TABLE OF CONTENTS

APPENDICES:

CLASS B – HIGH INTENSITY AND CLASS L – LINEAR SOIL SURVEY
SILVER MAPLE WIND PROJECT
CLIFTON, MAINE

1.0 INTRODUCTION

CES, Inc. (CES) has completed a Class B – High Intensity and Class L – Linear Soil Survey on the Silver Maple Wind Project (the Project) located in Clifton, Maine. The Project consists of a wind energy development with associated infrastructure such as access roads, a substation, and a switching station.

2.0 PURPOSE

The purpose of our work was to identify, describe, and map the major soil types on the Project area. This report and associated plans will be used to supplement other information required by regulatory agencies in their review of this project. The information provided in this report should also assist in evaluating the suitability of the site for the proposed development and indicate the relative suitability of the soils on-site for the proposed Project improvements, and also propose measures to overcome limitations related to soils.

3.0 METHODOLOGY

As required by Maine Department of Environmental Protection Standards, two classes of soil surveys were performed on the Project area: Class B – High Intensity Soil Survey and Class L – Linear Soil Survey. This soil survey, report, and attached plans were completed in accordance with Maine Association of Professional Soil Scientists (MAPSS) Mapping Standards. As defined in these Standards, the purpose and standards of these soil surveys are:

3.1 Soil Survey Standards

3.1.1 Class B, High Intensity Soil Survey

1. Map units may contain dissimilar limiting individual inclusions larger than one-acre. Dissimilar limiting inclusions may total more than one-acre in the aggregate if not contiguous.
2. Scale of one-inch equals 200 feet or larger.
3. Ground control – base line and test pits for which detailed data are recorded and located to sub-meter accuracy under the direction of a qualified professional.
4. Base map – with five-foot contour intervals.

3.1.2 Class L, Linear Soil Survey

This soil survey is intended to provide the minimum amount of information necessary for the design and construction of long, narrow projects, such as roads, utility lines, and trails located in remote, difficult to access areas. Due to the difficulty of access, soils observations may consist entirely of test pits and borings made by hand tools. Map units are separated based on soil parent material, slope, texture, depth to limitation or bedrock, and soil drainage class.

1. Map units will not contain dissimilar limiting or individual inclusions larger than 1/8 acre. Dissimilar and limiting inclusions may total more than 1/8 acre per map unit delineation in the aggregate if not contiguous.
2. Scale of one-inch equals 100 feet or larger (e.g., 1" = 50').
3. Ground control – base line and test pits for which detailed data are recorded and located to sub-meter accuracy under the direction of a qualified professional.
4. Base map – with two-foot contour intervals.

This soil survey is a compilation of on-site investigations performed on the Project area and soil survey data published by the USDA – Natural Resource Conservation Service (NRCS) for Penobscot County.

3.2 Field Methodology

Prior to CES' field work on the site, we reviewed available information about the Project area, such as published wetland data through the US Fish and Wildlife Service's National Wetlands Inventory Mapping, soils mapping information available through the NRCS, and site information available on USGS topographic maps.

CES completed wetland, stream, and potential vernal pool mapping on the Project area on July 28, 2018. This data was used to determine the location and extent of hydric soils within the Project area.

Field work for the soil survey was completed on May 21 and September 4, 2020. The soil survey areas were determined based on the proposed turbine and infrastructure locations based on an August 2020 Proposed Site Plan. A Class B – High Intensity Soil Survey was completed for the substation, switching station, and access road in this area. In total, seven test pits were excavated using an excavator in this area. A Class L – Linear Soil Survey was completed for the five turbines and associated access roads. In total, 12 test pits were excavated by hand in this area.

In both areas, test pit locations were selected based upon observed changes in relief, vegetation, and landform, and selected based on location of proposed improvements. Soil properties, such as texture, structure, color, consistence, and coarse fragment content were described when they could be observed within a test pit. Test pit characteristics, such as depth to restrictive horizon(s), depth to seasonal high-water table, depth of rooting, and depth to bedrock were described for each test pit, if observed. Soils were correlated to soil series established by the NRCS in the National Cooperative Soil Survey. In addition, the *Field Indicators of Hydric Soils in the United States* published by the National Technical Committee for Hydric Soils (NTCHS) was used for guidance.

Test pit locations and other site features were located by CES using a submeter capable GPS unit are shown on the Soil Survey Plan which is included in **Appendix B**. A Soil Conditions Summary Table and Test Pit Logs are included in **Appendix C**.

4.0 SITE DESCRIPTION

The Project is located in the Town of Clifton, Maine approximately two miles south of Airline Road/Route 9 on one of several peaks known as Pisgah Mountain. A Site Location Map is attached in **Appendix A**.

