) – All unnamed and unlisted tributaries to Swimming River Reservoir	FW2-NT(C1)
SWIMMING RIVER	
(Red Bank) - Swimming River Reservoir dam to Normandy Road	FW2-NT
(Red Bank) - Normandy Road to the Navesink River	SE1
TENNENT BROOK (Old Bridge) - Entire length	FW2-NT

TEPEHEMUS BROOK (Manalapan) - Entire length	FW2-NT
TOWN NECK CREEK	
(Little Silver) - Source to a line beginning on the easternmost extent of the unnamed point of land located just east of Paag Circle on the south bank of Town Neck Creek and bearing approximately 095 degrees True North and terminating on Silver Point	FW2-NT/SE1
(Little Silver) - Creek below the line described above	SE1(C1)
WEAMACONK CREEK - See MATCHAPONIX BROOK	
WEMROCK BROOK	
(Millhurst) - Entire length, except that segment described below	FW2-NT
(Monmouth Battlefield State Park) - Those segments of the brook and its tributaries within the boundaries of Monmouth Battlefield State Park	FW2-NT(C1)
WEMROCK POND (Monmouth Battlefield State Park)	FW2-NT(C1)
WILLOW BROOK (Holmdel) - Entire length, including all tributaries	FW2-NT(C1)
YELLOW BROOK (Colts Neck) - Entire length, including all tributaries	FW2-NT(C1)

(i) The following surface water classifications are for waters of the Wallkill River Basin:

Waterbody	Classification
BEARFORT WATERS (Wawayanda)	FW2-NT(C1)
BEAVER RUN (Wantage) - Entire length, except tributaries that originate in Wantage Township	FW2-NT(C1)
BLACK CREEK	
(McAfee) - Source to Rt. 94 bridge, except those tributaries described separately, below	FW2-TM
(Vernon) - Rt. 94 bridge to Pochuck Creek	FW2-NT
TRIBUTARIES	
(Hamburg) - Three tributaries to Black Creek which originate in the former Hamburg Mtn. Wildlife Management Area from their sources to the former Management Area boundaries	FW1(tm)
(Rudeville) - Triburaries within the former Hamburg Mtn. Wildlife Management Area not classified as FW1, above	FW2-TM(C1)
(McAfee) - Entire length	FW2-TP(C1)
(Vernon Valley) - Entire length	FW2-NT
BLUE HERON LAKE (Sparta)	FW2-NT(C1)
CEDAR SWAMP - See RUTGERS CREEK	
CLOVE CREEK (Colesville) - Entire length	FW2-TM
CLOVE BROOK	
(Wantage) - Source to, but not including, Clove Acres Lake, except those tributaries described separately below	FW2-TM
(Sussex) - Clove Acres Lake to Papakating Creek	FW2-NT
(High Point) - Those portions of the two northernmost tributaries located entirely within High Point State Park boundaries, immediately east of Lake Marcia	FW1(tp)
FRANKLIN POND (Hamburg Mtn.)	FW2-NT
TRIBUTARY (Franklin) – Southeastern tributary to Franklin Pond	FW2-NT(C1)
FRANKLIN POND CREEK	
(Hardyston) - Source to, but not including, Franklin Pond	FW2-TP(C1)
(Hamburg Mtn.) - Tributaries within the Hamburg Mtn.Wildlife Management Area	FW2-TM(C1)
TRIBUTARY (Hamburg Mtn.) - The first tributary to Franklin Pond Creek just south of Hamburg Mountain, flowing toward the Wallkill River and located entirely within the former Hamburg Mtn. Wildlife Management Area	FW1(tm)

GLENWOOD BROOK (Glenwood) - Outlet of Glenwood Lake to State line	FW2-TM
HAMBURG CREEK	
(Hamburg Mtn.) - Source to Route 517 bridge, Rudeville, except tributary described separately below	FW2-TM(C1)
(Hardistonville) - Route 517 bridge to Wallkill River	FW2-NT(C1)
(Hamburg Mtn.) - The third tributary just southwest of Hamburg Mtn. flowing toward the Wallkill River and located entirely within the Hamburg Mtn. Wildlife Management Area	FW1
HANFORD BROOK (Hanford) - Entire length within New Jersey	FW2-NT
HAWTHORNE LAKE (Sparta)	FW2-NT(C1)
HEATERS POND (Ogdensburg)	FW2-NT(C1)
LAKE LOOKOUT (Wawayanda)	FW1
LAKE LOOKOUT BROOK (Wawayanda) - Brook and tributaries from source in Newark City holdings, through the Wawayanda State Park, to confluence with the outlet stream from Lake Wawayanda	FW1
LAKE RUTHERFORD (Wantage) - The Lake and its tributaries	FW1(tm)
LAUREL POND (Wawayanda) - Laurel Pond, including its outlet stream and tributaries, to the outlet stream from Lake Wawayanda	FW1
LIVINGSTON PONDS (Wawayanda) - The two northwestern ponds which are within State Park lands	FW2-NT(C1)
LIVINGSTON PONDS BROOK (Wawayanda State Park) - Source downstream to State line	FW2-TP(C1)
LONG HOUSE BROOK	
(Upper Greenwood Lake) - Source to State line, except segment described below	FW2-NT
(Upper Greenwood Lake) - Segment within the boundaries of Hewitt State Forest	FW2-NT(C1)
LOUNSBERRY HOLLOW BROOK	
(Vernon Valley) - Outlet of Glenwood Lake to Pochuck Creek	FW2-TM
MOHAWK LAKE (Sparta) – Lake and its tributaries	FW2-NT
MORRIS LAKE (Sparta)	FW2-NT(C1)
MUD POND (Hamburg)	FW2-NT(C1)
MUD POND OUTLET STREAM (Hamburg) - Outlet stream from the Pond downstream to confluence with Hamburg Creek, including all tributaries	FW2-TP(C1)
PAPAKATING CREEK	
MAIN STEM	
(Frankford) - Source to Route 629 bridge, including all tributaries	FW2-TM(C1)
(Wantage) – Route 629 bridge to Lehigh and New England railroad crossing in Wantage Township, including	

all tributaries, except tributary east of Roys, Lake Windsor tributary, and the tributary that drains into Papakating Creek immediately upstream of the Lehigh and New England railroad crossing in Wantage Township	FW2-NT(C1)
(Lewisburg) - Lehigh and New England railroad crossing in Wantage Township to Wallkill River	FW2-NT
WEST BRANCH	
(Wantage) –Source to the confluence with Libertyville tributary, including all tributaries except the two tributaries immediately west of Plumbsock	FW2-NT(C1)
LIBERTYVILLE TRIBUTARY (Libertyville) – Entire length, except Herzenberg Lake tributary and the tributary south of Herzenberg Lake	FW2-NT(C1)
PARKER LAKE (Wawayanda)	FW2-NT(C1)
POCHUCK CREEK	
(Vernon) - Source to State line, except segment described separately below	FW2-NT
(High Point) - Segment within State Park lands	FW2-NT(C1)
QUARRYVILLE BROOK - See WILLOW BROOK	
RUTGERS CREEK (High Point) - The Cedar Swamp headwaters of the tributary to Rutgers Creek located entirely within the High Point State Park boundaries just south of the State line	FW1
SAGINAW, LAKE (Sparta)	FW2-NT(C1)
SAND HILLS BROOK	
(Hamburg Mtn.) - The upstream portion of Sand Hills Brook, including the pond at its headwaters, located entirely within the boundaries of the Hamburg Mtn. Wildlife Management Area	FW1
(Hamburg) - Brook and tributaries beyond Management Area boundaries	FW2-NT
SAWMILL POND BROOK	
(W. Milford) - Entire length, except segment described separately below	FW2-NT
(Wawayanda) - Segment within the boundaries of Wawayanda State Park	FW2-NT(C1)
SILVER LAKE (Hamburg Mtn.)	FW2-NT
SPARTA GLEN BROOK (Sparta) - Entire length	FW2-TP(C1)
SPRING BROOK (Maple Grange) - Entire length	FW2-TP(C1)
SUMMIT LAKE (Hardyston)	FW2-NT
SUNSET LAKE (Sparta)	FW2-NT(C1)
TAMARACKS LAKE (Hardyston)	FW2-NT
TOWN BROOK (Vernon) - Entire length	FW2-TM
WALLKILL RIVER	
(Sparta) - Source to confluence with Sparta Glen Brook	FW2-NT(C1)

(Franklin) - Sparta Glen Brook to, but not including, Franklin Pond, including all unnamed and unlisted tributaries	FW2-TM(C1)
(Wantage) - Outlet of Franklin Pond to confluence with Beaver Run, including all unnamed and unlisted tributaries	FW2-NT(C1)
(Wantage) - Confluence with Beaver Run to State line	FW2-NT
TRIBUTARIES	
(Sparta) - Entire length but not including Lake Saginaw	FW2-TP(C1)
(Ogdensburg) - Entire length	FW2-TP(C1)
(East of Quarryville) – Unnamed standalone stream segment east of Willow (Quarryville) Brook	FW2-NT(C1)
WANTAGE BROOK (Wantage) - Entire length, including all tributaries	FW2-NT
WAWAYANDA CREEK	
(Vernon) - State line to Pochuck Creek, except unnamed tributary described below	FW2-TM
TRIBUTARIES	
(Wawayanda) - Source to State line	FW2-NT
(Wawayanda State Park) - Segments within State Park boundaries, except Livingston Ponds Brook as noted above	FW2-NT(C1)
WAWAYANDA LAKE (Wawayanda)	FW2-TM(C1)
WHITE LAKE (Sparta)	FW2-TM(C1)
WILDCAT BROOK (Franklin) - Entire length, including all tributaries	FW2-NT(C1)
WILDWOOD LAKE (Hamburg Mountain)	FW2-NT(C1)
WILLOW (QUARRYVILLE) BROOK (Wantage) - Entire length, including all tributaries	FW2-TM

(j) FW1 waters are listed by tract within basins:

ATLANTIC COASTAL PLAIN BASIN

ALLAIRE STATE PARK	MANASQUAN RIVER WATERSHED Those portions of the first and second southerly tributaries to the Manasquan River, which are west of Hospital Rd. and are located entirely within the boundaries of Allaire State Park The easterly tributary to Mill Run upstream of Brisbane Lake, located entirely within the boundaries of Allaire State Park
BASS RIVER STATE FOREST	BASS RIVER WATERSHED Tommy's Branch from its headwaters downstream to the Bass River State Forest Recreation Area service road Falkenburg Branch of Lake Absegami from its headwaters to the Lake
GREENWOOD FOREST WILDLIFE MANAGEMENT AREA	CEDAR CREEK WATERSHED Webbs Mill Branch and tributaries, located entirely within the Greenwood Forest Wildlife Management Area boundaries Chamberlain's Branch from its origins to a point 1000 feet west of Route 539 Those portions of the tributaries to Chamberlain's Branch originating and wholly contained within the boundaries of the Greenwood Forest Wildlife Management Area WADING RIVER WATERSHED Westerly tributary to the Howardsville Cranberry Bog Reservoir and other tributaries that are located entirely within the boundaries of the Greenwood Forest Wildlife Management Area
ISLAND BEACH STATE PARK	BARNEGAT BAY WATERSHED All freshwater ponds in Island Beach State Park

LESTER G. MACNAMARA WILDLIFE MANAGEMENT AREA	GREAT EGG HARBOR RIVER WATERSHED Hawkins Creek and tributaries and the next adjacent, northern stream and tributaries that enter the Great Egg Harbor River, from their origins downstream to where the influence of impoundment begins
TUCKAHOE PUBLIC FISHING HUNTING GROUNDS	See LESTER G. MACNAMARA WILDLIFE AND MANAGEMENT AREA
WHARTON STATE FOREST	MULLICA RIVER WATERSHED Deep Run and tributaries from their headwaters downstream to Springer's Brook Skit Branch and tributaries from their headwaters downstream to the confluence with Robert's Branch Tulpehocken Creek and tributaries from their sources downstream to the confluence with Featherbed Branch The westerly tributaries to Tulpehocken Creek and those natural ponds within the lands bounded by Hawkins (Bulltown-Hawkins) Rd., Hampton Gate (Tuckerton) Rd., and Sandy Ridge Rd. Stream in the southeasterly corner of the Wharton State Forest, located between Ridge Rd. and Seaf Weeks Rd. downstream to the boundaries of Wharton State Forest Brooks and tributaries to the Mullica River between and immediately to the west of Tylertown and Crowleytown, from their headwaters downstream to the head of tide at mean high water The easterly branches of the Batsto River from Batsto Village upstream to the confluence with Skit Branch Gun Branch from its headwaters downstream to U.S. Route 206

DELAWARE RIVER BASIN

ALLAMUCHY STATE PARK	MUSCONETCONG RIVER WATERSHED All those tributaries to Deer Park Pond and its outlet stream, that are located entirely within the boundaries of Allamuchy State Park PEQUEST RIVER WATERSHED All tributaries that are located entirely within Allamuchy State Park and flow into Allamuchy Pond
BELLEPLAIN STATE FOREST	EAST CREEK WATERSHED All tributaries to Lake Nummi from their origins downstream to the Lake. Those two tributaries to Savages Run and portions thereof downstream of Lake Nummi, which are located entirely within the Belleplain State Forest boundaries A stream and its tributaries that originate just south of East Creek Mill Rd., 1.2+ miles north-northeast of Eldora, and are located entirely within the boundaries of Belleplain State Forest WEST CREEK WATERSHED The portion of the tributary to West Creek that originates about 0.9 miles southeast of Hoffman's Mill and is located entirely within the boundaries of Belleplain State Forest Eastern branch of the easterly tributary to Pickle Factory Pond from its origin to its confluence with the western branch Those tributaries to the stream which enter West Creek approximately 0.5 miles upstream of Hoffman's Mill and which are located entirely within the boundaries of Belleplain State Forest
COLLIERS MILLS WILDLIFE MANAGEMENT AREA	CROSSWICKS CREEK WATERSHED All tributaries to Lahaway Creek originating in the Colliers Mills Wildlife Management Area north-northeast of Archers Corner, from their origins downstream to the boundaries of the Colliers Mills Wildlife Management Area

DELAWARE WATER GAP NATIONAL RECREATION AREA	DELAWARE RIVER WATERSHED All tributaries to Flat Brook flowing from the Kittatinny Ridge and located entirely within the boundaries of the Delaware Water Gap National Recreation Area Rundle Brook upstream of Sussex County Route 615 Smith Ferry Brook Donkey's Corner Brook Sambo Island Brook and Pond Coppermine Brook in Pahaquarry Dunnfield Creek to Route I-80
DIX WILDLIFE MANAGEMENT AREA	MIDDLE MARSH CREEK WATERSHED All fresh waters which originate in and are located entirely within the boundaries of the Dix Wildlife Management Area
EDWARD G. BEVAN WILDLIFE MANAGEMENT AREA	MAURICE RIVER WATERSHED Joshua and Pine Branches of Buckshutem Creek to their confluences with Buckshutem Creek Gravelly Run downstream to the boundaries of the Edward G. Bevan Wildlife Management Area NANTUXENT CREEK WATERSHED Cedar and Mile Branches to Shaw's Mill Pond DIVIDING CREEK WATERSHED Those tributaries to Cedar Creek which originate in and are located entirely within the boundaries of the Edward G. Bevan Wildlife Management Area Those portions of tributaries to Dividing Creek, located entirely within the boundaries of the Edward G. Bevan Wildlife Management Area

