STORMWATER BASIN AREA INVESTIGATION

PROPOSED WAREHOUSE
322 Half Acre Road
Block 8, Lot 1.02 & 1.03
Township of Cranbury, Middlesex County, New Jersey

Prepared for:

ARNY ASSOCIATES, LLC
37 West Cherry Street
Rahway, NJ 07065

Prepared by:

DYNAMIC EARTH

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Project #3529-99-001E
February 8, 2022

STORMWATER BASIN AREA INVESTIGATION REPORT

Proposed Warehouse
322 Half Acre Road
Township of Cranbury, Middlesex County, New Jersey

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APPENDICES

1.0 INTRODUCTION

Dynamic Earth, LLC (Dynamic Earth) has completed an exploration and evaluation program for the proposed stormwater management facilities associated with the proposed site development to be located at 322 Half Acre Road in the Township of Cranbury, Middlesex County, New Jersey. The project site is further identified as Block 8, Lots 1.02 and 1.03. The subject site is bound to the north by an existing warehouse facility and stormwater management basin with Cranbury Half Acre Road beyond; to the east by an existing warehouse with Gavett Drive and railroad beyond; to the south by both undeveloped, wooded land and commercial properties; and to the west by NJ I-95 with commercial properties beyond. The site of the proposed construction is attached *Soil Profile Pit Location Plan* included in the appendix of this report.

At the time of Dynamic Earth's investigation, the subject site was developed with vacant two-story office building and associated pavements, utilities, and stormwater management facilities. Topography across the project site generally slopes downward toward the south from a high elevation of approximately 105 feet along the northern property boundary to a low elevation of approximately 97 feet within the southern portion of the property. Topographic information was provided on a November 13, 2020 (last revised) *Boundary & Topographic Survey* prepared by Dynamic Survey, LLC. The elevations included herein reference the North American Vertical Datum of 1988 (NAVD 1988), unless otherwise noted.

Based on a December 12, 2021 (last revised), *Conceptual Site Plan 'A'*, prepared by Dynamic Engineering Consultants, P.C. (Dynamic), re-development of the project will include the demolition of existing site structures and the construction of an 85,756 square foot warehouse building with associated driveways, loading docks, and utilities. Stormwater management facilities are proposed within the northern, southwestern, and southeastern portion of the site.

2.0 SCOPE OF SERVICES

Dynamic Earth's scope of services pertaining to this report included evaluating the subsurface conditions by excavating soil profile pits to estimate the apparent seasonal high groundwater level and collecting samples for laboratory permeability testing. Six soil profile pits (identified as SPP-1 through SPP-6) were excavated at the site using a rubber tire backhoe. Test locations were located within landscaped areas and were backfilled to the surface with excavated soils. The test locations are shown on the attached *Soil Profile Pit Location Plan.*

The soils encountered were classified using the United States Department of Agriculture (USDA) Classification System. Observations were made for groundwater and/or soil mottling

and mineral deposits potentially indicative of zones of saturation or seasonal high groundwater. Soil logs are included in the Appendix of the report. Samples were collected within representative zones near the infiltration level.

Undisturbed tube permeability tests were collected in general accordance with New Jersey Department of Environmental Protection (N.J.D.E.P.) *Stormwater Best Practices Manual – Chapter 12 Soil Testing Criteria* test methods on representative samples obtained from anticipated stormwater management facility.

Environmental conditions were not evaluated by Dynamic Earth.

3.0 SOIL SURVEY

Based on a review of the United States Department of Agriculture – Natural Resources Conservation Services (USDA-NRCS) soil survey the following soil resources are mapped underlying the site within the area of the proposed site improvements, are shown on the *NCRS-USDA Custom Soil Report* included in the appendix of this report and are described below:

Fallsington Loams, 0 to 2 percent slope, Northern Coastal Plain (FapA): This soils series is generally mapped within the southwestern portion of the site and the parent material is described as loamy fluviomarine deposits. The typical soil profile (as detailed in the survey) consist of mucky peat to a depth of 2 inches; loam to a depth of 10 inches; sandy clay loam to a depth of 32 inches; loamy sand to a depth of 39 inches; clay loam to a depth of sandy clay loam; underlain by a sand to a depth of 80 inches below the ground surface (limit of the report). The depth to the ground water table is reported to be between six to 18 inches below the natural ground surface.

Woodstown Loam, 0 to 2 percent slopes, Northern Coastal Plan (WogA): This soils series is generally mapped within the northwestern, central, and south eastern portion of the site and the parent material is described as loamy fluviomarine deposits. The typical soil profile (as detailed in the survey) consist of loam to a depth of seven inches; sandy loam to a depth of 29 inches; fine sandy loam to a depth of 45 inches; underlain by a loamy sand to a depth of 80 inches below the ground surface (limit of the report). The depth of the ground water table is reported to be between 20 to 40 inches.

Urban Land (UR): This series generally consists of disturbed and natural soil material covered by pavement, concrete, buildings, and other structures. The typical soil profile and depth to groundwater is not reported.

4.0 RESULTS

Detailed descriptions of the subsurface conditions encountered at each location are provided on the *Records of Subsurface Exploration* included herein. A summary of the subsurface conditions encountered is included below.

4.1 Subsurface Soil Profile

The soil profile pits were performed within undeveloped lawn areas and encountered approximately two inches to 18 inches of topsoil at the surface. Beneath the surface cover, possible fill/re-worked on-site soils were encountered at select test locations that consisted of loamy sand, loam, and sandy clay loam with varying amounts of gravel and roots. Where encountered, this stratum extended to depths ranging between approximately three feet and 3.5 feet below existing site grades; corresponding to elevations ranging between approximately 99 feet and 99.8 feet. Beneath the surface cover and/or possible fill/reworked on-site soils, natural coastal plain deposits were encountered that generally consisted of loamy sand, sandy loam, sandy clay loam, silt loam, and sand with varying amounts of gravel. The natural coastal plain deposits were encountered to termination/refusal depth ranging between approximately 8.8 feet and 10 feet below existing ground surface; corresponding to elevations ranging between approximately 94.7 feet and 91.3 feet. Refusal was encountered due to continuous wet-cave-in of the excavation.