The proposed turbine locations are along the ridgeline of two of the Pisgah Mountain peaks at approximately 650 to 750 feet in elevation. The substation and switching station is located on a north-facing sideslope. According to surficial geology data available from the Maine Geological Survey, till dominates the surficial materials on the site, with areas of bedrock exposure and shallow to bedrock soils noted on the ridgelines of Pisgah Mountain.

Within the site area, the landscape is dominated by a peak and valley landscape with lakes and streams throughout. The soils and surficial materials on the peaks and slopes are till-derived. While finer glacio-marine and coarser glacio-fluvial deposits are present along the lake and stream margins.

4.1 Soil Characteristics

The soils observed on-site are deep, sandy, and loamy textured soils that were formed in dense glacial till deposits and are in the Marlow-Peru-Colonel- Brayton soil catena. Peru series and the somewhat poorly drained Colonel series are related soils that were observed on-site. These soils are deep (greater than 60 inches to bedrock), sandy and loamy textured, and relatively shallow to the dense basal till substratum. In the test pits observed, this dense till substratum was encountered at approximately two feet in depth. The moderately well drained Peru series, with a seasonal high-water table from 16 inches to less than 40 inches, occurred in relatively higher landscape positions. The somewhat poorly drained Colonel has a seasonal high-water table from seven inches to less than 16 inches and occurred in lower or more level landscape positions.

A soil complex of Peru-Tunbridge was mapped on the steeper sideslopes of the turbine area. Tunbridge soils are moderately deep to bedrock (20 inches to less than 40 inches to bedrock) and well drained. On the steep sideslopes of Pisgah Mountain, shallow to bedrock soils and rock outcrops occur along with areas of deeper soils.

Hydric soils are mapped within a valley/drainage way in the turbine area. This area is mapped as wetland and is in the Brayton series, which is a deep, loamy-textured, till-derived soil. Brayton soils are poorly drained with a seasonal high-water table at or near the ground surface for a portion of the year. Brayton soils were mapped in this wetland area and from seven inches to less than 16 inches and occurred in lower or more level landscape positions.

4.2 Soil and Map Unit Descriptions

A Class B – High Intensity and Class L – Linear Soil Survey Plan is included in **Appendix B**, and illustrates our interpretation of the type, location, and extent of the soils observed on-site. Each map unit symbol consists of three letters (e.g., PeB). The first two letters represent the soil series (described above) and phase which is a differential commonly based on surface texture, stoniness, drainage, depth to bedrock, or similar characteristics that affect the use and management of the soil. The letter in the map unit symbol indicates the surface slope of the area within the map unit (B slope – three to eight percent slopes). The area within the map unit delineation defines an area that is estimated to be the same soil type. There may be small areas

of slightly differing soils, called inclusions, which exist within the map unit delineated. Descriptions of each map unit are included in **Appendix D**. Map unit descriptions include a description of a typical soil description, as well as information on physical properties and related interpretations. The physical properties and interpretations are from the USDA-NRCS.

5.0 FINDINGS

Based on the proposed development and the soils that we mapped on-site; the soils on-site are generally suitable for the proposed development. Some limitations exist due to the high seasonal water table and dense till substratum, characteristic of both Peru and Colonel soils. Peru and Colonel soils have high potential for frost action and a relatively high seasonal water table. These limitations are a consideration for the design and construction of roads, underground utilities, foundations, and drainage structures. Limitations as exist relative to the presence of bedrock in the areas mapped as Peru-Turnbridge complex.