FLATBROOK-ROY WILDLIFE MANAGEMENT AREA	FLAT BROOK WATERSHED The tributary to Little Flat Brook which originates north of the Bevans-Layton Rd., downstream to the first pond adjacent to the Fish and Game headquarters building Two tributaries to Flat Brook which originate along Struble Rd. in Stokes State Forest, downstream to the confluence with Flat Brook within Flatbrook-Roy Wildlife Management Area boundaries
GLASSBORO WILDLIFE MANAGEMENT AREA	MAURICE RIVER WATERSHED The portion of a branch of Little Ease Run situated immediately north of Stanger Avenue, and entirely within the Glassboro Wildlife Management Area First and second easterly tributaries to Little Ease Run north of Academy Road
HIGH POINT STATE PARK AND STOKES STATE FOREST	CLOVE BROOK WATERSHED The second and third northerly tributaries to Clove Brook, those tributaries to Steeny Kill Lake, Steeny Kill Lake, and those downstream of the Lake which originate in High Point State Park, downstream to the confluence with Clove Brook or to the boundaries of High Point State Park The northerly tributaries to Mill Brook due west of Steeny Kill Lake, within the High Point State Park boundaries FLAT BROOK WATERSHED All surface waters of the Flat Brook drainage within the boundaries of High Point State Park and Stokes State Forest except the following: (1) Saw Mill Pond and Big Flat Brook downstream to the confluence with Flat Brook; (2) Mashipacong Pond and its outlet stream (Parker Brook) to the confluence with Big Flat Brook; (3) Lake Wapalanne and its outlet stream to the confluence with Big Flat Brook; (4) Lake Ocquittunk and waters connecting it with Big Flat Brook;

	(5) Stony Lake and its outlet stream (Stony Brook) downstream to the confluence with the Big Flat Brook;
	(6) Kittatinny Lake, that portion of its inlet stream outside the Stokes State Forest boundaries, and its outlet stream, including the Shotwell Camping Area tributary, to the confluence with Big Flat Brook;
	(7) Deer Lake and its outlet stream to Lake Ashroe;
	(8) Lake Ashroe, the portions of its tributaries outside the Stokes State Forest boundaries, and its outlet stream to the confluence with Big Flat Brook;
	(9) Lake Shawanni and its outlet stream to the confluence with Flat Brook;
	(10) Crigger Brook and its tributary to the confluence with Big Flat Brook
	SHIMERS BROOK WATERSHED
	The portion of Shimers Brook and its tributaries that are located within the boundaries of High Point State Park
JOHNSONBURG NATURAL AREA	PEQUEST RIVER WATERSHED
	Mud Pond and its outlet stream, Bear Creek, to the Erie-Lackawanna Railroad trestle, north of Johnsonburg
BRENDAN T. BYRNE STATE FOREST	RANCOCAS CREEK WATERSHED
	Deer Park Branch and tributaries near Buckingham, downstream to the confluence with Pole Bridge Branch
	Tributaries to the South Branch of Mount Misery Brook located entirely within the boundaries of BRENDAN T. BYRNE State Forest
	Cooper Branch and tributaries downstream to Pakim Pond and those tributaries to Coopers Branch downstream of Pakim Pond that are located entirely within the boundaries of BRENDAN T. BYRNE State Forest
	Shinns Branch and tributaries located entirely within the boundaries of BRENDAN T. BYRNE State Forest, from their sources to the forest boundary

	Jade Run located entirely within the boundaries of BRENDAN T. BYRNE State Forest
	MacDonalds Branch and tributaries located entirely within the boundaries of BRENDAN T. BYRNE State Forest, from their sources to the forest boundary
MILLVILLE FISH AND GAME TRACT	See EDWARD G. BEVAN WILDLIFE MANAGEMENT AREA
PASADENA WILDLIFE MANAGEMENT AREA	RANCOCAS CREEK WATERSHED The two easterly branches of the South Branch of Mount Misery Brook, located entirely within the boundaries of the Pasadena Wildlife Management Area
PEASELEE WILDLIFE MANAGEMENT AREA	MAURICE RIVER WATERSHED Middle Branch of Muskee Creek from its origin to the boundaries of the Peaselee Wildlife Management Area
	Cedar Branch of the Manumuskin River, from its origin to the boundaries of the Peaselee Wildlife Management Area
	Those portions of tributaries to Slab Branch located entirely within the boundaries of the Peaselee Wildlife Management Area
WASHINGTON CROSSING STATE PARK	STEELE RUN WATERSHED That portion of Steele Run, located within the boundaries of Washington Crossing State Park, to the confluence with the westerly tributary
WHITTINGHAM WILDLIFE MANAGEMENT AREA	PEQUEST RIVER WATERSHED Northwesterly tributaries to the Pequest River, including Big Spring, located within the boundaries of the Whittingham Wildlife Management Area southwest of Springdale, from their origins to their confluence with the Pequest River
WORTHINGTON STATE FOREST	DELAWARE RIVER WATERSHED Sunfish Pond and its outlet stream to the Delaware River. All unnamed waters located entirely within the boundaries of the Worthington State Forest

	DUNNFIELD CREEK WATERSHED Dunnfield Creek to I-80

PASSAIC RIVER, HACKENSACK RIVER, NY HARBOR COMPLEX BASIN

A. S. HEWITT STATE FOREST	WANAQUE RIVER WATERSHED Portions of Cooley Brook and tributaries which originate and are located entirely within the boundaries of Hewitt State Forest Surprise Lake Portions of Green Brook and tributaries which originate and are located entirely within the boundaries of Hewitt State Forest West Pond
BERKSHIRE VALLEY WILDLIFE MANAGEMENT AREA	ROCKAWAY RIVER WATERSHED Stephens Brook north of the boundaries of the Berkshire Valley Wildlife Management Area
CITY OF NEWARK HOLDINGS AND WAWAYANDA STATE PARK	PEQUANNOCK RIVER WATERSHED Cedar Pond and all tributaries Hanks Pond and all tributaries Tributary to Pequannock River at Green Pond Junction from its origin downstream to Route 23 Tributary joining the main stem of the Pequannock River 3500+ feet southeast of the Sussex-Passaic County line, near Jefferson from its origin to about 2000 feet upstream of the pond Pacack Brook and its tributaries upstream of Canistear Reservoir, located entirely within the boundaries of the Newark watershed and Wawayanda State Park Cherry Ridge Brook and its tributaries north of Canistear Reservoir, located entirely within the boundaries of the Newark watershed lands and Wawayanda State Park The southern branch of the easterly tributary to Canistear Reservoir

	Pequannock River and tributaries upstream of the confluence with Pacack Brook
	The northwestern tributary to Oak Ridge Reservoir
	The portion of the westerly tributary to Lake Stockholm Brook, from its origins to about 1000 feet south of the Route 23 Bridge, located entirely within the boundaries of the Newark watershed
	Lud-Day Brook downstream to its confluence with the southwestern outlet stream from Clinton Reservoir just upstream of the confluence of the outlet stream and a tributary from Camp Garfield
	Brook between Hamburg Turnpike and Vernon-Stockholm Road, downstream to its confluence with Lake Stockholm Brook, north of Rt. 23
RARITAN RIVER BASIN	NONE
WALLKILL RIVER BASIN	
CITY OF NEWARK HOLDINGS AND WAWAYANDA STATE PARK	LAKE LOOKOUT BROOK WATERSHED Lake Lookout, Lake Lookout Brook and tributaries from its headwaters in the Newark City holdings, downstream through the State-owned Wawayanda State Park to the confluence with the outlet stream from Lake Wawayanda
HAMBURG MOUNTAIN WILDLIFE MANAGEMENT	SAND HILLS BROOK WATERSHED The upstream portion of Sand Hills Brook, including the pond at its headwaters, located entirely within the boundaries of the Hamburg Mtn. Wildlife Management Area
	BLACK CREEK WATERSHED All those portions of three tributaries to Black Creek originating in the Hamburg Mtn. Wildlife Management Area, from their origin downstream to the Management Area boundaries

	FRANKLIN POND CREEK WATERSHED The first tributary to Franklin Pond Creek just south of Hamburg Mountain, flowing toward the Wallkill River and located entirely within the Hamburg Mtn. Wildlife Management Area
	HAMBURG CREEK WATERSHED The third tributary just southwest of Hamburg Mountain, which flows toward the Wallkill River and is located entirely within the Hamburg Mtn. Wildlife Management Area
HIGH POINT STATE PARK	CLOVE RIVER WATERSHED Those portions of the two northernmost tributaries to Clove River which are located entirely within the boundaries of High Point State Park, and are immediately east of Lake Marcia
	RUTGERS CREEK WATERSHED The Cedar Swamp headwaters of the tributary to Rutgers Creek, located entirely within the boundaries of High Point State Park, just south of the New Jersey-New York state line
SUSSEX BOROUGH WATER SUPPLY LAND	LAKE RUTHERFORD WATERSHED Lake Rutherford and tributaries, located northwest of Colesville
WAWAYANDA STATE PARK	LAUREL POND WATERSHED Laurel Pond, and its outlet stream and tributaries downstream to the outlet stream from Lake Wawayanda

(k) The following are the Outstanding National Resource Waters of the State:

1. FW1 Waters; and
2. PL Waters.

Appendix E

Geotechnical Laboratory Testing Results

Project Name:	Wreck Pond Geotech					
Project Number:	1450.007	Task #: 4				
Location:	Wreck Pond					
Client:	USACE					
Owner:						
Client Address 1:	U.S. Army Engineer District					
Client Address 2:						
Client City:	New York					
Client State:	NY					
Client Zip:						
Block:						
Lot:						
Sample Information						
Laboratory Number	**1450007-1**	**1450007-2**	**1450007-3**	**1450007-4**		
Exploration Number	**B-1**	**B-1**	**B-2**	**B-2**		
Sample Number	**S2**	**S3-S5**	**S2-S4**	**S5-S6**		
Depth Range (ft)	**2'-4'**	**4'-14'**	**0'-9'**	**9'-14'**		
Requested Testing						
ASTM D 2216	x	x	x	x		
ASTM C 117						
ASTM C 136						
ASTM D 422	x	x	x	x		
ASTM D 2937						
ASTM D 2974						
ASTM D 4318		x				
ASTM D 854						
ASTM D 4972						
ASTM D 698						
ASTM D 1557						
ASTM D 2487						
ASTM D 2488						
ASTM D 4221						
ASTM D 4647						
ASTM C 127						
ASTM D 1883						
ASTM D 5084						
ASTM D 5102						
ASTM D 2166						
ASTM D 2850						
ASTM D 4767						
ASTM D 5102						
ASTM D 2435						
ASTM D 4767						
NJDEP K-Class						

ASTM D2216
Moisture Content

Laboratory Number	1450007-1	1450007-2	1450007-3	1450007-4	
Exploration Number	B-1	B-1	B-2	B-2	
Sample Number	S2	S3-S5	S2-S4	S5-S6	
Depth Range	2'-4'	4'-14'	0'-9'	9'-14'	
Test Method: Method A	x	x	x	x	
Method B					
Container/ Lid Number	A	B	J	H	
Container Mass, g (Mc)	13.6	13.6	13.9	13.8	
Container + Moist Specimen Mass, g (Mcms)	219.6	238.8	261.5	315.6	
Date / Time in oven					
Initial Container+Oven Dry Specimen Mass, g	126.8	181.7	122.3	271.3	
Date / Time out of oven					
Secondary Container+Oven Dry Specimen Mass, g	126.8	181.7	122.3	271.3	
Date / Time out of oven					
Final Container+Oven Dry Specimen Mass, g, (Mcds)	126.8	181.7	122.3	271.3	
Date / Time out of oven					
Mass of Water, g, Mw = Mcms – Mcds	92.8	57.1	139.2	44.3	
Mass of Solids, Ms = Mcds-Mc	113.2	168.1	108.4	257.5	
Water Content, %, w = (Mw/Ms)x100	82	34	128	17	
Maximum particle size (100% passing)					
3in					
1½ in					
¾ in					
3/8 in				x	
#4					
#10	x	x			
< #10			x		
Tested Maximum Grain Size (sieve #)	#10	#10	#18	3/8	
Oven Temperature	110.0	110.0	110.0	110.0	
Remarks					
QA/QC					
Sample Size Check: (grams less)	Adequate	Adequate	Adequate	Inadequate (Jar Sample)	
Tested by:	BA	BA	BA	BA	
Data Entry By:	BA	BA	BA	BA	
Data Entry Date:	04/16/15	04/16/15	04/16/15	04/16/15	
Checked By:	BA	BA	BA	BA	
Checked Date:	04/16/15	04/16/15	04/16/15	04/16/15	

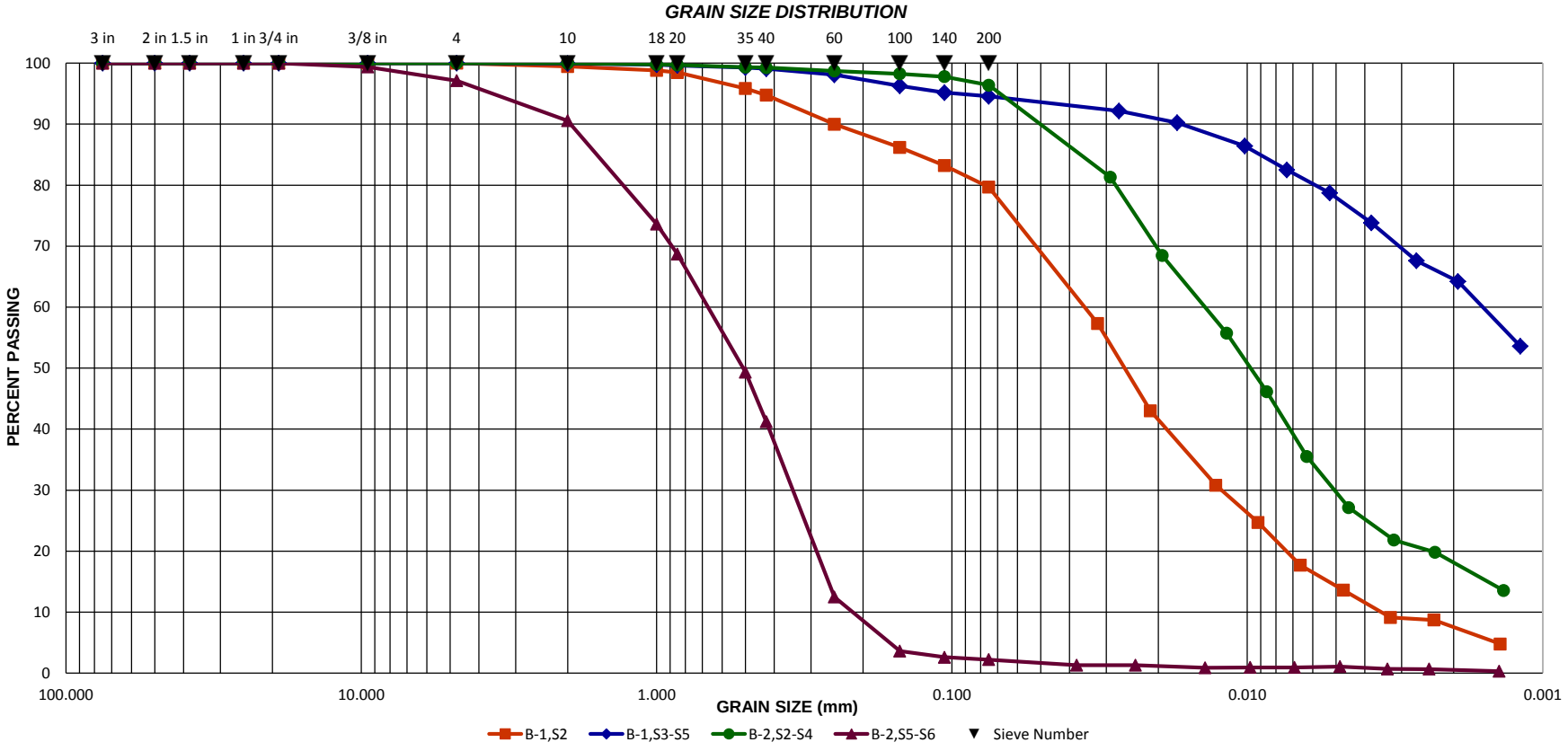
ASTM D 422
Particle Size Analysis of Soils