4.2 Seasonal High Groundwater, Groundwater, and Permeability Results

Indicators of seasonal high groundwater (based on soil mottling) was encountered during this investigation at depths ranging between approximately one foot and 4.2 feet below the ground surface; corresponding to elevations ranging between 95.4 feet and 102.3 feet. Groundwater was encountered at depths ranging between approximately 6.6 feet and eight feet below the ground surface; corresponding to elevations ranging between 93.4 feet and 96.8 feet.

The soil strata tested for the proposed stormwater facilities had permeability rates ranged between approximately less than 0.2 inches per hour (iph) and 0.6 iph.

Groundwater levels are expected to fluctuate seasonally and following significant periods of precipitation. A summary of the seasonal high groundwater and laboratory testing are presented in the following table.

SEASONAL HIGH GROUNDWATER, GROUNDWATER, AND PERMEABILITY TEST SUMMARY								
Location	Approximate Surface Elevation (NAVD88)	Seasonal High Groundwater		Groundwater		Permeability Test Results		
		Depth (Feet)	Elevation (NAVD88)	Depth (Feet)	Elevation (NAVD88)	Sample Depth (Inches)	Permeability (Inch(es)/Hour)	
							Replicate A	Replicate B
SPP-1	104.3	2.0	102.3	7.9	96.4	20	Note Tested	
SPP-2	104.6	2.5	102.1	7.8	96.8	26	Not Tested	
SPP-3	102.8	1.0	101.8	7.9	94.9	6	0.4	0.4
						70	Not Tested	
SPP-4	102.5	1.0	101.5	8.0	94.5	6	Not Tested	
						72	Not Tested	
SPP-5	102.2	3.8	98.5	7.1	95.1	40	< 0.2	< 0.2
SPP-6	100.0	4.2	95.8	6.6	93.4	40	0.2	0.6

5.0 GENERAL COMMENTS AND LIMITATIONS

Supplemental recommendations will be required upon finalization of conceptual site plans or if significant changes are made in the characteristics or location of the proposed stormwater management facilities. Dynamic Earth should be included as a consultant to the design team and should be provided final plans for review to confirm these criteria apply or to modify recommendations as necessary.

The results presented herein should be utilized by a qualified engineer in preparing preliminary design concepts and site grading. The engineer should consider these results as minimum physical standards that may be superseded by local and regional building codes and structural considerations. These results are prepared for the use of the client for the specific project detailed and should not be used by any third party. These recommendations are relevant to the preliminary design phase and should not be substituted for construction specifications.

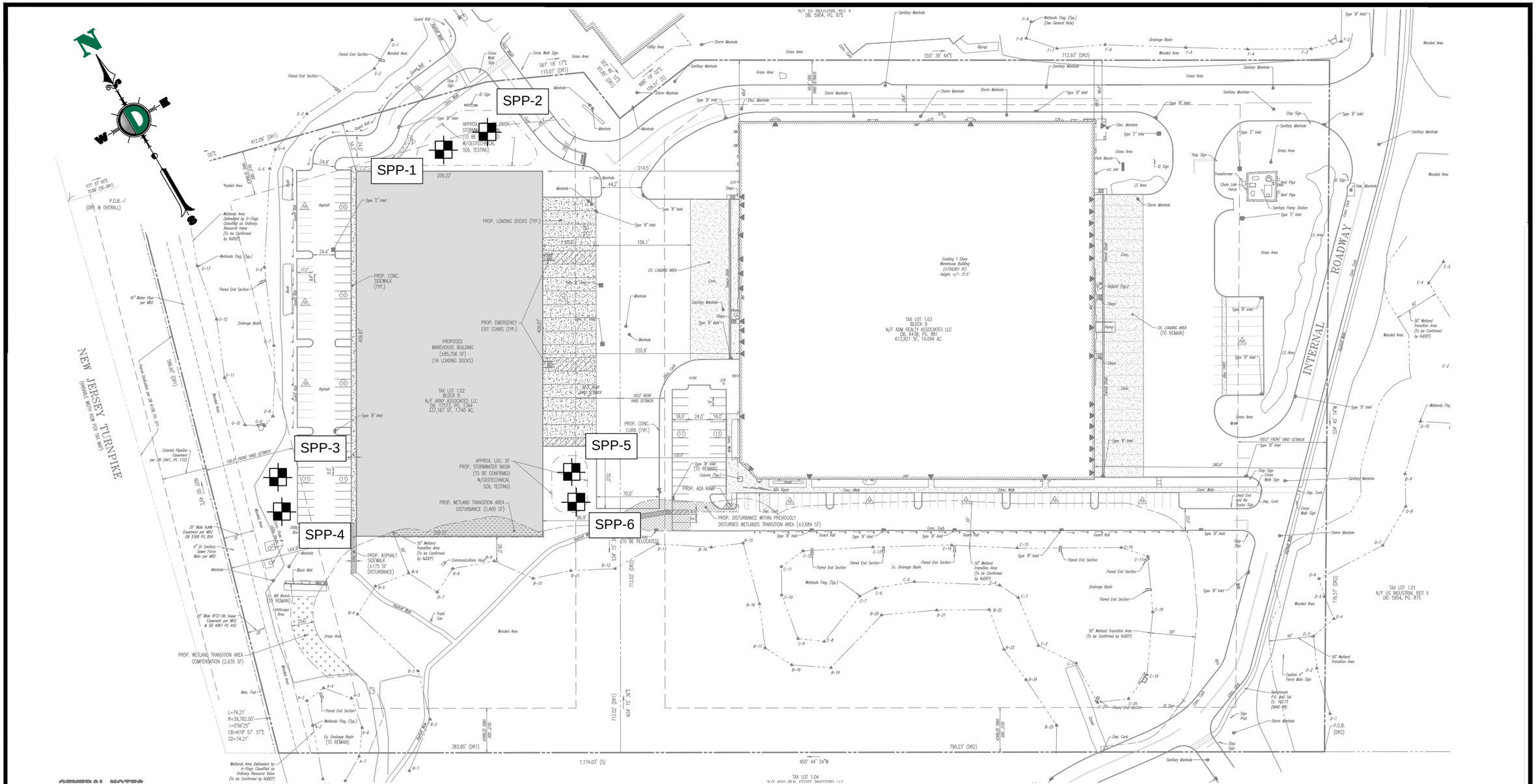
The possibility exists that conditions between test locations may differ from those at specific soil profile pit locations, and conditions may not be as anticipated by the designers or contractors. In addition, the construction process may itself alter soil conditions. Therefore, Dynamic Earth Geotechnical Engineers or their representatives should observe and document the final construction procedures used and the conditions encountered, as well as conduct testing and inspection to ensure the design criteria are met or recommendations to address deviations are implemented.