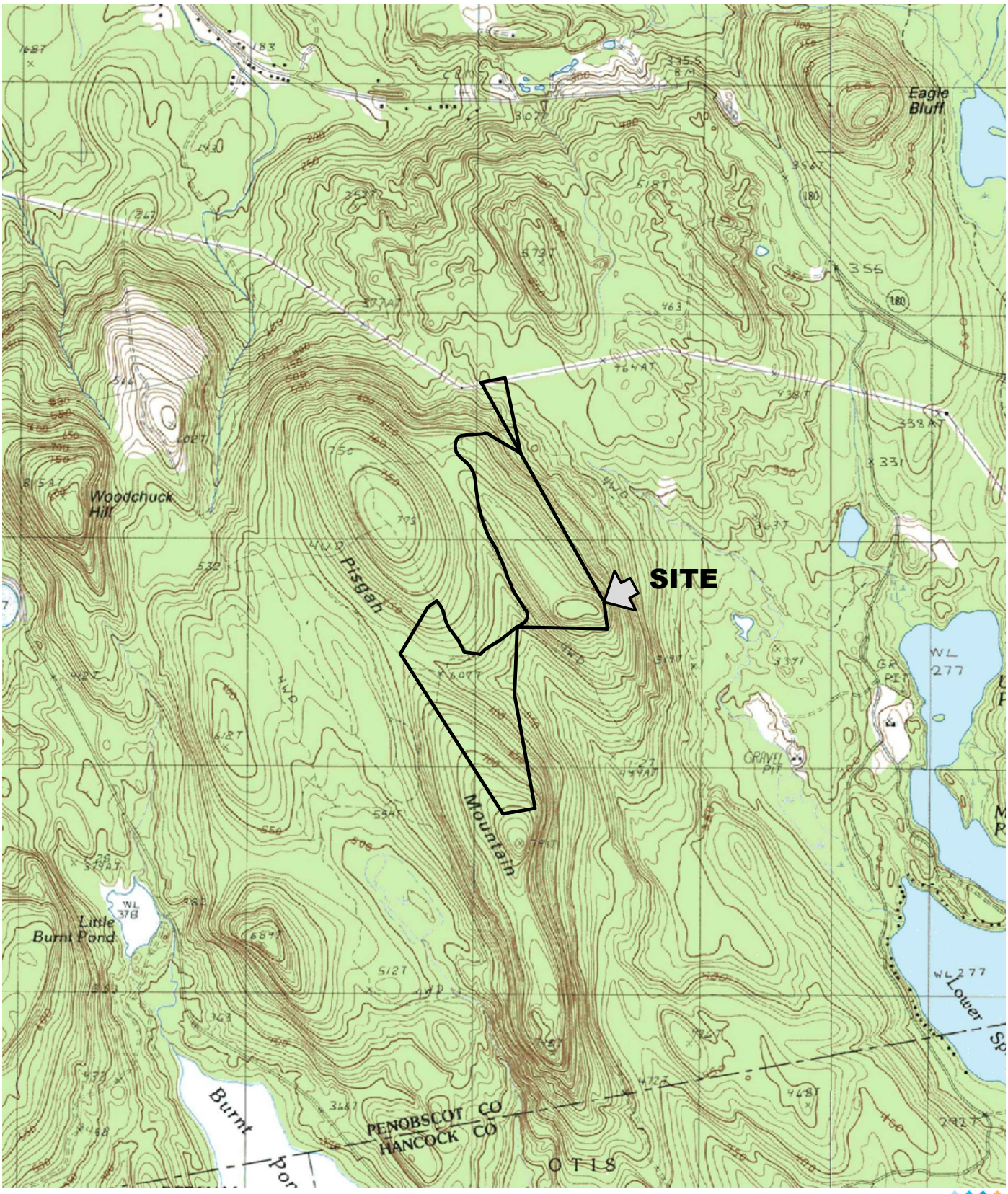
The scope of this work has been limited to the development of a Class B – High Intensity and Class L – Linear Soil Survey in general accordance with the standards established by the Maine Association of Professional Soil Scientists. This report has been prepared for SWEB Development, USA, LLC for specific application to the proposed Silver Maple Wind Energy development in Clifton, Maine. The conclusions and recommendations presented in this report are based up our interpretations of the data obtained from the explorations and are in part based upon the proposed development at the site.

The accompanying soil profile descriptions, soil survey map, and this report were completed in accordance with the standards for a Class A – High Intensity and Class L – Linear Soil Survey adopted by the Maine Associations of Professional Soil Scientists (February 2004, revised March 2009), as amended, and prepared by Johanna E. Szillery, CSS #494.

Johanna E. Szillery, C.S.S #494, Senior Project Scientist

APPENDIX A

SITE LOCATION MAP



SOURCE:
U.S.G.S. TOPOGRAPHIC QUADRANGLE
CHEMO POND
@ 1:24,000

CES INC

SILVER MAPLE WIND ENERGY PROJECT
CLIFTON, MAINE
LOCATION MAP

2020.09.17
11657.006

APPENDIX B

CLASS B – HIGH INTENSITY AND CLASS L – LINEAR SOIL SURVEY

LEGEND:

DESCRIPTION	EXISTING	PROPOSED
PROPERTY LINE		
UTILITY POLE		
EDGE OF GRAVEL		
MAJOR FOOT CONTOUR	100	100
MINOR FOOT CONTOUR	98	98
OVERHEAD UTILITIES	OHU	OHU
LIMIT OF SOIL SURVEY		
SOIL BOUNDARY		
TEST PIT	TP-6	
GRAVEL SURFACE		