Apparatus: x — A – Mechanical; B – Air Jet

Laboratory Number	1450007-1	1450007-2	1450007-3	1450007-4	
Exploration Number	B-1	B-1	B-2	B-2	
Sample Number	S2	S3-S5	S2-S4	S5-S6	
Depth Range	2'-4'	4'-14'	0'-9'	9'-14'	
Hydrometer					
Hydrometer Model:					
H151					
H152	x	x	x	x	
Hydrometer Serial Number:	541307	541307	541307	541307	
Air Drying Total Sample					
Container Number	A	B	J	H	
Container Mass, g (Mc)	13.6	13.6	13.9	13.8	
Container + Moist Specimen Mass, g (Mcms)	126.8	181.7	122.3	271.3	
Mass of Solids, g, Mod = Mcds-Mc	113.2	168.1	108.4	257.5	
Dry Sieved Sample (§ 5.2) No.10 Split					
Total Sample, g	110.8	163.4	108.1	257.4	
Mass Retained on No.10, g	0.6	0.1	0	24.3	
Mass Passing No. 10, g		163.3	108.1	233.1	
§6 – Sieve Analysis of Portion Retained on No. 10 Mass Retained on Sieves, g					
3 in					
2 in					
1.5 in					
1 in					
3/4 in					
3/8 in				1.60	
4	0.00	0.00		5.80	
6					
8					
10	0.60	0.10		16.90	
§7 through 11 – Hydrometer and Sieve Analysis of Portion Passing No. 10 §8.1 – Hygroscopic Moisture					
Container Number	24	XIII	C1	D1	
Container Mass, g (Mc)	13.71	13.53	13.61	13.57	
Container + Moist Specimen Mass, g (Mcms)	15.96	15.35	17.64	19.29	
Date / Time in oven					
Initial Container+Oven Dry Specimen Mass, g	15.9	15.3	17.24	19.22	
Date / Time out of oven					
Secondary Container+Oven Dry Specimen Mass, g	15.9	15.3	17.24	19.22	
Date / Time out of oven					
Final Container+Oven Dry Specimen Mass, g, (Mcds)	15.9	15.3	17.24	19.22	
Date / Time out of oven					
Oven Solids, Ms = Mcds-Mc	2.19	1.77	3.63	5.65	
Hygroscopic Moisture Corr. Factor, hmc	0.973	0.973	0.901	0.988	
§9 – Dispersion Soil Sample					
Container Number	1	2	3	4	
Air Dried Specimen Mass, g (Mcms)	50	52.4	52.3	108.9	
Date / Time Dispersion Agent Introduced	04/06/2015 09:00	04/06/2015 09:04	04/06/2015 09:08	04/06/2015 09:12	
Date / Time Sample Ready	04/07/2015 01:00	04/07/2015 01:04	04/07/2015 01:08	04/07/2015 01:12	
ASTM D 854 Data Available:	No	No	No	No	
Use D854 Info?	Assumed	Assumed	Assumed	Assumed	
Specific Gravity Calculated, G					
Specific Gravity Assumed, G	2.65	2.65	2.65	2.65	
Composite Correction Graph Available:	x	x	x	x	
Use Graph ?	x	x	x	x	

§10 – Hydrometer Test					
Date / Time Hydrometer Started	04/07/2015 09:00	04/07/2015 09:04	04/07/2015 09:08	04/07/2015 09:12	
Reading (min.)	2	2	2	2	
Reading time and date	04/07/2015 09:02	04/07/2015 09:06	04/07/2015 09:10	04/07/2015 09:14	
Hydrometer Reading, H	33	52	43	6.5	
Temperature, De. C., Tc	19.5	19.4	20.6	19.6	
Composite Correction Reading, Rcc	4.965	4.99	4.69	4.94	
Reading (min.)	5	5	5	5	
Reading time and date	04/07/2015 09:05	04/07/2015 09:09	04/07/2015 09:13	04/07/2015 09:17	
Hydrometer Reading, H	26	51	37	6.5	
Temperature, De. C., Tc	19.5	19.5	20.4	19.6	
Composite Correction Reading, Rcc	4.965	4.965	4.74	4.94	
Reading (min.)	15	15	15	15	
Reading time and date	04/07/2015 09:15	04/07/2015 09:19	04/07/2015 09:23	04/07/2015 09:27	
Hydrometer Reading, H	20	49	31	6	
Temperature, De. C., Tc	19.6	19.7	20.4	19.5	
Composite Correction Reading, Rcc	4.94	4.915	4.74	4.965	
Reading (min.)	30	30	30	30	
Reading time and date	04/07/2015 09:30	04/07/2015 09:34	04/07/2015 09:38	04/07/2015 09:42	
Hydrometer Reading, H	17	47	26.5	6	
Temperature, De. C., Tc	19.7	19.7	20.3	19.8	
Composite Correction Reading, Rcc	4.915	4.915	4.765	4.89	
Reading (min.)	60	60	60	60	
Reading time and date	04/07/2015 10:00	04/07/2015 10:04	04/07/2015 10:08	04/07/2015 10:12	
Hydrometer Reading, H	13.5	45	21.5	6	
Temperature, De. C., Tc	20	20	20.3	19.8	
Composite Correction Reading, Rcc	4.84	4.84	4.765	4.89	
Reading (min.)	120	120	120	120	
Reading time and date	04/07/2015 11:00	04/07/2015 11:04	04/07/2015 11:08	04/07/2015 11:12	
Hydrometer Reading, H	11.5	42.5	17.5	6	
Temperature, De. C., Tc	20	20	20.5	20.4	
Composite Correction Reading, Rcc	4.84	4.84	4.715	4.74	
Reading (min.)	250	250	250	250	
Reading time and date	04/07/2015 13:10	04/07/2015 13:14	04/07/2015 13:18	04/07/2015 13:22	
Hydrometer Reading, H	9	39	15	5.5	
Temperature, De. C., Tc	21.2	21.3	20.5	20.6	
Composite Correction Reading, Rcc	4.54	4.515	4.715	4.69	
Reading (min.)	480	480	480	480	
Reading time and date	04/07/2015 17:00	04/07/2015 17:04	04/07/2015 17:08	04/07/2015 17:12	
Hydrometer Reading, H	8.5	37	14	5.5	
Temperature, De. C., Tc	22.4	22.4	20.7	20.5	
Composite Correction Reading, Rcc	4.24	4.24	4.665	4.715	
Reading (min.)	1440	1440	1440	1440	
Reading time and date	04/08/2015 09:00	04/08/2015 09:04	04/08/2015 09:08	04/08/2015 09:12	
Hydrometer Reading, H	7	32	11	5	
Temperature, De. C., Tc	20.7	20.7	20.9	20.8	
Composite Correction Reading, Rcc	4.665	4.665	4.615	4.64	
§11 – Sieve Analysis Material Passing No. 10					
12					
16					
18	0.70	0.30	0.20	43.60	
20	0.40	0.20	0.10	12.70	
30					
35	2.90	0.60	0.40	49.80	
40	1.20	0.30	0.10	20.90	
50					
60	5.30	1.60	0.60	74.00	
80					
100	4.20	3.00	0.50	22.80	
140	3.30	1.80	0.50	2.60	
200	2.80	0.80	1.10	0.90	
270					
Pan	1.10	0.20	0.40	0.10	

Test Results					
§18.1.1 – Maximum Particle Size (mm)	4.750	4.750	1.000	9.500	
§ 18.1.2 – Mass Passing Sieves, %					
3 in	100.0	100.0	100.0	100.0	
2 in	100.0	100.0	100.0	100.0	
1.5 in	100.0	100.0	100.0	100.0	
1 in	100.0	100.0	100.0	100.0	
3/4 in	100.0	100.0	100.0	100.0	
3/8 in	100.0	100.0	100.0	99.4	
4	100.0	100.0	100.0	97.1	
6	--	--	--	--	
8	--	--	--	--	
10	99.5	99.9	100.0	90.6	
12	--	--	--	--	
16	--	--	--	--	
18	98.8	99.8	99.8	73.6	
20	98.5	99.6	99.7	68.7	
30	--	--	--	--	
35	95.8	99.3	99.4	49.3	
40	94.8	99.1	99.3	41.2	
50	--	--	--	--	
60	90.0	98.1	98.7	12.5	
80	--	--	--	--	
100	86.2	96.3	98.2	3.6	
140	83.2	95.2	97.8	2.6	
200	79.7	94.6	96.4	2.2	
270	--	--	--	--	
Hydrometer Results					
Diameter, Percent Passing	0.032, 57.31	0.027, 92.15	0.029, 81.3	0.038, 1.31	
Diameter, Percent Passing	0.021, 43	0.017, 90.24	0.019, 68.46	0.024, 1.31	
Diameter, Percent Passing	0.013, 30.79	0.01, 86.41	0.012, 55.73	0.014, 0.87	
Diameter, Percent Passing	0.009, 24.71	0.007, 82.49	0.009, 46.12	0.01, 0.93	
Diameter, Percent Passing	0.007, 17.7	0.005, 78.72	0.006, 35.51	0.007, 0.93	
Diameter, Percent Passing	0.005, 13.62	0.004, 73.82	0.005, 27.13	0.005, 1.06	
Diameter, Percent Passing	0.003, 9.12	0.003, 67.6	0.003, 21.83	0.003, 0.68	
Diameter, Percent Passing	0.002, 8.71	0.002, 64.21	0.002, 19.81	0.002, 0.66	
Diameter, Percent Passing	0.001, 4.77	0.001, 53.58	0.001, 13.55	0.001, 0.3	
§18.1.3.1 – Shape of Sand\Gravel particles:	--	--	--	Subrounded	
§18.1.3.2 – Hardness of Sand\Gravel particles:	--	--	--	Hard and Durable	
§18.3 – Graph Results					
(1) Gravel; passing No. 3, retained on No.4	0.0	0.0	0.0	2.9	
(2) Sand; passing No. 4, retained on No. 200	20.3	5.4	3.6	94.9	
(a) Coarse Sand; passing No. 4, retained on No. 10	0.5	0.1	0.0	6.6	
(b) Medium Sand; passing No. 10, retained on No. 40	4.7	0.9	0.7	49.3	
(c) Fine Sand; passing No. 40, retained on No. 200	15.1	4.5	2.9	39.0	
(3) Silt size; 0.074 to 0.002 mm	71.0	30.3	76.6	1.6	
(4) Clay size, 0.002 to 0.001 mm	8.7	64.2	19.8	0.7	
(5) Colloid, smaller than 0.001 mm	4.8	53.6	13.5	0.3	
QA/QC					
Sieve Check (§ 3.6)	Ok	Ok	Ok	Ok	
Alt. Sieve Check (§ 3.6 – Note 6)	Ok	Ok	Ok	Ok	
Size of Retained (No. 10) Check (§ 5.1.1)	TRUE	TRUE	TRUE	TRUE	
Size of Passing (No. 10) Check (§ 5.1.2)	FALSE	TRUE	TRUE	TRUE	
Mass Check (§ 5.2 – Note 8)	Ok	Ok	Ok	Ok	
Tested by:	BA	BA	BA	BA	
Data Entry By:	BA	BA	BA	BA	
Data Entry Date:	04/16/15	04/16/15	04/16/15	04/16/15	
Checked By:	BA	BA	BA	BA	
Checked Date:	04/16/15	04/16/15	04/16/15	04/16/15	



Project:	1450.007 T:, USACE, Wreck Pond Geotech													**Location:**	Wreck Pond
Sample	**Depth**	**% Moist. (D2216/2974)**	**% Org. (D2974)**	**Atterberg Limits (ASTM D4318)**			**USCS Gravel**		**USCS Sand**			**USCS Fines**		**USCS**
				PI	**LL**	**PL**	**% Coarse**	**%Fine**	**% Coarse**	**%Medium**	**%Fine**	**% Silt**	**% Clay**	**Symbol, Description**
B-1,S2	2'-4'	82	NT	NT	NT	NT	0	0	1	5	15	71	9	OH, Organic Silt with Sand
B-1,S3-S5	4'-14'	34	NT	23	50	27	0	0	0	1	5	30	64	CH, Fat Clay
B-2,S2-S4	0'-9'	128	NT	NT	NT	NT	0	0	0	1	3	77	20	OH, Organic Silt
B-2,S5-S6	9'-14'	17	NT	NP	NP	NP	0	3	7	49	39	2	1	SP, Poorly Graded Sand

Project Name:	Wreck Pond Geotech					
Project Number:	1450.007	Task #: 4				
Location:	Wreck Pond					
Client:	USACE					
Owner:						
Client Address 1:	U.S. Army Engineer District					
Client Address 2:						
Client City:	New York					
Client State:	NY					
Client Zip:						
Block:						
Lot:						
Sample Information						
Laboratory Number	**1450007-5**	**1450007-6**	**1450007-7**	**1450007-8**		
Exploration Number	**B-3**	**B-3**	**B-4**	**B-4**		
Sample Number	**S1-S5**	**S6**	**S1-S2**	**S3-S5**		
Depth Range (ft)	**0'-11'**	**11'-14'**	**0'-4'**	**4'-11'**		
Requested Testing						
ASTM D 2216	x	x	x	x		
ASTM C 117						
ASTM C 136						
ASTM D 422	x	x	x	x		
ASTM D 2937						
ASTM D 2974						
ASTM D 4318	x					
ASTM D 854						
ASTM D 4972						
ASTM D 698						
ASTM D 1557						
ASTM D 2487						
ASTM D 2488						
ASTM D 4221						
ASTM D 4647						
ASTM C 127						
ASTM D 1883						
ASTM D 5084						
ASTM D 5102						
ASTM D 2166						
ASTM D 2850						
ASTM D 4767						
ASTM D 5102						
ASTM D 2435						
ASTM D 4767						
NJDEP K-Class						

ASTM D2216
Moisture Content

Laboratory Number	1450007-5	1450007-6	1450007-7	1450007-8	
Exploration Number	B-3	B-3	B-4	B-4	
Sample Number	S1-S5	S6	S1-S2	S3-S5	
Depth Range	0'-11'	11'-14'	0'-4'	4'-11'	
Test Method: Method A	x	x	x	x	
Method B					
Container/ Lid Number	K	G	L	M	
Container Mass, g (Mc)	13.8	13.7	13.9	13.9	
Container + Moist Specimen Mass, g (Mcms)	279.6	316.8	304.3	220.5	
Date / Time in oven					
Initial Container+Oven Dry Specimen Mass, g	134.7	267.4	255.5	133.5	
Date / Time out of oven					
Secondary Container+Oven Dry Specimen Mass, g	134.7	267.4	255.5	133.5	
Date / Time out of oven					
Final Container+Oven Dry Specimen Mass, g, (Mcds)	134.7	267.4	255.5	133.5	
Date / Time out of oven					
Mass of Water, g, Mw = Mcms – Mcds	144.9	49.4	48.8	87	
Mass of Solids, Ms = Mcds-Mc	120.9	253.7	241.6	119.6	
Water Content, %, w = (Mw/Ms)x100	120	19	20	73	
Maximum particle size (100% passing)					
3in					
1½ in					
¾ in					
3/8 in		x	x		
#4					
#10				x	
< #10	x				
Tested Maximum Grain Size (sieve #)	#18	3/8	3/8	#10	
Oven Temperature	110.0	110.0	110.0	110.0	
Remarks					
QA/QC					
Sample Size Check: (grams less)	Adequate	Adequate	Adequate	Adequate	
Tested by:	BA	RR	RR	RR	
Data Entry By:	BA	BA	BA	BA	
Data Entry Date:	04/16/15	04/16/15	04/16/15	04/16/15	
Checked By:	BA	BA	BA	BA	
Checked Date:	04/16/15	04/16/15	04/16/15	04/16/15	