Dynamic Earth assumes that a qualified contractor will be employed to perform the construction work, and that the contractor will be required to exercise care to ensure all excavations are performed in accordance with applicable regulations and good practice. Particular attention should be paid to avoiding damaging or undermining adjacent properties

and maintaining slope stability. Deviations from the noted subsurface conditions encountered during construction should be brought to the attention of the geotechnical engineer.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been promulgated after being prepared in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology. No other warranties are implied or expressed.

Soil Profile Pit Location Plan



SCALE: N.T.S.	JOB No: 3529-99-001E
SHEET No: 1 OF 1	DRAWN BY: JSS DESIGNED BY: -- CHECKED BY: GJF DATE: 01/28/2022

TITLE:

SOIL PROFILE PIT LOCATION PLAN

PROJECT: **ARNY ASSOCIATES, LLC**

PROPOSED WAREHOUSE

322 Half Acre Road
Block 8, Lots 1.02 & Lots 1.03
Cranbury Township, Middlesex County, New Jersey

Rev. # 0 | DEC Client Code: 3529

LEGEND:

SPP-X — APPROXIMATE LOCATION OF SOIL PROFILE PIT

NOTES:

1. THIS PLAN IS NOT FOR CONSTRUCTION AND WAS PREPARED TO ILLUSTRATE TEST LOCATIONS ONLY AND MAY NOT REFLECT THE MOST CURRENT REVISION OF THE BASE PLAN.
2. BASE PLAN OBTAINED FROM A DECEMBER 21, 2021 CONCEPTUAL SITE PLAN 'A' PREPARED BY DYNAMIC ENGINEERING CONSULTANTS, P.C.

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Records of Subsurface Exploration

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP- 1

Project: Porposed Warehouse — **Project No.:** 3529-99-001E

Location: 322 Half Acre Road, Township of Cranbury, Middlesex County, New Jersey — **Client:** Arny Associates

Surface Elevation (ft):	104.3	**Date Started:**	1/11/22	**Groundwater Data**	**Depth (ft)** / **El. (ft)**
Termination Depth (ft):	9.6	**Date Completed:**	1/11/22	**Seepage**	9.6 / 94.7
Proposed Location:	SWM	**Logged by:**	Anthony Park	**Groundwater**	7.9 / 96.4
Excavation / Test Method:	Visual Observation	**Contractor:**	Neighbors	**Seasonal High Groundwater**	2.0 / 102.3
		Rig Type:	Bobcat E60		

Groundwater Comments: Soil Profile Pit left open for 5 hours to monitor groundwater. Light gray (10YR 7/1) mottles at 24 to 115 inches.

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
			GRAVEL	COBBLES	STONES	BOULDERS																		
0-12	TOPSOIL Dark Brown (7.5YR 3/3)	LOAMY SAND	5	0	0	0	GRANNULAR/ SPHERIODAL	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	CMN (20% MAX)	COARSE	NONE			BAG	12	S-1	
12-24	Yellowish Brown (10YR 5/6)	LOAM	5	0	0	0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	FINE	NONE			BAG TUBE	20	S-2,T-1	
24-90	Brown (10YR 5/3)	LOAM	5	0	0	0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		MNY >20%	MEDIUM 5MM-15MM	PROMINENT	BAG	24	S-3	
90-95	Grayish Brown (10YR 5/2)	LOAMY SAND	5	0	0	0	SUBANGULAR BLOCKY	MODERATE	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	GRADUAL <5"	SMOOTH	NONE		MNY >20%	MEDIUM 5MM-15MM	PROMINENT	BAG	90	S-4	
95-115	Grayish Brown (10YR 5/2)	LOAMY SAND	5	0	0	0	SUBANGULAR BLOCKY	MODERATE	FINE	WET	FRIABLE	NONSTICKY	NONPLASTIC			NONE		MNY >20%	MEDIUM 5MM-15MM	PROMINENT	BAG	115	S-5	

Additional Remarks: Abandoned irrigation line encountered at approximately 8 inches below grade. SPP-1 was terminated at 115 inches below the ground surface due to wet cave in.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP- 2

Project: Porposed Building
Project No.: 3529-99-001E
Location: 322 Half Acre Road, Township of Cranbury, Middlesex County, New Jersey
Client: Arny Associates

Surface Elevation (ft):	104.6	**Date Started:**	1/11/22	**Groundwater Data**	**Depth (ft)** / **El. (ft)**
Termination Depth (ft):	10.0	**Date Completed:**	1/11/22	**Seepage**	7.8 / 96.8
Proposed Location:	SWM	**Logged by:**	Anthony Park	**Groundwater**	7.8 / 96.8
Excavation / Test Method:	Visual Observation	**Contractor:**	Neighbors	**Seasonal High Groundwater**	2.5 / 102.1
		Rig Type:	Bobcat E60		

Groundwater Comments
Soil Profile Pit left open for 4 hours to monitor groundwater.
Light gray (10YR 7/1) mottles at 30 to 120 inches.