SOIL LEGEND

BrB	Bryaton loam, 3 to 8 percent slopes
CnB	Colonel gravelly sandy loam, 3 to 8 percent slopes
PeB	Peru cobby loam, 3 to 8 percent slopes
PeC	Peru gravelly loam, 8 to 15 percent slopes
PeD	Peru cobbly loam, 15 to 25 percent slopes
PTD	Peru-Tunbridge complex, 15 to 25 percent slopes

MAPPING NOTES:

1. THIS SOIL SURVEY PLAN AND THE MAP UNIT DELINEATIONS MEET THE MAINE ASSOCIATION OF PROFESSIONAL SOIL SCIENTISTS' (MAPSS) GUIDELINES FOR A CLASS B - HIGH INTENSITY AND CLASS L - LINEAR SOIL SURVEY AS DESCRIBED IN THE PUBLICATION ENTITLED GUIDELINES FOR MAINE CERTIFIED SOIL SCIENTISTS FOR SOIL IDENTIFICATION AND MAPPING (FEBRUARY 2004, REV MARCH 2009).
2. TEST PIT LOCATIONS, CONTROL POINTS, AND OTHER FEATURES WERE LOCATED USING A SUB-METER CAPABLE TRIMBLE GPS. DATA WAS POST-PROCESSED ACCORDING TO MANUFACTURER'S RECOMMENDED POST-PROCESSING SETTINGS USING CORS REFERENCE STATIONS.
3. THIS MAP SHOULD BE USED AND INTERPRETED WITH THE ACCOMPANYING SOIL SURVEY REPORT, TITLED "CLASS B - HIGH INTENSITY AND CLASS L - LINEAR SOIL SURVEY, SILVER MAPLE WIND PROJECT, CLIFTON, MAINE" BY JOHANNA SZILLERY, CSS #494, AND DATED SEPTEMBER 15, ,32020.