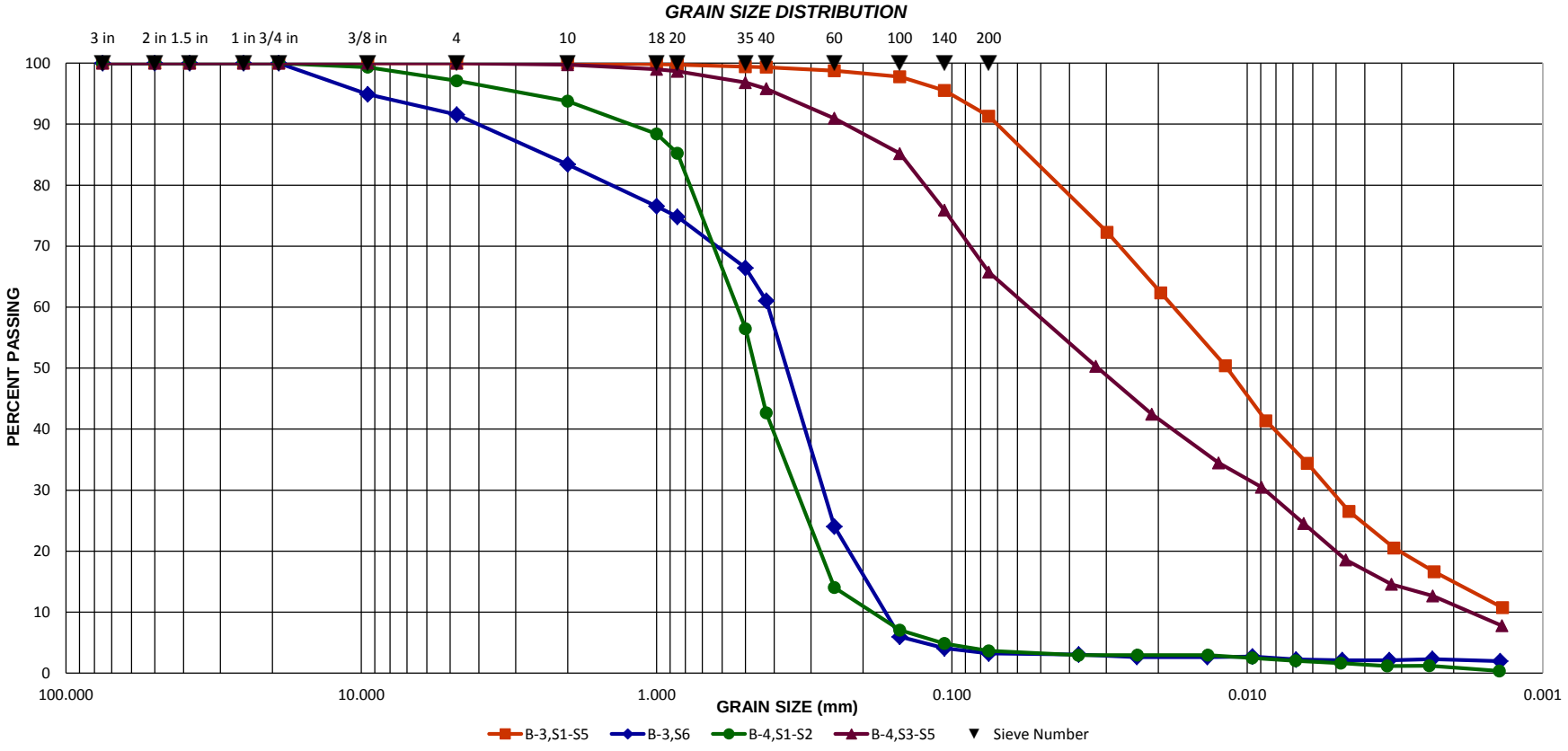
ASTM D 422
Particle Size Analysis of Soils

Apparatus: x — A – Mechanical; B – Air Jet

Laboratory Number	1450007-5	1450007-6	1450007-7	1450007-8	
Exploration Number	B-3	B-3	B-4	B-4	
Sample Number	S1-S5	S6	S1-S2	S3-S5	
Depth Range	0'-11'	11'-14'	0'-4'	4'-11'	
Hydrometer					
Hydrometer Model:					
H151					
H152	x	x	x	x	
Hydrometer Serial Number:	541307	541307	541307	541307	
Air Drying Total Sample					
Container Number	K	G	L	M	
Container Mass, g (Mc)	13.8	13.7	13.9	13.9	
Container + Moist Specimen Mass, g (Mcms)	134.7	267.4	255.5	133.5	
Mass of Solids, g, Mod = Mcds-Mc	120.9	253.7	241.6	119.6	
Dry Sieved Sample					
(§ 5.2) No.10 Split					
Total Sample, g	120.8	248.5	241	119.4	
Mass Retained on No.10, g	0	41.2	15	0.3	
Mass Passing No. 10, g	120.8	207.3	226	119.1	
§6 – Sieve Analysis of Portion Retained on No. 10					
Mass Retained on Sieves, g					
3 in					
2 in					
1.5 in					
1 in					
3/4 in					
3/8 in		12.70	1.60		
4		8.30	5.40		
6					
8					
10		20.20	8.00	0.30	
§7 through 11 – Hydrometer and Sieve Analysis of Portion Passing No. 10					
§8.1 – Hygroscopic Moisture					
Container Number	BJ	AB	54	XI	
Container Mass, g (Mc)	13.54	13.61	13.59	13.54	
Container + Moist Specimen Mass, g (Mcms)	16.55	18.81	18.99	19.66	
Date / Time in oven					
Initial Container+Oven Dry Specimen Mass, g	16.31	18.79	18.98	19.2	
Date / Time out of oven					
Secondary Container+Oven Dry Specimen Mass, g	16.31	18.79	18.98	19.2	
Date / Time out of oven					
Final Container+Oven Dry Specimen Mass, g, (Mcds)	16.31	18.79	18.98	19.2	
Date / Time out of oven					
Oven Solids, Ms = Mcds-Mc	2.77	5.18	5.39	5.66	
Hygroscopic Moisture Corr. Factor, hmc	0.920	0.996	0.998	0.925	
§9 – Dispersion Soil Sample					
Container Number	1	2	3	4	
Air Dried Specimen Mass, g (Mcms)	54.5	100.1	103.6	54	
Date / Time Dispersion Agent Introduced	04/07/2015 09:00	04/07/2015 09:04	04/07/2015 09:08	04/07/2015 09:12	
Date / Time Sample Ready	04/08/2015 01:00	04/08/2015 01:04	04/08/2015 01:08	04/08/2015 01:12	
ASTM D 854 Data Available:	No	No	No	No	
Use D854 Info?	Assumed	Assumed	Assumed	Assumed	
Specific Gravity Calculated, G					
Specific Gravity Assumed, G	2.65	2.65	2.65	2.65	
Composite Correction Graph Available:	x	x	x	x	
Use Graph ?	x	x	x	x	

§10 – Hydrometer Test					
Date / Time Hydrometer Started	04/08/2015 09:00	04/08/2015 09:04	04/08/2015 09:08	04/08/2015 09:12	
Reading (min.)	2	2	2	2	
Reading time and date	04/08/2015 09:02	04/08/2015 09:06	04/08/2015 09:10	04/08/2015 09:14	
Hydrometer Reading, H	41	8.5	8	30	
Temperature, De. C., Tc	20.3	20	20.3	20.1	
Composite Correction Reading, Rcc	4.765	4.84	4.765	4.815	
Reading (min.)	5	5	5	5	
Reading time and date	04/08/2015 09:05	04/08/2015 09:09	04/08/2015 09:13	04/08/2015 09:17	
Hydrometer Reading, H	36	8	8	26	
Temperature, De. C., Tc	20.4	20	20.4	20.4	
Composite Correction Reading, Rcc	4.74	4.84	4.74	4.74	
Reading (min.)	15	15	15	15	
Reading time and date	04/08/2015 09:15	04/08/2015 09:19	04/08/2015 09:23	04/08/2015 09:27	
Hydrometer Reading, H	30	8	8	22	
Temperature, De. C., Tc	20.4	20	20.4	20.4	
Composite Correction Reading, Rcc	4.74	4.84	4.74	4.74	
Reading (min.)	30	30	30	30	
Reading time and date	04/08/2015 09:30	04/08/2015 09:34	04/08/2015 09:38	04/08/2015 09:42	
Hydrometer Reading, H	25.5	8	7.5	20	
Temperature, De. C., Tc	20.3	20.4	20.4	20.4	
Composite Correction Reading, Rcc	4.765	4.74	4.74	4.74	
Reading (min.)	60	60	60	60	
Reading time and date	04/08/2015 10:00	04/08/2015 10:04	04/08/2015 10:08	04/08/2015 10:12	
Hydrometer Reading, H	22	7.5	7	17	
Temperature, De. C., Tc	20.3	20	20.3	20.5	
Composite Correction Reading, Rcc	4.765	4.84	4.765	4.715	
Reading (min.)	120	120	120	120	
Reading time and date	04/08/2015 11:00	04/08/2015 11:04	04/08/2015 11:08	04/08/2015 11:12	
Hydrometer Reading, H	18	7	6.5	14	
Temperature, De. C., Tc	20.5	21.5	20.5	20.5	
Composite Correction Reading, Rcc	4.715	4.465	4.715	4.715	
Reading (min.)	250	250	250	250	
Reading time and date	04/08/2015 13:10	04/08/2015 13:14	04/08/2015 13:18	04/08/2015 13:22	
Hydrometer Reading, H	15	7	6	12	
Temperature, De. C., Tc	20.5	21.5	20.5	20.5	
Composite Correction Reading, Rcc	4.715	4.465	4.715	4.715	
Reading (min.)	480	480	480	480	
Reading time and date	04/08/2015 17:00	04/08/2015 17:04	04/08/2015 17:08	04/08/2015 17:12	
Hydrometer Reading, H	13	7	6	11	
Temperature, De. C., Tc	20.7	22.4	20.7	20.7	
Composite Correction Reading, Rcc	4.665	4.24	4.665	4.665	
Reading (min.)	1440	1440	1440	1440	
Reading time and date	04/09/2015 09:00	04/09/2015 09:04	04/09/2015 09:08	04/09/2015 09:12	
Hydrometer Reading, H	10	7	5	8.5	
Temperature, De. C., Tc	20.9	20.7	20.9	20.9	
Composite Correction Reading, Rcc	4.615	4.665	4.615	4.615	
§11 – Sieve Analysis Material Passing No. 10					
12					
16					
18	0.20	17.10	13.00	0.90	
20	0.10	4.30	7.60	0.40	
30					
35	0.40	20.80	69.30	2.20	
40	0.10	13.40	33.30	1.20	
50					
60	0.70	92.00	69.00	5.80	
80					
100	1.20	44.90	16.80	6.90	
140	2.70	4.70	5.30	11.10	
200	4.10	1.80	2.50	10.40	
270					
Pan	1.00	0.30	0.40	1.70	

Test Results					
§18.1.1 – Maximum Particle Size (mm)	1.000	9.500	9.500	2.000	
§ 18.1.2 – Mass Passing Sieves, %					
3 in	100.0	100.0	100.0	100.0	
2 in	100.0	100.0	100.0	100.0	
1.5 in	100.0	100.0	100.0	100.0	
1 in	100.0	100.0	100.0	100.0	
3/4 in	100.0	100.0	100.0	100.0	
3/8 in	100.0	94.9	99.3	100.0	
4	100.0	91.5	97.1	100.0	
6	--	--	--	--	
8	--	--	--	--	
10	100.0	83.4	93.8	99.7	
12	--	--	--	--	
16	--	--	--	--	
18	99.8	76.5	88.4	99.0	
20	99.8	74.8	85.2	98.7	
30	--	--	--	--	
35	99.4	66.4	56.5	96.8	
40	99.3	61.0	42.7	95.8	
50	--	--	--	--	
60	98.8	24.0	14.0	91.0	
80	--	--	--	--	
100	97.8	6.0	7.1	85.2	
140	95.5	4.1	4.9	75.9	
200	91.3	3.2	3.7	65.7	
270	--	--	--	--	
Hydrometer Results					
Diameter, Percent Passing	0.03, 72.27	0.037, 3.06	0.037, 2.93	0.033, 50.29	
Diameter, Percent Passing	0.02, 62.35	0.024, 2.64	0.024, 2.96	0.021, 42.46	
Diameter, Percent Passing	0.012, 50.38	0.014, 2.64	0.014, 2.96	0.013, 34.47	
Diameter, Percent Passing	0.009, 41.35	0.01, 2.73	0.01, 2.5	0.009, 30.47	
Diameter, Percent Passing	0.006, 34.37	0.007, 2.23	0.007, 2.03	0.006, 24.53	
Diameter, Percent Passing	0.005, 26.5	0.005, 2.12	0.005, 1.62	0.005, 18.54	
Diameter, Percent Passing	0.003, 20.51	0.003, 2.12	0.003, 1.17	0.003, 14.55	
Diameter, Percent Passing	0.002, 16.62	0.002, 2.31	0.002, 1.21	0.002, 12.65	
Diameter, Percent Passing	0.001, 10.74	0.001, 1.95	0.001, 0.35	0.001, 7.76	
§18.1.3.1 – Shape of Sand\Gravel particles:	--	Subrounded	Angular	--	
§18.1.3.2 – Hardness of Sand\Gravel particles:	--	Hard and Durable	Fragile, Shell Pieces	--	
§18.3 – Graph Results					
(1) Gravel; passing No. 3, retained on No.4	0.0	8.5	2.9	0.0	
(2) Sand; passing No. 4, retained on No. 200	8.7	88.3	93.4	34.3	
(a) Coarse Sand; passing No. 4, retained on No. 10	0.0	8.1	3.3	0.3	
(b) Medium Sand; passing No. 10, retained on No. 40	0.7	22.4	51.1	3.9	
(c) Fine Sand; passing No. 40, retained on No. 200	8.0	57.8	39.0	30.1	
(3) Silt size; 0.074 to 0.002 mm	74.7	0.9	2.4	53.1	
(4) Clay size, 0.002 to 0.001 mm	16.6	2.3	1.2	12.7	
(5) Colloid, smaller than 0.001 mm	10.7	2.0	0.3	7.8	
QA/QC					
Sieve Check (§ 3.6)	Ok	Ok	Ok	Ok	
Alt. Sieve Check (§ 3.6 – Note 6)	Ok	Ok	Ok	Ok	
Size of Retained (No. 10) Check (§ 5.1.1)	TRUE	TRUE	TRUE	TRUE	
Size of Passing (No. 10) Check (§ 5.1.2)	TRUE	TRUE	TRUE	TRUE	
Mass Check (§ 5.2 – Note 8)	Ok	Ok	Ok	Ok	
Tested by:	BA	RR	RR	RR	
Data Entry By:	BA	BA	BA	BA	
Data Entry Date:	04/16/15	04/16/15	04/16/15	04/16/15	
Checked By:	BA	BA	BA	BA	
Checked Date:	04/16/15	04/16/15	04/16/15	04/16/15	



Project:	1450.007 T:, USACE, Wreck Pond Geotech								**Location:**	Wreck Pond					
Sample	**Depth**	**% Moist. (D2216/2974)**	**% Org. (D2974)**	**Atterberg Limits (ASTM D4318)**			**USCS Gravel**		**USCS Sand**			**USCS Fines**		**USCS**
				PI	**LL**	**PL**	**% Coarse**	**%Fine**	**% Coarse**	**%Medium**	**%Fine**	**% Silt**	**% Clay**	**Symbol, Description**
B-3,S1-S5	0'-11'	120	NT	52	94	42	0	0	0	1	8	75	17	OH, Organic Silt
B-3,S6	11'-14'	19	NT	NP	NP	NP	0	8	8	22	58	1	2	SP, Poorly Graded Sand
B-4,S1-S2	0'-4'	20	NT	NP	NP	NP	0	3	3	51	39	2	1	SP, Poorly Graded Sand
B-4,S3-S5	4'-11'	73	NT	NT	NT	NT	0	0	0	4	30	53	13	OH, Sandy Organic Silt

Project Name:	Wreck Pond Geotech
Project Number:	1450.007 Task #: 4
Location:	Wreck Pond
Client:	USACE
Owner:	
Client Address 1:	U.S. Army Engineer District
Client Address 2:	
Client City:	New York
Client State:	NY
Client Zip:	
Block:	
Lot:	