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
0-18	TOPSOIL Dark Brown (7.5YR 3/3)	SANDY LOAM	GRAVEL 5	COBBLES 0	STONES 0	BOULDERS 0	GRANNULAR/ SPHERIODAL	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	CMN (20% MAX)	FINE	NONE			BAG	12	S-1	
18-30	Yellowish Brown (10YR 5/6)	LOAM	GRAVEL 5	COBBLES 0	STONES 0	BOULDERS 0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		NONE			BAG TUBE	22, 26	S-2, T-1	
30-78	Grayish Brown (10YR 5/2)	SANDY CLAY LOAM	GRAVEL 0	COBBLES 0	STONES 0	BOULDERS 0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		MNY >20%	MEDIUM 5MM-15MM	PROMINENT	BAG	30	S-3	
78-94	Yellowish Brown (10YR 5/4)	SAND	GRAVEL 10	COBBLES 0	STONES 0	BOULDERS 0	SINGLE GRAIN	STRUCTURELESS		MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		MNY >20%	MEDIUM 5MM-15MM	PROMINENT	BAG	80	S-4	
94-120	Yellowish Brown (10YR 5/4)	SAND	GRAVEL 10	COBBLES 0	STONES 0	BOULDERS 0	SINGLE GRAIN	STRUCTURELESS		WET	LOOSE	NONSTICKY	NONPLASTIC			NONE		MNY >20%	MEDIUM 5MM-15MM	PROMINENT	BAG	115	S-5	

Additional Remarks: SPP-2 was terminated at 120 inches below the ground surface due to wet cave in.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP- 3

Project: Porposed Building — **Project No.:** 3529-99-001E

Location: 322 Half Acre Road, Township of Cranbury, Middlesex County, New Jersey — **Client:** Arny Associates

Surface Elevation (ft):	102.8	**Date Started:**	1/11/22	**Groundwater Data**	**Depth (ft)** / **El. (ft)**
Termination Depth (ft):	9.6	**Date Completed:**	1/11/22	**Seepage**	7.9 / 94.9
Proposed Location:	SWM	**Logged by:**	Anthony Park	**Groundwater**	7.9 / 94.9
Excavation / Test Method:	Visual Observation	**Contractor:**	Neighbors	**Seasonal High Groundwater**	1.0 / 101.8
		Rig Type:	Bobcat E60		

Groundwater Comments: Light gray (10YR 7/1) mottles at 12 inches to 115 inches.

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
			GRAVEL	COBBLES	STONES	BOULDERS																		
0-2	TOPSOIL Dark Brown (7.5YR 3/3)	LOAMY SAND	15	0	0	0	GRANNULAR/ SPHERIODAL	WEAK	VERY FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	CMN (20% MAX)	FINE	NONE						
2-12	FILL Brown 10 YR 4/3	LOAM	15	0	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	FINE	NONE			BAG TUBE	6	S-1, T-1	A = 0.4 iph B = 0.4 iph
12-22	FILL Brown 10 YR 4/3	LOAM	15	0	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	FINE	FEW 2%	FINE <5MM	DISTINCT	BAG	16	S-2	
22-36	FILL Dark Brown 10 YR 3/3	SANDY CLAY LOAM	5	0	0	0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FRIABLE	SLIGHTLY STICKY	SLIGHTLY PLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	VERY FINE	FEW 2%	FINE <5MM	FAINT	BAG	25	S-3	
36-84	Dark Yellowish Brown (10YR 4/6)	SAND	15	0	0	0	SINGLE GRAIN	STRUCTURELESS		MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		FEW 2%	FINE <5MM	FAINT	BAG TUBE	45, 70	S-4, T-2	
84-95	Brown (10YR 4/3)	SAND	15	0	0	0	SINGLE GRAIN	STRUCTURELESS		MOIST	LOOSE	NONSTICKY	NONPLASTIC	ABRUPT <1"	WAVY	NONE		FEW 2%	FINE <5MM	FAINT	BAG	95	S-5	
95-115	Brown (10YR 4/3)	SAND	15	0	0	0	SINGLE GRAIN	STRUCTURELESS		WET	LOOSE	NONSTICKY	NONPLASTIC			NONE		FEW 2%	FINE <5MM	FAINT	BAG			

Additional Remarks: Possible Fill/Re-worked on-sites to a depth of 36 inches. SPP-3 was terminated at 115 inches below the ground surfae due to wet cave in.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP- 4

Project: Porposed Building — **Project No.:** 3529-99-001E

Location: 322 Half Acre Road, Township of Cranbury, Middlesex County, New Jersey — **Client:** Arny Associates

Surface Elevation (ft):	102.5	**Date Started:**	1/11/22	**Groundwater Data**	**Depth (ft)** / **El. (ft)**
Termination Depth (ft):	10.0	**Date Completed:**	1/11/22	**Seepage**	8.0 / 94.5
Proposed Location:	SWM	**Logged by:**	Anthony Park	**Groundwater**	8.0 / 94.5
Excavation / Test Method:	Visual Observation	**Contractor:**	Neighbors	**Seasonal High Groundwater**	1.0 / 101.5
		Rig Type:	Bobcat E60		

Groundwater Comments: Light gray (10YR 7/1) mottles at 12 inches to 120 inches.

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
			GRAVEL	COBBLES	STONES	BOULDERS																		
0-2	TOPSOIL Dark Brown (7.5YR 3/3)	LOAMY SAND	15	0	0	0	GRANNULAR/ SPHERIODAL	WEAK	VERY FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	WAVY	CMN (20% MAX)	FINE	NONE						
2-6	FILL Dark Grayish Brown (10 YR 4/2)	LOAMY SAND	10	0	0	0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	VERY FINE	CMN 2%-20%	MEDIUM 5MM-15MM	DISTINCT	BAG TUBE	6	S-1,T-1	
6-22	FILL Dark Grayish Brown (10 YR 4/2)	LOAMY SAND	10	0	0	0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	VERY FINE	CMN 2%-20%	MEDIUM 5MM-15MM	DISTINCT	BAG	16	S-2	
22-42	FILL Very Dask Brown (10YR 5/6)	SANDY CLAY LOAM	5	0	0	0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FIRM	SLIGHTLY STICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	CMN (20% MAX)	MEDIUM	FEW 2%	FINE <5MM	FAINT	BAG	25	S-3	
42-96	Dark Grayish Brown (10YR 4/2)	SANDY CLAY LOAM	0	0	0	0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FIRM	SLIGHTLY STICKY	NONPLASTIC	CLEAR <2.5"	WAVY	NONE		CMN 2%-20%	MEDIUM 5MM-15MM	DISTINCT	BAG TUBE	65	S-4	
96-120	Yellowish Brown (10YR 5/6)	GRAVELLY SAND	50	0	0	0	STRUCTURELESS SINGLE GRAIN			WET	LOOSE	NONSTICKY	NONPLASTIC			NONE		CMN 2%-20%	MEDIUM 5MM-15MM	DISTINCT	BAG	100	S-5	