Sample Information						
Laboratory Number	**1450007-9**	**1450007-10**	**1450007-11**	**1450007-12**		
Exploration Number	**B-4**	**B-5**	**B-5**	**B-6**		
Sample Number	**S6**	**S4**	**S5-S6**	**S4-S5**		
Depth Range (ft)	**11'-12'**	**6'-8'**	**8'-11.5'**	**7'-10'**		
Requested Testing						
ASTM D 2216	x	x	x	x		
ASTM C 117						
ASTM C 136						
ASTM D 422	x	x	x	x		
ASTM D 2937						
ASTM D 2974						
ASTM D 4318						
ASTM D 854						
ASTM D 4972						
ASTM D 698						
ASTM D 1557						
ASTM D 2487						
ASTM D 2488						
ASTM D 4221						
ASTM D 4647						
ASTM C 127						
ASTM D 1883						
ASTM D 5084						
ASTM D 5102						
ASTM D 2166						
ASTM D 2850						
ASTM D 4767						
ASTM D 5102						
ASTM D 2435						
ASTM D 4767						
NJDEP K-Class						

ASTM D2216
Moisture Content

Laboratory Number	1450007-9	1450007-10	1450007-11	1450007-12	
Exploration Number	B-4	B-5	B-5	B-6	
Sample Number	S6	S4	S5-S6	S4-S5	
Depth Range	11'-12'	6'-8'	8'-11.5'	7'-10'	
Test Method: Method A	x	x	x	x	
Method B					
Container/ Lid Number	172	PSH	F	UFC	
Container Mass, g (Mc)	15.7	14.1	13.8	14.1	
Container + Moist Specimen Mass, g (Mcms)	204.3	251.8	518.4	454.6	
Date / Time in oven					
Initial Container+Oven Dry Specimen Mass, g	169.4	199.9	479.9	418.6	
Date / Time out of oven					
Secondary Container+Oven Dry Specimen Mass, g	169.4	199.9	479.9	418.6	
Date / Time out of oven					
Final Container+Oven Dry Specimen Mass, g, (Mcds)	169.4	199.9	479.9	418.6	
Date / Time out of oven					
Mass of Water, g, Mw = Mcms – Mcds	34.9	51.9	38.5	36	
Mass of Solids, Ms = Mcds-Mc	153.7	185.8	466.1	404.5	
Water Content, %, w = (Mw/Ms)x100	23	28	8	9	
Maximum particle size (100% passing)					
3in					
1½ in					
¾ in				x	
3/8 in			x		
#4					
#10	x	x			
< #10					
Tested Maximum Grain Size (sieve #)	#10	#10	3/8	3/4	
Oven Temperature	110.0	110.0	110.0	110.0	
Remarks					
QA/QC					
Sample Size Check: (grams less)	Adequate	Adequate	Adequate	Inadequate (Jar Sample)	
Tested by:	BA	RR	RR	RR	
Data Entry By:	BA	BA	BA	BA	
Data Entry Date:	04/16/15	04/16/15	04/16/15	04/16/15	
Checked By:	BA	BA	BA	BA	
Checked Date:	04/16/15	04/16/15	04/16/15	04/16/15	

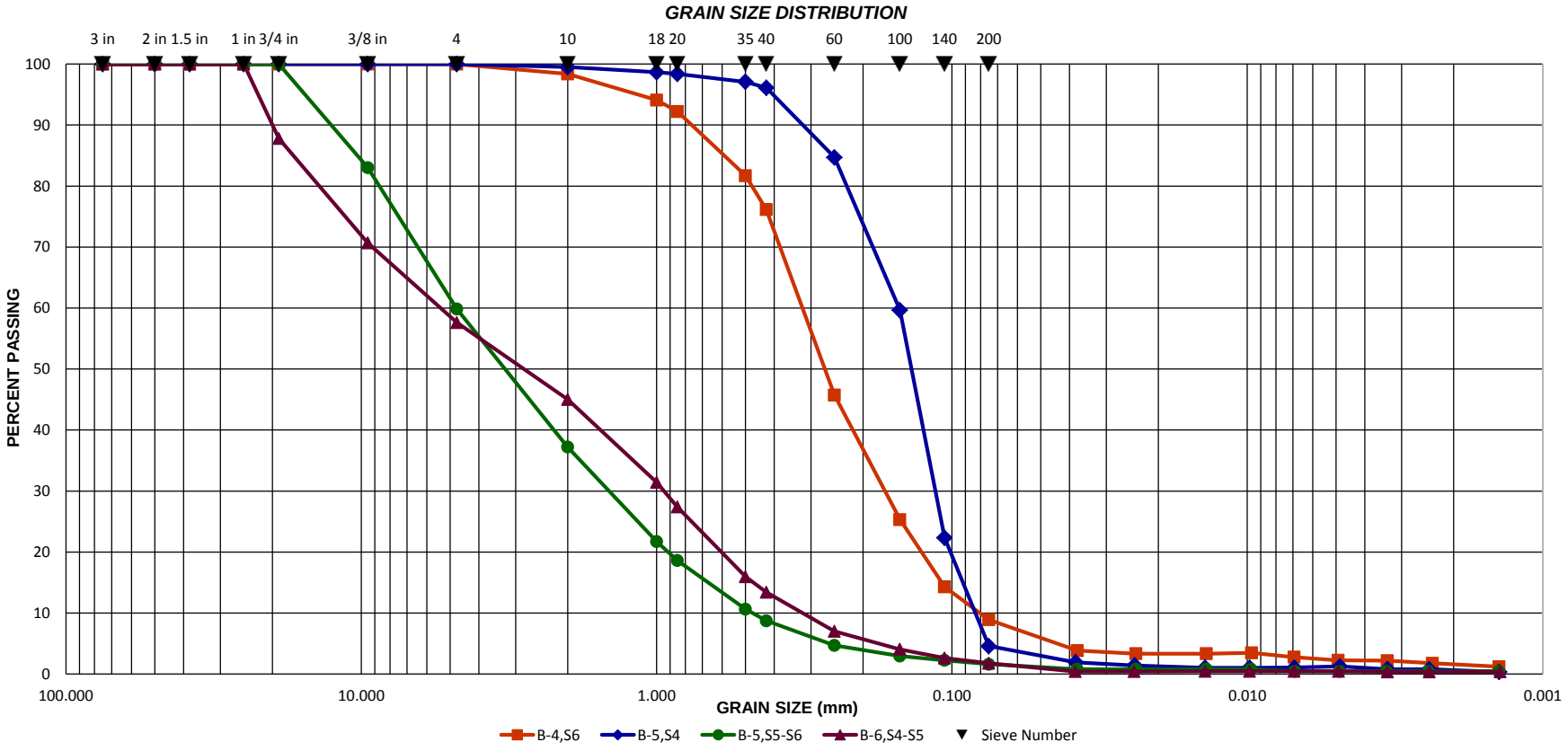
ASTM D 422
Particle Size Analysis of Soils

Apparatus: x — A – Mechanical; B – Air Jet

Laboratory Number	1450007-9	1450007-10	1450007-11	1450007-12	
Exploration Number	B-4	B-5	B-5	B-6	
Sample Number	S6	S4	S5-S6	S4-S5	
Depth Range	11'-12'	6'-8'	8'-11.5'	7'-10'	
Hydrometer					
Hydrometer Model:					
H151					
H152	x	x	x	x	
Hydrometer Serial Number:	541307	541307	541307	541307	
Air Drying Total Sample					
Container Number	172	PSH	F	UFC	
Container Mass, g (Mc)	15.7	14.1	13.8	14.1	
Container + Moist Specimen Mass, g (Mcms)	169.4	199.9	479.9	418.6	
Mass of Solids, g, Mod = Mcds-Mc	153.7	185.8	466.1	404.5	
Dry Sieved Sample (§ 5.2) No.10 Split					
Total Sample, g	142.6	185.6	459.5	404.3	
Mass Retained on No.10, g	2.3	0.9	288.5	222.3	
Mass Passing No. 10, g	140.3	184.7	171	182	
§6 – Sieve Analysis of Portion Retained on No. 10 Mass Retained on Sieves, g					
3 in					
2 in					
1.5 in					
1 in					
3/4 in				49.30	
3/8 in			78.10	69.20	
4			106.40	52.90	
6					
8					
10	2.30	0.90	104.00	50.90	
§7 through 11 – Hydrometer and Sieve Analysis of Portion Passing No. 10					
§8.1 – Hygroscopic Moisture					
Container Number	AA	57	BG	24	
Container Mass, g (Mc)	13.62	13.54	13.58	13.55	
Container + Moist Specimen Mass, g (Mcms)	19.2	19.55	19.26	20.14	
Date / Time in oven					
Initial Container+Oven Dry Specimen Mass, g	19.18	19.28	19.24	19.72	
Date / Time out of oven					
Secondary Container+Oven Dry Specimen Mass, g	19.18	19.28	19.24	19.72	
Date / Time out of oven					
Final Container+Oven Dry Specimen Mass, g, (Mcds)	19.18	19.28	19.24	19.72	
Date / Time out of oven					
Oven Solids, Ms = Mcds-Mc	5.56	5.74	5.66	6.17	
Hygroscopic Moisture Corr. Factor, hmc	0.996	0.955	0.996	0.936	
§9 – Dispersion Soil Sample					
Container Number	1	2	3	4	
Air Dried Specimen Mass, g (Mcms)	100.6	105.2	100.1	108.8	
Date / Time Dispersion Agent Introduced	04/08/2015 09:00	04/08/2015 09:04	04/08/2015 09:08	04/08/2015 09:12	
Date / Time Sample Ready	04/09/2015 01:00	04/09/2015 01:04	04/09/2015 01:08	04/09/2015 01:12	
ASTM D 854 Data Available:	No	No	No	No	
Use D854 Info?	Assumed	Assumed	Assumed	Assumed	
Specific Gravity Calculated, G					
Specific Gravity Assumed, G	2.65	2.65	2.65	2.65	
Composite Correction Graph Available:	x	x	x	x	
Use Graph ?	x	x	x	x	

§10 – Hydrometer Test					
Date / Time Hydrometer Started	04/09/2015 09:00	04/09/2015 09:04	04/09/2015 09:08	04/09/2015 09:12	
Reading (min.)	2	2	2	2	
Reading time and date	04/09/2015 09:02	04/09/2015 09:06	04/09/2015 09:10	04/09/2015 09:14	
Hydrometer Reading, H	9	7	7	6	
Temperature, De. C., Tc	19	19.1	20	19.1	
Composite Correction Reading, Rcc	5.09	5.065	4.84	5.065	
Reading (min.)	5	5	5	5	
Reading time and date	04/09/2015 09:05	04/09/2015 09:09	04/09/2015 09:13	04/09/2015 09:17	
Hydrometer Reading, H	8.5	6.5	7	6	
Temperature, De. C., Tc	19	19.1	20	19.1	
Composite Correction Reading, Rcc	5.09	5.065	4.84	5.065	
Reading (min.)	15	15	15	15	
Reading time and date	04/09/2015 09:15	04/09/2015 09:19	04/09/2015 09:23	04/09/2015 09:27	
Hydrometer Reading, H	8.5	6	7	6	
Temperature, De. C., Tc	19	19.5	20	19.5	
Composite Correction Reading, Rcc	5.09	4.965	4.84	4.965	
Reading (min.)	30	30	30	30	
Reading time and date	04/09/2015 09:30	04/09/2015 09:34	04/09/2015 09:38	04/09/2015 09:42	
Hydrometer Reading, H	8.5	6	7	6	
Temperature, De. C., Tc	19.5	19.5	20	19.5	
Composite Correction Reading, Rcc	4.965	4.965	4.84	4.965	
Reading (min.)	60	60	60	60	
Reading time and date	04/09/2015 10:00	04/09/2015 10:04	04/09/2015 10:08	04/09/2015 10:12	
Hydrometer Reading, H	8	6	6	6	
Temperature, De. C., Tc	18.7	19.6	20	19.5	
Composite Correction Reading, Rcc	5.165	4.94	4.84	4.965	
Reading (min.)	120	120	120	120	
Reading time and date	04/09/2015 11:00	04/09/2015 11:04	04/09/2015 11:08	04/09/2015 11:12	
Hydrometer Reading, H	7.5	6	6	6	
Temperature, De. C., Tc	18.6	20.4	20	19.5	
Composite Correction Reading, Rcc	5.19	4.74	4.84	4.965	
Reading (min.)	250	250	250	250	
Reading time and date	04/09/2015 13:10	04/09/2015 13:14	04/09/2015 13:18	04/09/2015 13:22	
Hydrometer Reading, H	7	5.5	6	5.5	
Temperature, De. C., Tc	20.3	20.6	20	20.6	
Composite Correction Reading, Rcc	4.765	4.69	4.84	4.69	
Reading (min.)	480	480	480	480	
Reading time and date	04/09/2015 17:00	04/09/2015 17:04	04/09/2015 17:08	04/09/2015 17:12	
Hydrometer Reading, H	6	5.5	6	5.5	
Temperature, De. C., Tc	22.6	20.5	20	20.6	
Composite Correction Reading, Rcc	4.19	4.715	4.84	4.69	
Reading (min.)	1440	1440	1440	1440	
Reading time and date	04/10/2015 09:00	04/10/2015 09:04	04/10/2015 09:08	04/10/2015 09:12	
Hydrometer Reading, H	6	5	6	5.5	
Temperature, De. C., Tc	20.2	20.8	20	20.8	
Composite Correction Reading, Rcc	4.79	4.64	4.84	4.64	
§11 – Sieve Analysis Material Passing No. 10					
12					
16					
18	6.10	1.60	71.20	55.00	
20	2.70	0.50	14.30	16.30	
30					
35	15.00	2.40	36.60	46.20	
40	7.90	1.80	8.80	10.30	
50					
60	43.40	21.20	18.50	25.80	
80					
100	29.10	46.50	8.00	12.00	
140	15.70	69.20	3.20	5.80	
200	7.00	29.70	2.30	3.00	
270					
Pan	0.70	3.30	0.70	0.50	

Test Results					
§18.1.1 – Maximum Particle Size (mm)	2.000	2.000	9.500	19.000	
§ 18.1.2 – Mass Passing Sieves, %					
3 in	100.0	100.0	100.0	100.0	
2 in	100.0	100.0	100.0	100.0	
1.5 in	100.0	100.0	100.0	100.0	
1 in	100.0	100.0	100.0	100.0	
3/4 in	100.0	100.0	100.0	87.8	
3/8 in	100.0	100.0	83.0	70.7	
4	100.0	100.0	59.8	57.6	
6	--	--	--	--	
8	--	--	--	--	
10	98.4	99.5	37.2	45.0	
12	--	--	--	--	
16	--	--	--	--	
18	94.1	98.7	21.7	31.4	
20	92.2	98.4	18.6	27.4	
30	--	--	--	--	
35	81.7	97.1	10.6	16.0	
40	76.2	96.1	8.7	13.4	
50	--	--	--	--	
60	45.7	84.7	4.7	7.0	
80	--	--	--	--	
100	25.3	59.6	3.0	4.1	
140	14.3	22.4	2.3	2.6	
200	8.9	4.6	1.6	1.8	
270	--	--	--	--	
Hydrometer Results					
Diameter, Percent Passing	0.038, 3.84	0.038, 1.92	0.038, 0.81	0.038, 0.41	
Diameter, Percent Passing	0.024, 3.35	0.024, 1.42	0.024, 0.81	0.024, 0.41	
Diameter, Percent Passing	0.014, 3.35	0.014, 1.03	0.014, 0.81	0.014, 0.46	
Diameter, Percent Passing	0.01, 3.47	0.01, 1.03	0.01, 0.81	0.01, 0.46	
Diameter, Percent Passing	0.007, 2.78	0.007, 1.05	0.007, 0.43	0.007, 0.46	
Diameter, Percent Passing	0.005, 2.27	0.005, 1.25	0.005, 0.43	0.005, 0.46	
Diameter, Percent Passing	0.003, 2.19	0.003, 0.8	0.003, 0.43	0.003, 0.36	
Diameter, Percent Passing	0.002, 1.78	0.002, 0.78	0.002, 0.43	0.002, 0.36	
Diameter, Percent Passing	0.001, 1.19	0.001, 0.36	0.001, 0.43	0.001, 0.38	
§18.1.3.1 – Shape of Sand\Gravel particles:	--	--	Subrounded	Subrounded	
§18.1.3.2 – Hardness of Sand\Gravel particles:	--	--	Hard and Durable	Hard and Durable	
§18.3 – Graph Results					
(1) Gravel; passing No. 3, retained on No.4	0.0	0.0	40.2	42.4	
(2) Sand; passing No. 4, retained on No. 200	91.1	95.4	58.2	55.8	
(a) Coarse Sand; passing No. 4, retained on No. 10	1.6	0.5	22.6	12.6	
(b) Medium Sand; passing No. 10, retained on No. 40	22.2	3.4	28.5	31.6	
(c) Fine Sand; passing No. 40, retained on No. 200	67.3	91.5	7.1	11.6	
(3) Silt size; 0.074 to 0.002 mm	7.1	3.8	1.2	1.4	
(4) Clay size, 0.002 to 0.001 mm	1.8	0.8	0.4	0.4	
(5) Colloid, smaller than 0.001 mm	1.2	0.4	0.4	0.4	
QA/QC					
Sieve Check (§ 3.6)	Ok	Ok	Ok	Ok	
Alt. Sieve Check (§ 3.6 – Note 6)	Ok	Ok	Ok	Ok	
Size of Retained (No. 10) Check (§ 5.1.1)	TRUE	TRUE	TRUE	TRUE	
Size of Passing (No. 10) Check (§ 5.1.2)	TRUE	TRUE	TRUE	TRUE	
Mass Check (§ 5.2 – Note 8)	Ok	Ok	Ok	Ok	
Tested by:	BA	RR	RR	RR	
Data Entry By:	BA	BA	BA	BA	
Data Entry Date:	04/16/15	04/16/15	04/16/15	04/16/15	
Checked By:	BA	BA	BA	BA	
Checked Date:	04/16/15	04/16/15	04/16/15	04/16/15	



Project:	1450.007 T:, USACE, Wreck Pond Geotech													**Location:**	Wreck Pond
Sample	**Depth**	**% Moist. (D2216/2974)**	**% Org. (D2974)**	**Atterberg Limits (ASTM D4318)**			**USCS Gravel**		**USCS Sand**			**USCS Fines**		**USCS**
				PI	**LL**	**PL**	**% Coarse**	**%Fine**	**% Coarse**	**%Medium**	**%Fine**	**% Silt**	**% Clay**	**Symbol, Description**
B-4,S6	11'-12'	23	NT	NT	NT	NT	0	0	2	22	67	7	2	SP-SM, Poorly Graded Sand with Silt
B-5,S4	6'-8'	28	NT	NP	NP	NP	0	0	0	3	92	4	1	SP, Poorly Graded Sand
B-5,S5-S6	8'-11.5'	8	NT	NP	NP	NP	0	40	23	28	7	1	0	SP, Poorly Graded Sand with Gravel
B-6,S4-S5	7'-10'	9	NT	NT	NT	NT	12	30	13	32	12	1	0	SP, Poorly Graded Sand with Gravel

Project Name:	Wreck Pond Geotech					
Project Number:	1450.007	Task #: 4				
Location:	Wreck Pond					
Client:	USACE					
Owner:						
Client Address 1:	U.S. Army Engineer District					
Client Address 2:						
Client City:	New York					
Client State:	NY					
Client Zip:						
Block:						
Lot:						
Sample Information						
Laboratory Number	**1450007-13**	**1450007-14**	**1450007-15**	**1450007-16**		
Exploration Number	**B-7**	**B-7**	**B-8**	**B-8**		
Sample Number	**S1-S3**	**S4-S6**	**S3**	**S4-S5**		
Depth Range (ft)	**0'-6'**	**6'-12'**	**4'-6'**	**6'-10'**		
Requested Testing						
ASTM D 2216	x	x	x	x		
ASTM C 117						
ASTM C 136						
ASTM D 422	x	x	x	x		
ASTM D 2937						
ASTM D 2974						
ASTM D 4318						
ASTM D 854						
ASTM D 4972						
ASTM D 698						
ASTM D 1557						
ASTM D 2487						
ASTM D 2488						
ASTM D 4221						
ASTM D 4647						
ASTM C 127						
ASTM D 1883						
ASTM D 5084						
ASTM D 5102						
ASTM D 2166						
ASTM D 2850						
ASTM D 4767						
ASTM D 5102						
ASTM D 2435						
ASTM D 4767						
NJDEP K-Class						

ASTM D2216
Moisture Content

Laboratory Number	1450007-13	1450007-14	1450007-15	1450007-16	
Exploration Number	B-7	B-7	B-8	B-8	
Sample Number	S1-S3	S4-S6	S3	S4-S5	
Depth Range	0'-6'	6'-12'	4'-6'	6'-10'	
Test Method: Method A	x	x	x	x	
Method B					
Container/ Lid Number	D	F16	E	BK	
Container Mass, g (Mc)	13.7	14	13.7	16.1	
Container + Moist Specimen Mass, g (Mcms)	211.4	422.6	262.5	660	
Date / Time in oven					
Initial Container+Oven Dry Specimen Mass, g	119.8	383.4	211.4	619.2	
Date / Time out of oven					
Secondary Container+Oven Dry Specimen Mass, g	119.8	383.4	211.4	619.2	
Date / Time out of oven					
Final Container+Oven Dry Specimen Mass, g, (Mcds)	119.8	383.4	211.4	619.2	
Date / Time out of oven					
Mass of Water, g, Mw = Mcms – Mcds	91.6	39.2	51.1	40.8	
Mass of Solids, Ms = Mcds-Mc	106.1	369.4	197.7	603.1	
Water Content, %, w = (Mw/Ms)x100	86	11	26	7	
Maximum particle size (100% passing)					
3in					
1½ in					
¾ in		x		x	
3/8 in					
#4					
#10	x		x		
< #10					
Tested Maximum Grain Size (sieve #)	#18	3/4	3/8	3/4	
Oven Temperature	110.0	110.0	110.0	110.0	
Remarks					
QA/QC					
Sample Size Check: (grams less)	Adequate	Inadequate (Jar Sample)	Adequate	Inadequate (Jar Sample)	
Tested by:	BA	RR	RR	RR	
Data Entry By:	BA	BA	BA	BA	
Data Entry Date:	04/16/15	04/16/15	04/16/15	04/16/15	
Checked By:	BA	BA	BA	BA	
Checked Date:	04/16/15	04/16/15	04/16/15	04/16/15	

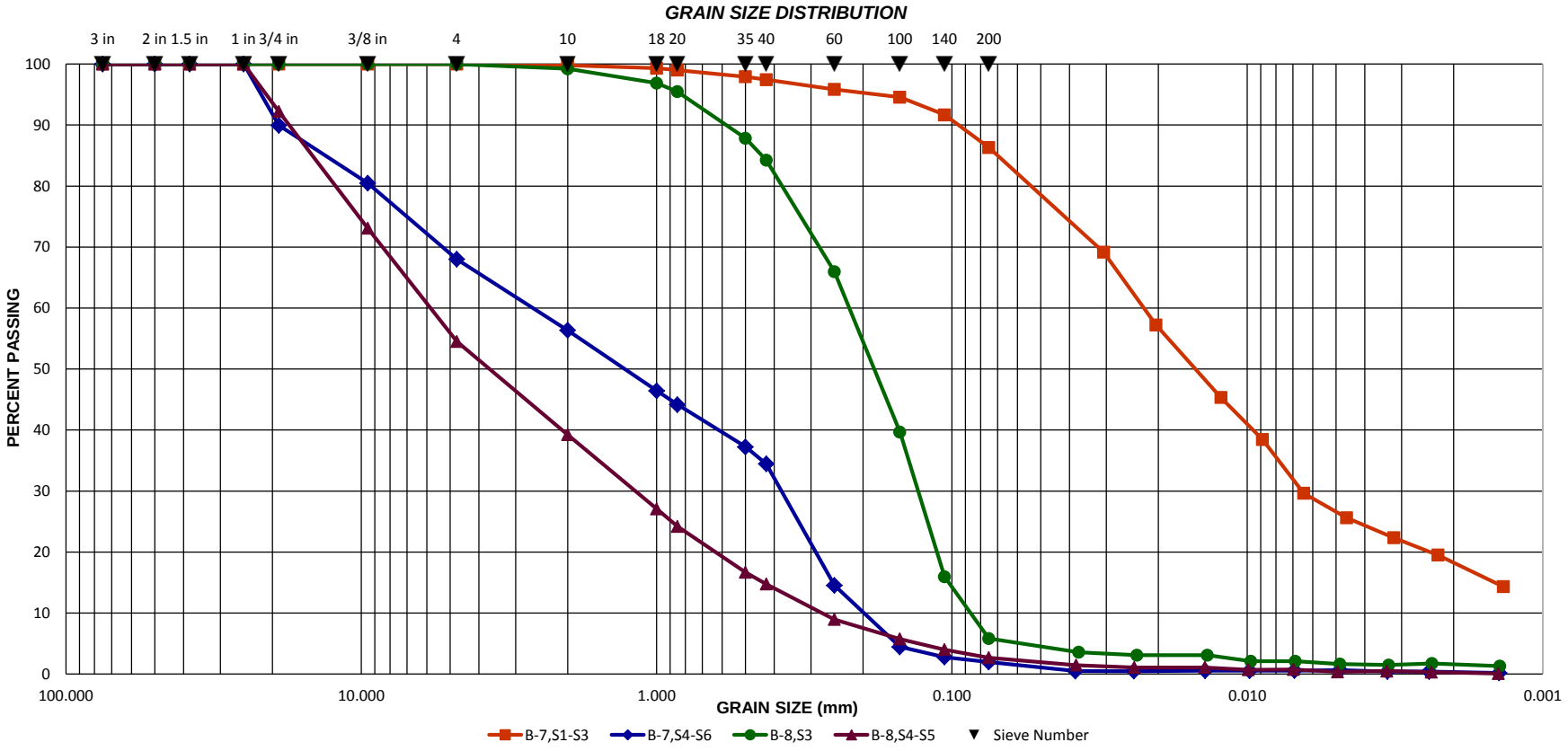
ASTM D 422
Particle Size Analysis of Soils

Apparatus: x — A – Mechanical; B – Air Jet

Laboratory Number	1450007-13	1450007-14	1450007-15	1450007-16	
Exploration Number	B-7	B-7	B-8	B-8	
Sample Number	S1-S3	S4-S6	S3	S4-S5	
Depth Range	0'-6'	6'-12'	4'-6'	6'-10'	
Hydrometer					
Hydrometer Model:					
H151					
H152	x	x	x	x	
Hydrometer Serial Number:	541307	541307	541307	541307	
Air Drying Total Sample					
Container Number	D	F16	E	BK	
Container Mass, g (Mc)	13.7	14	13.7	16.1	
Container + Moist Specimen Mass, g (Mcms)	119.8	383.4	211.4	619.2	
Mass of Solids, g, Mod = Mcds-Mc	106.1	369.4	197.7	603.1	
Dry Sieved Sample **(§ 5.2) No.10 Split**					
Total Sample, g	100.9	369.5	192.4	588.3	
Mass Retained on No.10, g	0.2	161.3	1.5	357.5	
Mass Passing No. 10, g	100.7	208.2	190.9	230.8	
§6 – Sieve Analysis of Portion Retained on No. 10 **Mass Retained on Sieves, g**					
3 in					
2 in					
1.5 in					
1 in					
3/4 in		37.20		45.80	
3/8 in		35.00		112.60	
4		46.00		109.20	
6					
8					
10	0.20	43.10	1.50	89.90	
§7 through 11 – Hydrometer and Sieve Analysis of Portion Passing No. 10 **§8.1 – Hygroscopic Moisture**					
Container Number	BF	20	53	AC	
Container Mass, g (Mc)	13.59	13.55	13.69	14.02	
Container + Moist Specimen Mass, g (Mcms)	17.23	19.41	18.9	21.93	
Date / Time in oven					
Initial Container+Oven Dry Specimen Mass, g	17.13	19.34	18.87	21.9	
Date / Time out of oven					
Secondary Container+Oven Dry Specimen Mass, g	17.13	19.34	18.87	21.9	
Date / Time out of oven					
Final Container+Oven Dry Specimen Mass, g, (Mcds)	17.13	19.34	18.87	21.9	
Date / Time out of oven					
Oven Solids, Ms = Mcds-Mc	3.54	5.79	5.18	7.88	
Hygroscopic Moisture Corr. Factor, hmc	0.973	0.988	0.994	0.996	
§9 – Dispersion Soil Sample					
Container Number	1	2	3	4	
Air Dried Specimen Mass, g (Mcms)	51.6	108.8	102.2	100.9	
Date / Time Dispersion Agent Introduced	04/12/2015 09:00	04/12/2015 09:04	04/12/2015 09:08	04/12/2015 09:12	
Date / Time Sample Ready	04/13/2015 01:00	04/13/2015 01:04	04/13/2015 01:08	04/13/2015 01:12	
ASTM D 854 Data Available:	No	No	No	No	
Use D854 Info?	Assumed	Assumed	Assumed	Assumed	
Specific Gravity Calculated, G					
Specific Gravity Assumed, G	2.65	2.65	2.65	2.65	
Composite Correction Graph Available:	x	x	x	x	
Use Graph ?	x	x	x	x	

§10 – Hydrometer Test					
Date / Time Hydrometer Started	04/13/2015 09:00	04/13/2015 09:04	04/13/2015 09:08	04/13/2015 09:12	
Reading (min.)	2	2	2	2	
Reading time and date	04/13/2015 09:02	04/13/2015 09:06	04/13/2015 09:10	04/13/2015 09:14	
Hydrometer Reading, H	40	6	8.5	9	
Temperature, De. C., Tc	18.5	19.1	20	18.3	
Composite Correction Reading, Rcc	5.215	5.065	4.84	5.265	
Reading (min.)	5	5	5	5	
Reading time and date	04/13/2015 09:05	04/13/2015 09:09	04/13/2015 09:13	04/13/2015 09:17	
Hydrometer Reading, H	34	6	8	8	
Temperature, De. C., Tc	18.5	19	20	18.4	
Composite Correction Reading, Rcc	5.215	5.09	4.84	5.24	
Reading (min.)	15	15	15	15	
Reading time and date	04/13/2015 09:15	04/13/2015 09:19	04/13/2015 09:23	04/13/2015 09:27	
Hydrometer Reading, H	28	6	8	8	
Temperature, De. C., Tc	18.6	19.4	20	18.5	
Composite Correction Reading, Rcc	5.19	4.99	4.84	5.215	
Reading (min.)	30	30	30	30	
Reading time and date	04/13/2015 09:30	04/13/2015 09:34	04/13/2015 09:38	04/13/2015 09:42	
Hydrometer Reading, H	24.5	6	7	7	
Temperature, De. C., Tc	18.7	19.5	20	18.5	
Composite Correction Reading, Rcc	5.165	4.965	4.84	5.215	
Reading (min.)	60	60	60	60	
Reading time and date	04/13/2015 10:00	04/13/2015 10:04	04/13/2015 10:08	04/13/2015 10:12	
Hydrometer Reading, H	20	6	7	7	
Temperature, De. C., Tc	19	19.7	20	18.8	
Composite Correction Reading, Rcc	5.09	4.915	4.84	5.14	
Reading (min.)	120	120	120	120	
Reading time and date	04/13/2015 11:00	04/13/2015 11:04	04/13/2015 11:08	04/13/2015 11:12	
Hydrometer Reading, H	18	6	6.5	6	
Temperature, De. C., Tc	18.9	20.4	20	18.9	
Composite Correction Reading, Rcc	5.115	4.74	4.84	5.115	
Reading (min.)	250	250	250	250	
Reading time and date	04/13/2015 13:10	04/13/2015 13:14	04/13/2015 13:18	04/13/2015 13:22	
Hydrometer Reading, H	16	5.5	6	6	
Temperature, De. C., Tc	20.3	20.6	21.4	20.3	
Composite Correction Reading, Rcc	4.765	4.69	4.49	4.765	
Reading (min.)	480	480	480	480	
Reading time and date	04/13/2015 17:00	04/13/2015 17:04	04/13/2015 17:08	04/13/2015 17:12	
Hydrometer Reading, H	14	5.5	6	5	
Temperature, De. C., Tc	22.6	20.5	22.4	22.5	
Composite Correction Reading, Rcc	4.19	4.715	4.24	4.215	
Reading (min.)	1440	1440	1440	1440	
Reading time and date	04/14/2015 09:00	04/14/2015 09:04	04/14/2015 09:08	04/14/2015 09:12	
Hydrometer Reading, H	12	5	6	5	
Temperature, De. C., Tc	20.2	20.8	20.7	20.3	
Composite Correction Reading, Rcc	4.79	4.64	4.665	4.765	
§11 – Sieve Analysis Material Passing No. 10					
12					
16					
18	0.50	36.60	4.50	71.60	
20	0.30	8.40	2.70	16.80	
30					
35	1.10	25.60	14.70	44.40	
40	0.50	10.30	6.90	11.20	
50					
60	1.60	73.60	35.20	34.10	
80					
100	1.30	37.30	50.60	18.90	
140	2.90	6.10	45.60	10.20	
200	4.40	2.40	17.90	6.10	
270					
Pan	1.00	0.60	1.60	1.70	