Additional Remarks: Organic odor at 42 inches. Possible fill/re-worked on-site soils to 42 inches. SPP-4 was terminated at 120 inches below the ground surface due to wet cave in.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP- 5

Project: Porposed Building — **Project No.:** 3529-99-001E

Location: 322 Half Acre Road, Township of Cranbury, Middlesex County, New Jersey — **Client:** Arny Associates

Surface Elevation (ft):	102.2	**Date Started:**	1/11/22	**Groundwater Data**	**Depth (ft)** / **El. (ft)**
Termination Depth (ft):	9.2	**Date Completed:**	1/11/22	**Seepage**	7.9 / 94.3
Proposed Location:	SWM	**Logged by:**	Anthony Park	**Groundwater**	7.1 / 95.1
Excavation / Test Method:	Visual Observation	**Contractor:**	Neighbors	**Seasonal High Groundwater**	3.8 / 98.5
		Rig Type:	Bobcat E60		

Groundwater Comments: Light gray (10YR 7/1) mottles at 45 inches to 110 inches.

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
			GRAVEL	COBBLES	STONES	BOULDERS																		
0-12	TOPSOIL Dark Brown (7.5YR 3/3)	LOAMY SAND	5	5	0	0	SUBANGULAR BLOCKY	WEAK	VERY FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	FINE	NONE			BAG	6	S-1	
12-17	Very Dark Brown (10YR 2/2)	SANDY LOAM	5	0	0	0	SUBANGULAR BLOCKY	WEAK	VERY FINE	MOIST	FRIABLE	SLIGHTLY STICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	FEW (5% MAX)	FINE	NONE			BAG	14	S-2	
17-45	Dark Yellowish Brown (10YR 3/6)	SILT LOAM	5	0	0	0	SUBANGULAR BLOCKY	MODERATE	FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		NONE			BAG TUBE	20, 40	S-3, T-1	A: <0.2 iph B: <0.2iph
45-70	Dark Yellowish Brown (10YR 3/4)	SANDY LOAM	5	0	0	0	SUBANGULAR BLOCKY	MODERATE	FINE	MOIST	FRIABLE	SLIGHTLY STICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		CMN 2%-20%	MEDIUM 5MM-15MM	DISTINCT	BAG	50	S-4	
70-95	Dark Grayish Brown (10YR 4/2)	LOAMY SAND	10	0	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		CMN 2%-20%	MEDIUM 5MM-15MM	DISTINCT	BAG	75	S-5	
95-85	Very Dark Grayish Brown (10YR 3/2)	LOAMY SAND	10	0	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		CMN 2%-20%	MEDIUM 5MM-15MM	DISTINCT				
85-110	Very Dark Grayish Brown (10YR 3/2)	LOAMY SAND	10	0	0	0	SUBANGULAR BLOCKY	WEAK	FINE	WET	LOOSE	NONSTICKY	NONPLASTIC			NONE		CMN 2%-20%	MEDIUM 5MM-15MM	DISTINCT	BAG	100	S-6	

Additional Remarks: SPP-5 was terminated at approximately 110 inches below the ground surface due to wet cave in.

DYNAMIC EARTH

SOIL PROFILE PIT LOG

Soil Profile Pit: SPP- 6

Project: Porposed Building
Location: 322 Half Acre Road, Township of Cranbury, Middlesex County, New Jersey
Project No.: 3529-99-001E
Client: Arny Associates

Surface Elevation (ft): 100.0
Termination Depth (ft): 8.8
Proposed Location: SWM
Excavation / Test Method: Visual Observation

Date Started: 1/11/22
Date Completed: 1/11/22
Logged by: Anthony Park
Contractor: Neighbors
Rig Type: Bobcat E60

Groundwater Data	Depth (ft)	El. (ft)
Seepage	7.9	92.1
Groundwater	6.6	93.4
Seasonal High Groundwater	4.2	95.8

Groundwater Comments: Light gray (10YR 7/1) mottles at 50 inches to 105 inches.

DEPTH (IN)	COLOR	SOIL TEXTURE	COARSE FRAGMENTS (%)				STRUCTURE			WATER CONTENT	CONSISTENCY			BOUNDARY		ROOTS		MOTTLING			SAMPLING			LAB RESULTS
							Shape	Grade	Size		Resistance to Rupture	Stickiness	Plasticity	Distinctness	Topography			Quantity	Size	Contrast	Type	Depth (in)	No.	
			GRAVEL	COBBLES	STONES	BOULDERS																		
0-18	TOPSOIL Dark Brown (7.5YR 3/3)	LOAMY SAND	10	0	0	0	GRANNULAR/ SPHERIODAL	WEAK	VERY FINE	MOIST	FRIABLE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	CMN (20% MAX)	FINE	NONE			BAG	6	S-1	
18-50	Very Dark Brown (10YR 2/2)	SILT LOAM	5	0	0	0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FRIABLE	SLIGHTLY STICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		NONE			BAG TUBE	25, 40	S-2, T-1	A: 0.2 iph B: 0.6 iph
50-72	Dark Yellowish Brown (10YR 3/6)	SANDY LOAM	5	0	0	0	SUBANGULAR BLOCKY	MODERATE	MEDIUM	MOIST	FRIABLE	SLIGHTLY STICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		CMN 2%-20%	MEDIUM 5MM-15MM	DISTINCT	BAG	50	S-3	
72-95	Dark Yellowish Brown (10YR 3/4)	LOAMY SAND	10	0	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		CMN 2%-20%	MEDIUM 5MM-15MM	FAINT	BAG	76	S-4	
95-105	Dark Grayish Brown (10YR 4/2)	LOAMY SAND	10	0	0	0	SUBANGULAR BLOCKY	WEAK	FINE	MOIST	LOOSE	NONSTICKY	NONPLASTIC	CLEAR <2.5"	SMOOTH	NONE		CMN 2%-20%	MEDIUM 5MM-15MM	FAINT	BAG	100	S-5	

Additional Remarks: SPP-6 was terminated at approximatley 105 inches below the ground surface due to wet cave in.