Test Results					
§18.1.1 – Maximum Particle Size (mm)	2.000	19.000	2.000	19.000	
§ 18.1.2 – Mass Passing Sieves, %					
3 in	100.0	100.0	100.0	100.0	
2 in	100.0	100.0	100.0	100.0	
1.5 in	100.0	100.0	100.0	100.0	
1 in	100.0	100.0	100.0	100.0	
3/4 in	100.0	89.9	100.0	92.2	
3/8 in	100.0	80.5	100.0	73.1	
4	100.0	68.0	100.0	54.5	
6	--	--	--	--	
8	--	--	--	--	
10	99.8	56.3	99.2	39.2	
12	--	--	--	--	
16	--	--	--	--	
18	99.3	46.4	96.9	27.1	
20	99.0	44.2	95.5	24.2	
30	--	--	--	--	
35	97.9	37.2	87.8	16.7	
40	97.4	34.5	84.3	14.8	
50	--	--	--	--	
60	95.8	14.5	66.0	9.0	
80	--	--	--	--	
100	94.5	4.4	39.7	5.7	
140	91.7	2.8	16.0	4.0	
200	86.3	2.0	5.8	2.7	
270	--	--	--	--	
Hydrometer Results					
Diameter, Percent Passing	0.031, 69.15	0.038, 0.49	0.037, 3.57	0.038, 1.46	
Diameter, Percent Passing	0.02, 57.22	0.024, 0.48	0.024, 3.09	0.024, 1.08	
Diameter, Percent Passing	0.012, 45.34	0.014, 0.53	0.014, 3.09	0.014, 1.09	
Diameter, Percent Passing	0.009, 38.43	0.01, 0.54	0.01, 2.11	0.01, 0.7	
Diameter, Percent Passing	0.006, 29.64	0.007, 0.57	0.007, 2.11	0.007, 0.73	
Diameter, Percent Passing	0.005, 25.61	0.005, 0.66	0.005, 1.62	0.005, 0.35	
Diameter, Percent Passing	0.003, 22.33	0.003, 0.42	0.003, 1.47	0.003, 0.48	
Diameter, Percent Passing	0.002, 19.5	0.002, 0.41	0.002, 1.72	0.002, 0.31	
Diameter, Percent Passing	0.001, 14.33	0.001, 0.19	0.001, 1.3	0.001, 0.09	
§18.1.3.1 – Shape of Sand\Gravel particles:	--	Subrounded	--	Subrounded	
§18.1.3.2 – Hardness of Sand\Gravel particles:	--	Hard and Durable	--	Hard and Durable	
§18.3 – Graph Results					
(1) Gravel; passing No. 3, retained on No.4	0.0	32.0	0.0	45.5	
(2) Sand; passing No. 4, retained on No. 200	13.7	66.0	94.2	51.8	
(a) Coarse Sand; passing No. 4, retained on No. 10	0.2	11.7	0.8	15.3	
(b) Medium Sand; passing No. 10, retained on No. 40	2.4	21.9	15.0	24.5	
(c) Fine Sand; passing No. 40, retained on No. 200	11.1	32.5	78.4	12.1	
(3) Silt size; 0.074 to 0.002 mm	66.8	1.6	4.1	2.4	
(4) Clay size, 0.002 to 0.001 mm	19.5	0.4	1.7	0.3	
(5) Colloid, smaller than 0.001 mm	14.3	0.2	1.3	0.1	
QA/QC					
Sieve Check (§ 3.6)	Ok	Ok	Ok	Ok	
Alt. Sieve Check (§ 3.6 – Note 6)	Ok	Ok	Ok	Ok	
Size of Retained (No. 10) Check (§ 5.1.1)	TRUE	TRUE	TRUE	TRUE	
Size of Passing (No. 10) Check (§ 5.1.2)	TRUE	TRUE	TRUE	TRUE	
Mass Check (§ 5.2 – Note 8)	Ok	Ok	Ok	Ok	
Tested by:	BA	RR	RR	RR	
Data Entry By:	BA	BA	BA	BA	
Data Entry Date:	04/16/15	04/16/15	04/16/15	04/16/15	
Checked By:	BA	BA	BA	BA	
Checked Date:	04/16/15	04/16/15	04/16/15	04/16/15	



Project:	1450.007 T:, USACE, Wreck Pond Geotech								**Location:**	Wreck Pond				
Sample	**Depth**	**% Moist. (D2216/2974)**	**% Org. (D2974)**	**Atterberg Limits (ASTM D4318)**			**USCS Gravel**		**USCS Sand**			**USCS Fines**		**USCS**
				PI	**LL**	**PL**	**% Coarse**	**%Fine**	**% Coarse**	**%Medium**	**%Fine**	**% Silt**	**% Clay**	**Symbol, Description**
B-7,S1-S3	0'-6'	86	NT	NT	NT	NT	0	0	0	2	11	67	20	OH, Organic Silt
B-7,S4-S6	6'-12'	11	NT	NP	NP	NP	10	22	12	22	32	2	0	SP, Poorly Graded Sand with Gravel
B-8,S3	4'-6'	26	NT	NP	NP	NP	0	0	1	15	78	4	2	SP-SM, Poorly Graded Sand with Silt
B-8,S4-S5	6'-10'	7	NT	NP	NP	NP	8	38	15	24	12	2	0	SP, Poorly Graded Sand with Gravel

Project Name:	Wreck Pond Geotech					
Project Number:	1450.007	Task #: 4				
Location:	Wreck Pond					
Client:	USACE					
Owner:						
Client Address 1:	U.S. Army Engineer District					
Client Address 2:						
Client City:	New York					
Client State:	NY					
Client Zip:						
Block:						
Lot:						
Sample Information						
Laboratory Number	**1450007-17**	**1450007-18**	**1450007-19**	**1450007-20**		
Exploration Number	**B-9**	**B-9**	**B-10**	**B-10**		
Sample Number	**S1**	**S3-S4**	**S1-S3**	**S5-S6**		
Depth Range (ft)	**0'-3'**	**4'-8'**	**0'-7.5'**	**8'-12'**		
Requested Testing						
ASTM D 2216	x	x	x	x		
ASTM C 117						
ASTM C 136						
ASTM D 422	x	x	x	x		
ASTM D 2937						
ASTM D 2974						
ASTM D 4318			x			
ASTM D 854						
ASTM D 4972						
ASTM D 698						
ASTM D 1557						
ASTM D 2487						
ASTM D 2488						
ASTM D 4221						
ASTM D 4647						
ASTM C 127						
ASTM D 1883						
ASTM D 5084						
ASTM D 5102						
ASTM D 2166						
ASTM D 2850						
ASTM D 4767						
ASTM D 5102						
ASTM D 2435						
ASTM D 4767						
NJDEP K-Class						

Project Name:	Wreck Pond Geotech
Project Number:	1450.007 Task #: 4
Location:	Wreck Pond
Client:	USACE
Owner:	
Client Address 1:	U.S. Army Engineer District
Client Address 2:	
Client City:	New York
Client State:	NY
Client Zip:	
Block:	
Lot:	

Sample Information						
Laboratory Number	**1450007-21**	**1450007-22**	**1450007-23**			
Exploration Number	**B-1**	**B-3**	**B-3**			
Sample Number	**S2-S5**	**S1-S5**	**S1-S5**			
Depth Range (ft)	**4'-10'**	**0'-10'**	**0'-10'**			
Requested Testing						
ASTM D 2216						
ASTM C 117						
ASTM C 136						
ASTM D 422						
ASTM D 2937						
ASTM D 2974						
ASTM D 854						
ASTM D 4318	x	x	x			
ASTM D 4972						
ASTM D 698						
ASTM D 1557						
ASTM D 2487						
ASTM D 2488						
ASTM D 4221						
ASTM D 4647						
ASTM C 127						
ASTM D 1883						
ASTM D 5084						
ASTM D 5102						
ASTM D 2166						
ASTM D 2850						
ASTM D 4767						
ASTM D 5102						
ASTM D 2435						
ASTM D 4767						
NJDEP K-Class						

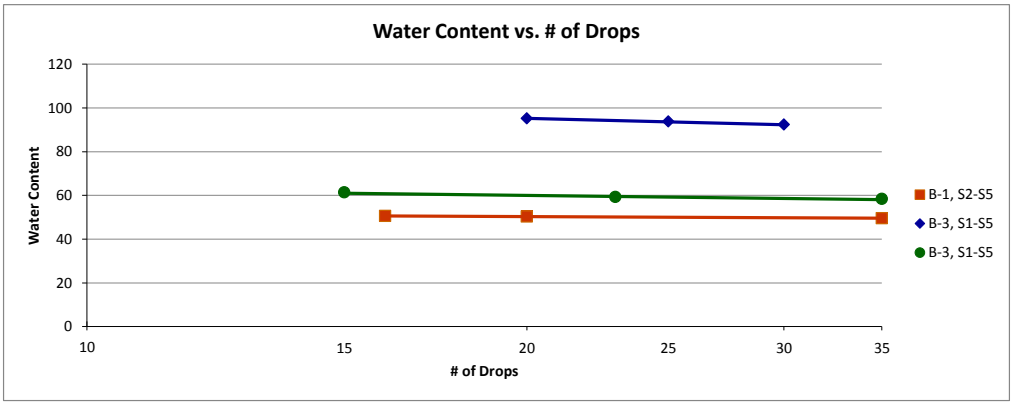
ASTM D 4318
Plasticity of Soils (Atterberg Limits)

Laboratory Number	1450007-21	1450007-22	1450007-23	
Exploration Number	B-1	B-3	B-3	
Sample Number	S2-S5	S1-S5	S1-S5	
Depth Range	4'-10'	0'-10'	0'-10'	
Soil Description				
Initial Visual Description:	Dark Gray Clay	Black Organic Silt	Black Organic Silt	
Approximate Max. Grain Size				
3”				
1 ½”				
¾”				
3/8”				
#4				
#10				
<#10	x	x	x	
Testing Equipment				
Plastic Limit – Hand Rolled	x	x	x	
Plastic Limit – Mechanically Rolled				
Liquid Limit – Apparatus Number				
Liquid Limit – Manual	x	x	x	
Liquid Limit – Mechanical				
Grooving Tool – Metal				
Grooving Tool – Plastic	x	x	x	
Specimen Preparation				
Wet	x	x		
Dry (Air)	Oven Dried for Classification			
Washed on #40				
Dry Sieved on #40				
Mechanically Pushed through #40				
Mixing Water – Distilled	x	x	x	
Mixing Water – Demineralized				
Mixing Water – Other				
As-Received Water Content (Oven Dried)				
Mass of Tare (g)	NT	NT	NT	
Mass of Moist Soil and Tare (g)	NT	NT	NT	
Time in oven				
Time out of oven				
Drying Time				
Mass of Dry Soil and Tare (g)	NT	NT	NT	
A = mass of as received test specimen (g)				
B = mass of oven-dried specimen (g)				
C = mass of Water (g)				
Moisture Content (%)				
Plastic Limit				
Trail 1				
Mass of Tare (g)	13.63	13.44	NT	
Mass of Moist Soil and Tare (g)	17.19	16.55	NT	
Time in oven				
Time out of oven				
Drying Time	00:00	00:00		
Mass of Dry Soil and Tare (g)	16.43	15.63	NT	
A = mass of as received test specimen (g)	3.56	3.11		
B = mass of oven-dried specimen (g)	2.8	2.19		
C = mass of Water (g)	0.76	0.92		
Moisture Content (%)	27.14	42.01		
Trail 2				
Mass of Tare (g)	13.54	13.58	NT	
Mass of Moist Soil and Tare (g)	28.98	17.56	NT	
Time in oven				
Time out of oven				
Drying Time	00:00	00:00		
Mass of Dry Soil and Tare (g)	25.62	16.39	NT	
A = mass of as received test specimen (g)	15.44	3.98		
B = mass of oven-dried specimen (g)	12.08	2.81		
C = mass of Water (g)	3.36	1.17		
Moisture Content (%)	27.81	41.64		

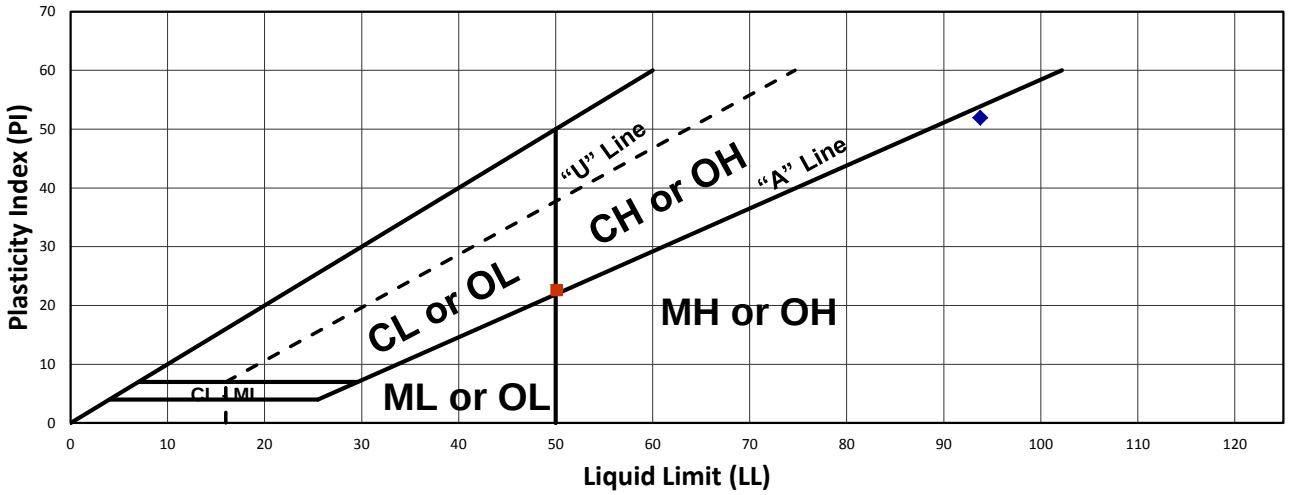
Liquid Limit			
A – Multiple Point B – Single Point	x	x	x
Trial 1			
Mass of Tare (g)	13.55	13.53	13.68
Mass of Moist Soil and Tare (g)	26.26	20.32	22.47
Time in oven			
Time out of oven			
Drying Time	00:00	00:00	00:00
Mass of Dry Soil and Tare (g)	22.05	17.06	19.2
A = mass of as received test specimen (g)	12.71	6.79	8.79
B = mass of oven-dried specimen (g)	8.5	3.53	5.52
C = mass of Water (g)	4.21	3.26	3.27
Moisture Content (%)	49.53	92.35	59.24
Number of Blows, N	35	30	23
Liquid Limit – Method B	NT	NT	NT
Trial 2			
Mass of Tare (g)	13.58	13.81	13.27
Mass of Moist Soil and Tare (g)	24.87	21.31	20.71
Time in oven			
Time out of oven			
Drying Time	00:00	00:00	00:00
Mass of Dry Soil and Tare (g)	21.09	17.68	17.88
A = mass of as received test specimen (g)	11.29	7.5	7.44
B = mass of oven-dried specimen (g)	7.51	3.87	4.61
C = mass of Water (g)	3.78	3.63	2.83
Moisture Content (%)	50.33	93.80	61.39
Number of Blows, N	20	25	15
Liquid Limit – Method B	NT	NT	NT
Trial 3			
Mass of Tare (g)	13.58	13.49	13.46
Mass of Moist Soil and Tare (g)	24.53	19.56	20.46
Time in oven			
Time out of oven			
Drying Time	00:00	00:00	00:00
Mass of Dry Soil and Tare (g)	20.85	16.6	17.88
A = mass of as received test specimen (g)	10.95	6.07	7
B = mass of oven-dried specimen (g)	7.27	3.11	4.42
C = mass of Water (g)	3.68	2.96	2.58
Moisture Content (%)	50.62	95.18	58.37
Number of Blows, N	16	20	35
Liquid Limit – Method B	NT	NT	NT