Laboratory Test Results

Tube Permeameter Test Data

Job Number: 3529-99-001E
Project: Propsed Warehouse Expansion
Client: Arny Associates, LLC
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-3 **Sample No.:** T-1 **Depth:** 6"

MUNICIPALITY Township of Cranbury BLOCK 8 LOT 1.02 & 1.03

1. Test Number T-1 Replicate (letter) A Date Collected 1/11/2022

2. Material Tested: _____ Fill x Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams _____
   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 347.3238

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1	5.00
At the End of Each Test Interval, H2	4.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		105.0
		106.0
		105.0

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 105.0

K = 0.4 **Classification:** **K1**

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 3529-99-001E
Project: Propsed Warehouse Expansion
Client: Arny Associates, LLC
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-3 **Sample No.:** T-1 **Depth:** 6"

MUNICIPALITY Township of Cranbury BLOCK 8 LOT 1.02 & 1.03

1. Test Number T-1 Replicate (letter) B Date Collected 1/11/2022

2. Material Tested: _____ Fill x Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams _____

   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 347.3238

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. _____

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

    At the Beginning of Each Test Interval, H1 5.00
    At the End of Each Test Interval, H2 4.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		113.0
		112.0
		110.0

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 110.0

    K = 0.4 **Classification:** **K1**

13. Defects in the Sample (Check appropriate items):

    x NONE

    _____ Soil/Tube Contact _____Large Gravel _____ Large Roots

    _____ Dry Soil _____Smearing _____ Compaction

    _____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 3529-99-001E
Project: Propsed Warehouse Expansion
Client: Arny Associates, LLC
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-5 **Sample No.:** T-1 **Depth:** 40"

MUNICIPALITY Township of Cranbury BLOCK 8 LOT 1.02 & 1.03

1. Test Number T-1 Replicate (letter) A Date Collected 1/11/2022

2. Material Tested: _____ Fill x Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams _____
   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 347.3238

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1	5.00
At the End of Each Test Interval, H2	4.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.2 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____ Large Gravel _____ Large Roots

_____ Dry Soil _____ Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 3529-99-001E
Project: Propsed Warehouse Expansion
Client: Arny Associates, LLC
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-5 **Sample No.:** T-1 **Depth:** 40"

MUNICIPALITY Township of Cranbury BLOCK 8 LOT 1.02 & 1.03

1. Test Number T-1 Replicate (letter) B Date Collected 1/11/2022

2. Material Tested: _____ Fill x Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams _____
   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 347.3238

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1	5.00
At the End of Each Test Interval, H2	4.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		>240
		>240
		>240

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= >240

K = <0.2 **Classification:** **K0**

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____ Large Gravel _____ Large Roots

_____ Dry Soil _____ Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 3529-99-001E
Project: Propsed Warehouse Expansion
Client: Arny Associates, LLC
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-6 **Sample No.:** T-1 **Depth:** 40"

MUNICIPALITY Township of Cranbury BLOCK 8 LOT 1.02 & 1.03

1. Test Number T-1 Replicate (letter) A Date Collected 1/11/2022

2. Material Tested: _____ Fill x Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams _____
   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 347.3238

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1	5.00
At the End of Each Test Interval, H2	4.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		165.0
		165.0
		165.0

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 165.0

K = 0.2 **Classification:** **K1**

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

Tube Permeameter Test Data

Job Number: 3529-99-001E
Project: Propsed Warehouse Expansion
Client: Arny Associates, LLC
Lab Tech: M. Mickley

Sample ID: **Boring/Test Pit No.:** SPP-6 **Sample No.:** T-1 **Depth:** 40"

MUNICIPALITY Township of Cranbury BLOCK 8 LOT 1.02 & 1.03

1. Test Number T-1 Replicate (letter) B Date Collected 1/11/2022

2. Material Tested: _____ Fill x Test in Native Soil-Indicate Depth

3. Type of Sample: x Undisturbed _____ Disturbed

4. Sample Dimensions: Inside Radius of Sample Tube, R, in cm 3.81
   Length of Sample, L, in inches 3.00

5. Bulk Density Determination (Disturbed Samples Only): N/A

6. Sample Weight (Wt. Tube Containing Sample-Wt. of Empty Tube), grams _____
   Wt. of Tube Containing Sample _____
   Wt. of Empty Tube _____

7. Sample Volume (L x 2.54 cm./inch x 3.14R2), cc. 347.3238

8. Bulk Density (Sample Wt./Sample Volume), grams/cc. 0 > 1.2

9. Standpipe Used: x No _____ Yes, Indicate Internal Radius, cm. N/A

10. Height of Water Level Above Rim of Test Basin, in inches:

At the Beginning of Each Test Interval, H1	5.00
At the End of Each Test Interval, H2	4.00

11. Rate of Water Level Drop (Add additional lines if needed):

Time, Start of Test Interval, T1	Time End of Test Interval T2	Length of Test Interval, T, Minutes
		69.0
		71.0
		70.0

12. Calculation of Permeability: K, (in/hr) = 60 min/hr x r2/R2 x L(in)/T(min) x ln (H1/H2) T= 70.0

K = 0.6 **Classification:** **K1**

13. Defects in the Sample (Check appropriate items):

x NONE

_____ Soil/Tube Contact _____Large Gravel _____ Large Roots

_____ Dry Soil _____Smearing _____ Compaction

_____ Other - Specify _____

NCRS-USDA Custom Soil Survey of Middlesex County, New Jersey

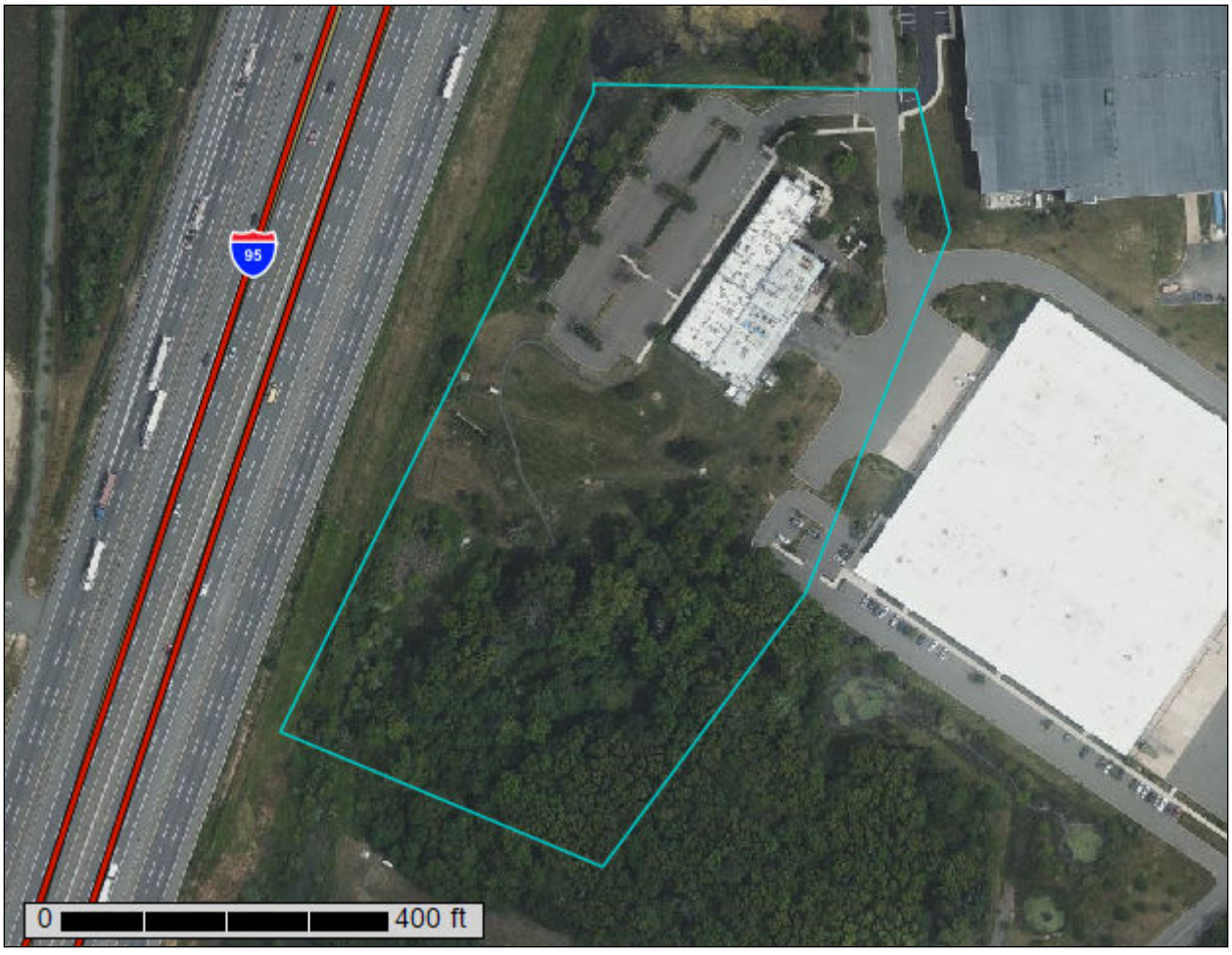
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Middlesex County, New Jersey