Results			
Sample Number	B-1, S2-S5	B-3, S1-S5	B-3, S1-S5
Plastic Limit	27	42	NT
Liquid Limit – Method B	NT	NT	NT
Liquid Limit – Method A	50	94	60

Liquid Limit Determination – Method A



Plasticity Chart



Symbol	■	◆	●	
Sample Number	B-1, S2-S5	B-3, S1-S5	B-3, S1-S5	
Liquid Limit (LL)	50	94	60	
Plasticity Index (PI)	23	52	Oven Dried LL for USCS Classification	
QA/QC				
Tested by:	BA	BA	BA	
Data Entry By:	BA	BA	BA	
Data Entry Date:	04/15/15	04/15/15	04/15/15	
Checked By:	BA	BA	BA	
Checked Date:	04/15/15	04/15/15	04/15/15	

Project Name:	Wreck Pond Geotech
Project Number:	1450.007 Task #: 4
Location:	Wreck Pond
Client:	USACE
Owner:	
Client Address 1:	U.S. Army Engineer District
Client Address 2:	
Client City:	New York
Client State:	NY
Client Zip:	
Block:	
Lot:	

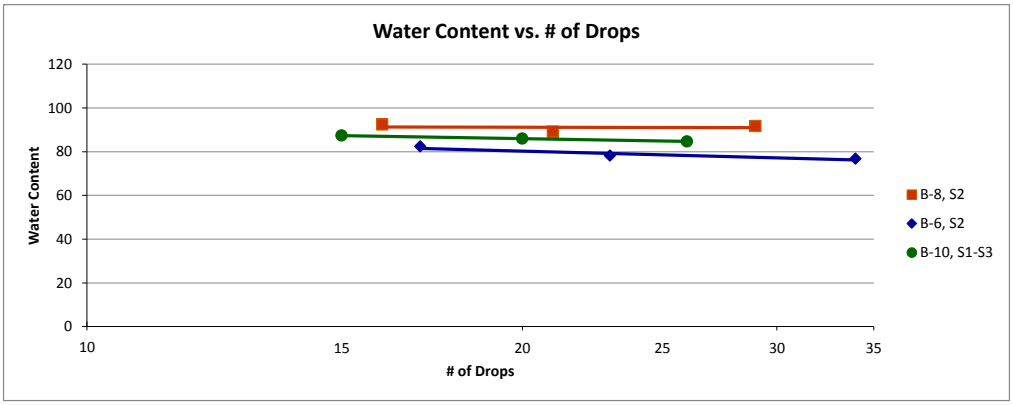
Sample Information						
Laboratory Number	**1450007-24**	**1450007-25**	**1450007-26**			
Exploration Number	**B-8**	**B-6**	**B-10**			
Sample Number	**S2**	**S2**	**S1-S3**			
Depth Range (ft)	**2'-4'**	**2'-4'**	**0'-6'**			
Requested Testing						
ASTM D 2216						
ASTM C 117						
ASTM C 136						
ASTM D 422						
ASTM D 2937						
ASTM D 2974						
ASTM D 854						
ASTM D 4318	x	x	x			
ASTM D 4972						
ASTM D 698						
ASTM D 1557						
ASTM D 2487						
ASTM D 2488						
ASTM D 4221						
ASTM D 4647						
ASTM C 127						
ASTM D 1883						
ASTM D 5084						
ASTM D 5102						
ASTM D 2166						
ASTM D 2850						
ASTM D 4767						
ASTM D 5102						
ASTM D 2435						
ASTM D 4767						
NJDEP K-Class						

ASTM D 4318
Plasticity of Soils (Atterberg Limits)

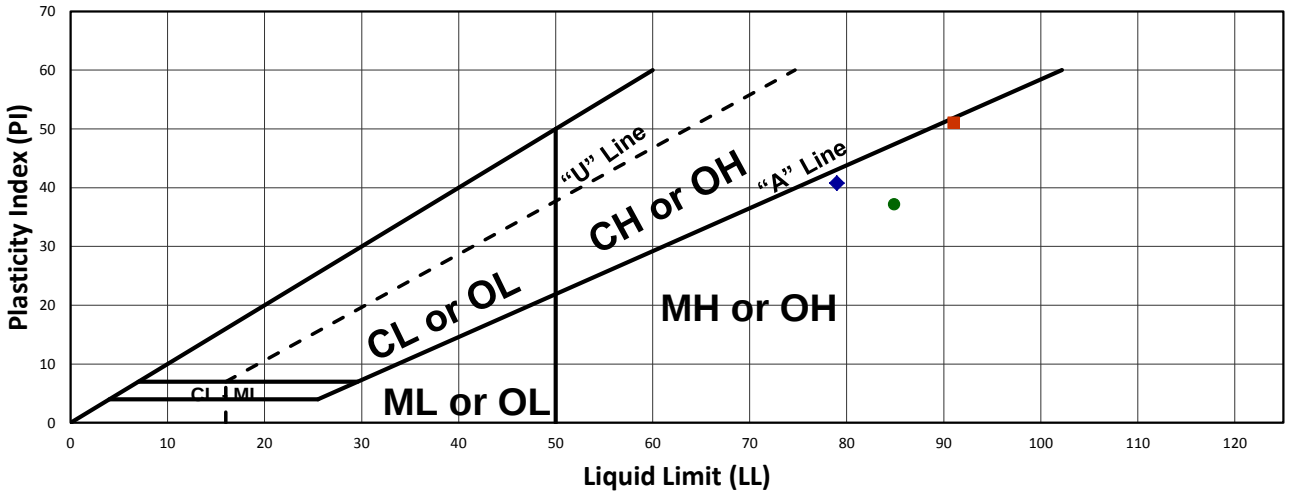
Laboratory Number	1450007-24	1450007-25	1450007-26	
Exploration Number	B-8	B-6	B-10	
Sample Number	S2	S2	S1-S3	
Depth Range	2'-4'	2'-4'	0'-6'	
Soil Description				
Initial Visual Description:	Black Organic Silt	Black Organic Silt	Black Organic Silt	
Approximate Max. Grain Size				
3”				
1 ½”				
¾”				
3/8”				
#4				
#10				
<#10	x	x	x	
Testing Equipment				
Plastic Limit – Hand Rolled	x	x	x	
Plastic Limit – Mechanically Rolled				
Liquid Limit – Apparatus Number				
Liquid Limit – Manual	x	x	x	
Liquid Limit – Mechanical				
Grooving Tool – Metal				
Grooving Tool – Plastic	x	x	x	
Specimen Preparation				
Wet	x	x	x	
Dry (Air)				
Washed on #40				
Dry Sieved on #40				
Mechanically Pushed through #40				
Mixing Water – Distilled	x	x	x	
Mixing Water – Demineralized				
Mixing Water – Other				
As-Received Water Content (Oven Dried)				
Mass of Tare (g)	NT	NT	NT	
Mass of Moist Soil and Tare (g)	NT	NT	NT	
Time in oven				
Time out of oven				
Drying Time				
Mass of Dry Soil and Tare (g)	NT	NT	NT	
A = mass of as received test specimen (g)				
B = mass of oven-dried specimen (g)				
C = mass of Water (g)				
Moisture Content (%)			#DIV/0!	
Plastic Limit				
Trail 1				
Mass of Tare (g)	13.6	13.6	13.66	
Mass of Moist Soil and Tare (g)	18.55	17.66	19.25	
Time in oven				
Time out of oven				
Drying Time	00:00	00:00	00:00	
Mass of Dry Soil and Tare (g)	17.13	16.53	17.44	
A = mass of as received test specimen (g)	4.95	4.06	5.59	
B = mass of oven-dried specimen (g)	3.53	2.93	3.78	
C = mass of Water (g)	1.42	1.13	1.81	
Moisture Content (%)	40.23	38.57	47.88	
Trail 2				
Mass of Tare (g)	13.53	13.63	13.5	
Mass of Moist Soil and Tare (g)	27.11	17.89	20.14	
Time in oven				
Time out of oven				
Drying Time	00:00	00:00	00:00	
Mass of Dry Soil and Tare (g)	23.25	16.72	18	
A = mass of as received test specimen (g)	13.58	4.26	6.64	
B = mass of oven-dried specimen (g)	9.72	3.09	4.5	
C = mass of Water (g)	3.86	1.17	2.14	
Moisture Content (%)	39.71	37.86	47.56	

Liquid Limit			
A – Multiple Point B – Single Point	x	x	x
Trial 1			
Mass of Tare (g)	13.52	13.63	13.56
Mass of Moist Soil and Tare (g)	25.5	27.1	26.82
Time in oven			
Time out of oven			
Drying Time	00:00	00:00	00:00
Mass of Dry Soil and Tare (g)	19.77	21.25	20.74
A = mass of as received test specimen (g)	11.98	13.47	13.26
B = mass of oven-dried specimen (g)	6.25	7.62	7.18
C = mass of Water (g)	5.73	5.85	6.08
Moisture Content (%)	91.68	76.77	84.68
Number of Blows, N	29	34	26
Liquid Limit – Method B	NT	NT	NT
Trial 2			
Mass of Tare (g)	13.76	13.58	13.7
Mass of Moist Soil and Tare (g)	26.13	23.02	25.84
Time in oven			
Time out of oven			
Drying Time	00:00	00:00	00:00
Mass of Dry Soil and Tare (g)	20.3	18.88	20.18
A = mass of as received test specimen (g)	12.37	9.44	12.14
B = mass of oven-dried specimen (g)	6.54	5.3	6.48
C = mass of Water (g)	5.83	4.14	5.66
Moisture Content (%)	89.14	78.11	87.35
Number of Blows, N	21	23	15
Liquid Limit – Method B	NT	NT	NT
Trial 3			
Mass of Tare (g)	13.67	13.66	13.62
Mass of Moist Soil and Tare (g)	24.83	28.38	31.68
Time in oven			
Time out of oven			
Drying Time	00:00	00:00	00:00
Mass of Dry Soil and Tare (g)	19.47	21.73	23.33
A = mass of as received test specimen (g)	11.16	14.72	18.06
B = mass of oven-dried specimen (g)	5.8	8.07	9.71
C = mass of Water (g)	5.36	6.65	8.35
Moisture Content (%)	92.41	82.40	85.99
Number of Blows, N	16	17	20
Liquid Limit – Method B	NT	NT	NT
Results			
Sample Number	B-8, S2	B-6, S2	B-10, S1-S3
Plastic Limit	40	38	48
Liquid Limit – Method B	NT	NT	NT
Liquid Limit – Method A	91	79	85

Liquid Limit Determination – Method A



Plasticity Chart



Symbol	■	◆	●	
Sample Number	B-8, S2	B-6, S2	B-10, S1-S3	
Liquid Limit (LL)	91	79	85	
Plasticity Index (PI)	51	41	37	
		QA/QC		
Tested by:	RR	RR	RR	
Data Entry By:	BA	BA	BA	
Data Entry Date:	04/15/15	04/15/15	04/15/15	
Checked By:	BA	BA	BA	
Checked Date:	04/15/15	04/15/15	04/15/15	

Princeton Hydro, LLC

Unconfined Compression Test Report (ASTM D2166) - Wreck Pond, B-1, ST-1, 8-10'

Date 4/16/2015

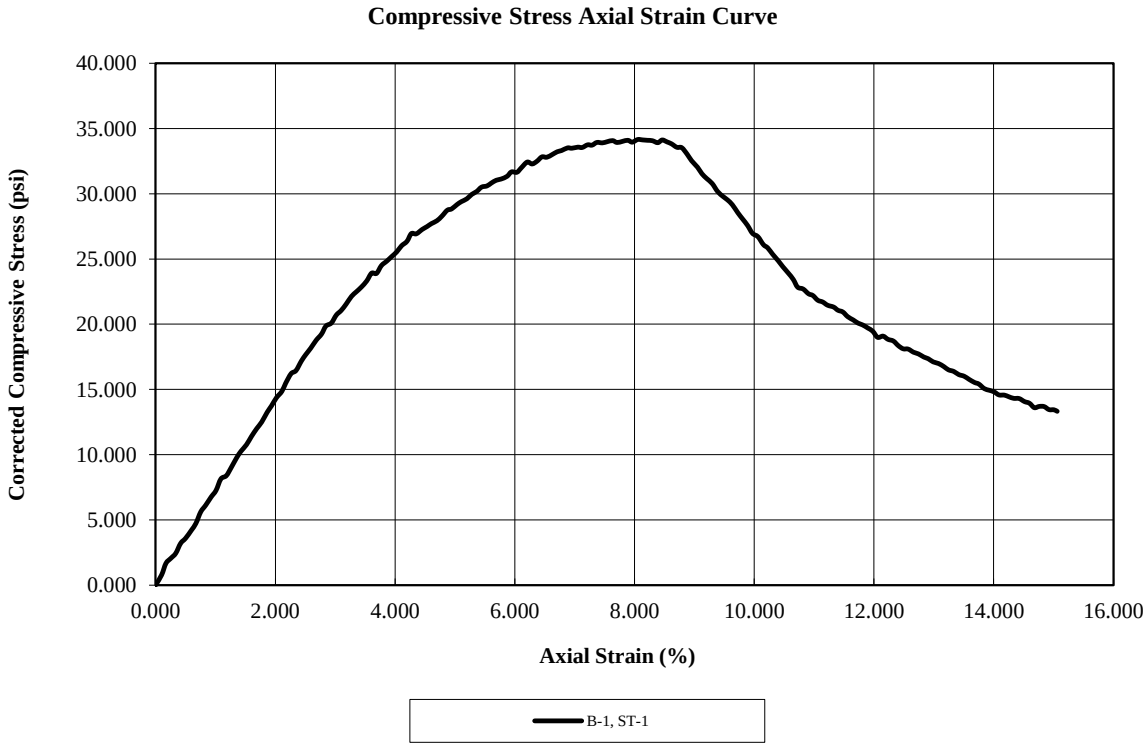
Checked By BA

Date 4/16/2015

Computed By BA

Date 4/16/2015

Tested By BA



Before Test	Specimen
	B-1, ST-1
Water Content (%)	35.7
Dry Density (pcf)	88.2
Saturation (%)	NT
Void Ratio	NT
Diameter (in)	2.859
Height (in)	6.271
Test Data	**B-1, ST-1**
Unconfined Strength (psi)	34.2
Undrained Shear Strength (tsf)	1.23
Undrained Shear Strength (psi)	17.1
Rate of Strain (in/min)	0.063
Strain at Failure (%)	8.10

Project Information		Specimen Description	
Project Num	1450.007	ST-1, 8-10'	Dark Gray (10YR 4/1) fat clay (CH), trace fine sand, stiff
Project	Wreck Pond Geotech		
Sampling Date	3/24/2015		
Sample #	B-1, ST-1		
Client	USACE	**Test Variables**	
		Specific Gravity	NT
		Liquid Limit:	50
		Plastic Limit:	27

Remarks Undisturbed sample, Height:Dia = 2.19, Diagonal shear failure