October 4, 2021

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

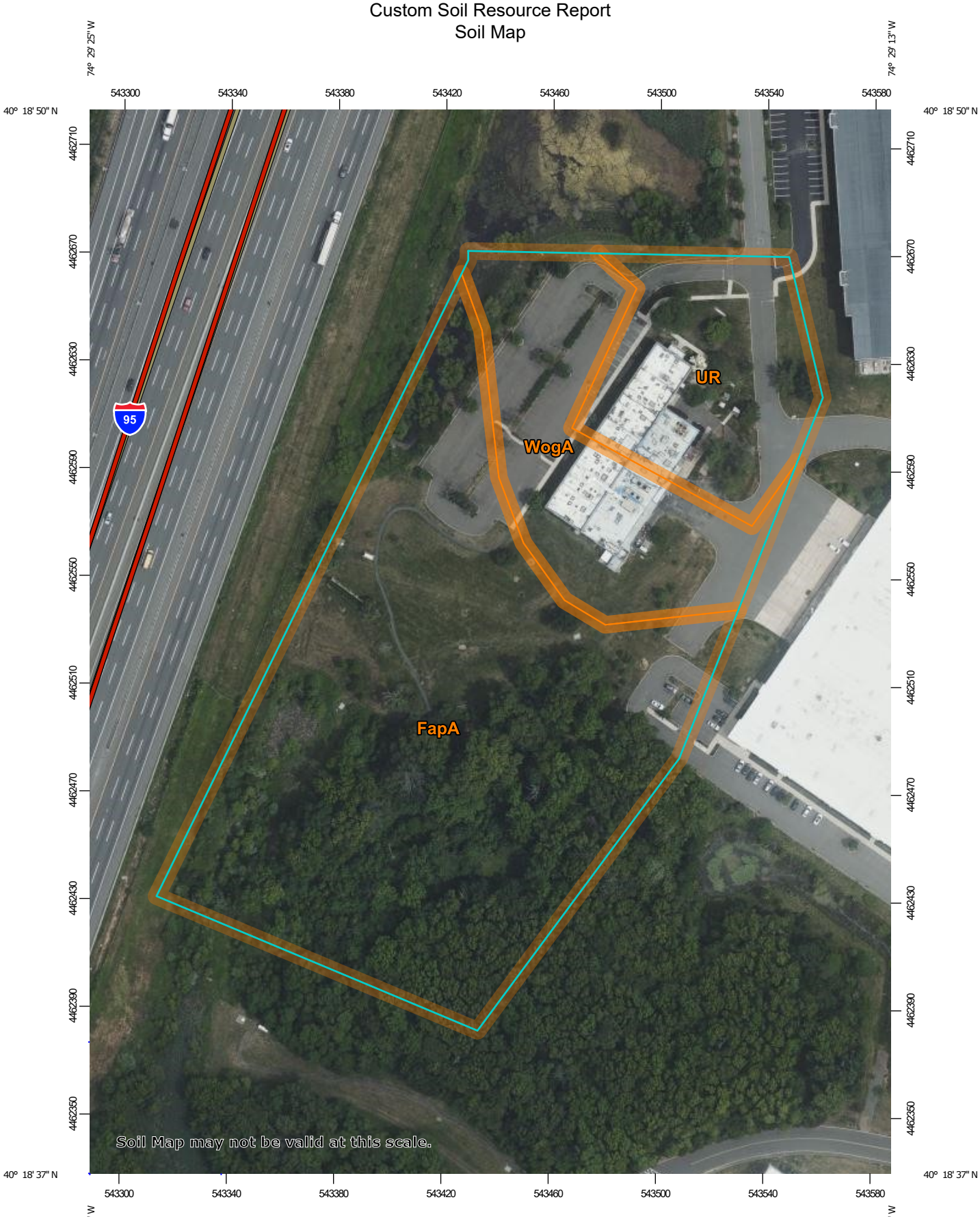
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:1,930 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Middlesex County, New Jersey
Survey Area Data: Version 17, Aug 31, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 13, 2020—Jun 24, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
FapA	Fallsington loams, 0 to 2 percent slopes, Northern Coastal Plain	6.7	65.2%
UR	Urban land	1.6	15.6%
WogA	Woodstown loam, 0 to 2 percent slopes, Northern Coastal Plain	2.0	19.2%
Totals for Area of Interest		**10.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or

landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Middlesex County, New Jersey

FapA—Fallsington loams, 0 to 2 percent slopes, Northern Coastal Plain

Map Unit Setting

National map unit symbol: 2s96v
Elevation: 80 to 100 feet
Mean annual precipitation: 42 to 48 inches
Mean annual air temperature: 52 to 58 degrees F
Frost-free period: 180 to 220 days
Farmland classification: Farmland of statewide importance, if drained

Map Unit Composition

Fallsington, undrained, and similar soils: 38 percent
Fallsington, drained, and similar soils: 37 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fallsington, Undrained

Setting

Landform: Swales, flats, drainageways, depressions
Landform position (three-dimensional): Dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Loamy fluviomarine deposits

Typical profile

Oe - 0 to 2 inches: mucky peat
A - 2 to 10 inches: loam
Btg - 10 to 32 inches: sandy clay loam
BCg - 32 to 39 inches: loamy sand
Cg1 - 39 to 46 inches: sandy clay loam
Cg2 - 46 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.01 to 1.98 in/hr)
Depth to water table: About 0 to 10 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.3 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Description of Fallsington, Drained

Setting

Landform: Swales, depressions, flats
Landform position (three-dimensional): Dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Parent material: Loamy fluviomarine deposits

Typical profile

Ap - 0 to 10 inches: loam
Btg - 10 to 32 inches: sandy clay loam
BCg - 32 to 39 inches: loamy sand
Cg1 - 39 to 46 inches: sandy clay loam
Cg2 - 46 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.01 to 1.98 in/hr)
Depth to water table: About 10 to 20 inches
Frequency of flooding: None
Frequency of ponding: Rare
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.3 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Hydric soil rating: Yes

Minor Components

Woodstown

Percent of map unit: 8 percent
Landform: Flats, fluviomarine terraces, depressions, broad interstream divides
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Tread, rise, dip, talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

Hammonton

Percent of map unit: 7 percent
Landform: Drainageways, flats
Landform position (three-dimensional): Dip, rise
Down-slope shape: Concave, linear
Across-slope shape: Linear
Hydric soil rating: No

Othello

Percent of map unit: 5 percent
Landform: Swales, flats, drainageways, depressions
Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Mullica, undrained

Percent of map unit: 5 percent
Landform: Flats, depressions, drainageways, swales
Landform position (three-dimensional): Dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

UR—Urban land

Map Unit Setting

National map unit symbol: 4jyh
Elevation: 0 to 170 feet
Mean annual precipitation: 30 to 64 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 131 to 178 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Parent material: Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: Unranked

Minor Components

Udorthents

Percent of map unit: 5 percent
Landform: Low hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

WogA—Woodstown loam, 0 to 2 percent slopes, Northern Coastal Plain

Map Unit Setting

National map unit symbol: 2thx3
Elevation: 0 to 470 feet
Mean annual precipitation: 40 to 50 inches
Mean annual air temperature: 52 to 59 degrees F
Frost-free period: 190 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Woodstown and similar soils: 81 percent
Minor components: 19 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodstown

Setting

Landform: Fluviomarine terraces, depressions, broad interstream divides, flats
Landform position (two-dimensional): Summit, footslope
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Loamy fluviomarine deposits

Typical profile

Ap - 0 to 7 inches: loam
E - 7 to 11 inches: sandy loam
Bt - 11 to 29 inches: sandy loam
BCg - 29 to 45 inches: fine sandy loam
Cg - 45 to 80 inches: loamy sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 20 to 40 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Fallsington

Percent of map unit: 7 percent
Landform: Drainageways, swales, flats, depressions
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

Hammonton

Percent of map unit: 7 percent
Landform: Flats, broad interstream divides
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hambrook

Percent of map unit: 5 percent
Landform: Fluviomarine terraces, flats
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

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