CLASS B - HIGH INTENSITY AND CLASS L - LINEAR SOIL SURVEY

FOR

SILVER MAPLE WIND ENERGY PROJECT

CLIFTON, MAINE

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

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F.207-989-4881

CES INC
Engineers • Environmental Scientists • Surveyors

PROJECT TITLE
SILVER MAPLE WIND ENERGY PROJECT
CLIFTON, MAINE

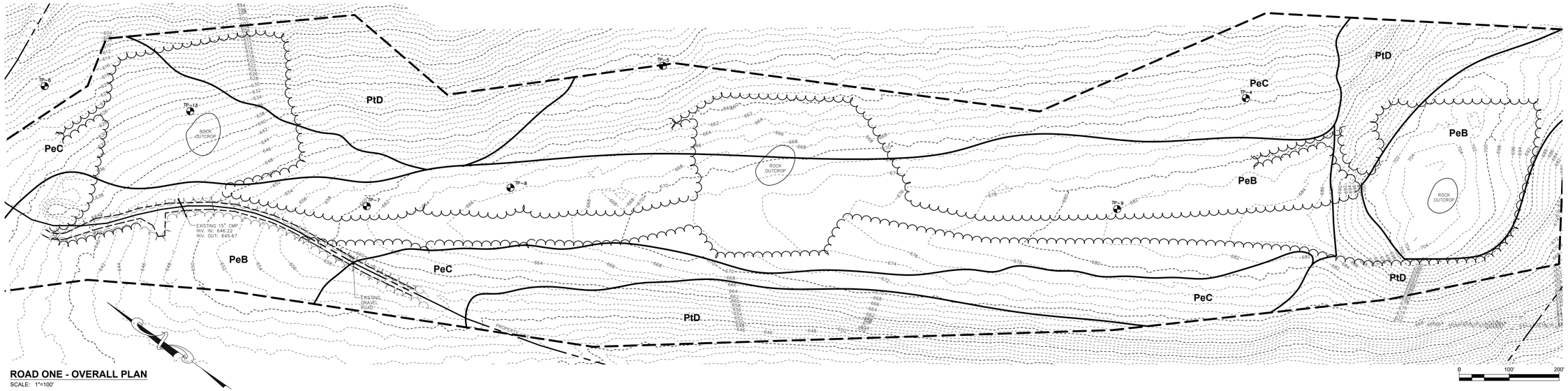
SHEET TITLE
CLASS B - HIGH INTENSITY AND CLASS L - LINEAR SOIL SURVEY

NO	DESCRIPTION	DATE	DRAWN BY	CHECKED BY

ISSUE STATUS
NOT FOR CONSTRUCTION

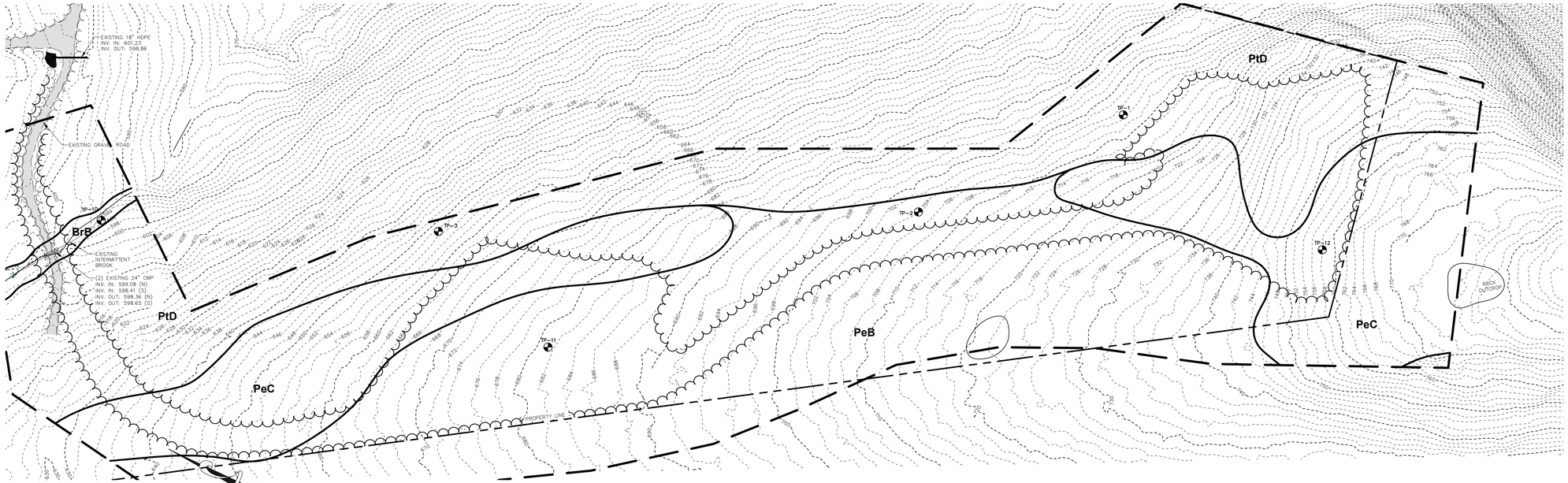
SCALE	1"=30'
DATE	2020.09.17
DRAWN BY	WAB
CHECKED BY	TRB
DESIGNED BY	
APPROVED BY	
JOB NUMBER	11657.006
SHEET NUMBER	SK-1

P:\11657-SWEB_DEVELOPMENT\04-SILVER MAPLE CIVIL DESIGN & PERMITTING-TRB\02-CAD_DRAWINGS\CIVIL\SOIL_DWGS\11657-SK-SOIL.DWG



ROAD ONE - OVERALL PLAN

SCALE: 1"=100'



ROAD TWO OVERALL PLAN

SCALE: 1"=100'

NOTES:

1. PLAN ORIENTED TO MAINE STATE PLANE COORDINATE SYSTEM, NAD83, EAST ZONE, U.S. SURVEY FOOT AND THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
2. CONTOUR INTERVAL: 2 FOOT.
3. TOPOGRAPHY SHOWN IS A COMPILATION OF LIDAR DATA PROVIDED BY THE STATE OF MAINE OFFICE OF GIS AND A FIELD SURVEY COMPLETED BY CES, INC. ON APRIL 1, 2019, APRIL 2, 2019, APRIL 18, 2019, AND APRIL 23, 2019.
4. EXISTING CONDITIONS BASED ON SURVEY COMPLETED BY CES, INC. ON DATES NOTED ABOVE.

MAPPING NOTES:

1. THIS SOIL SURVEY PLAN AND THE MAP UNIT DELINEATIONS MEET THE MAINE ASSOCIATION OF PROFESSIONAL SOIL SCIENTISTS' (MAPSS) GUIDELINES FOR A CLASS B - HIGH INTENSITY AND CLASS L - LINEAR SOIL SURVEY AS DESCRIBED IN THE PUBLICATION ENTITLED GUIDELINES FOR MAINE CERTIFIED SOIL SCIENTISTS FOR SOIL IDENTIFICATION AND MAPPING (FEBRUARY 2004, REV MARCH 2009).
2. TEST PIT LOCATIONS, CONTROL POINTS, AND OTHER FEATURES WERE LOCATED USING A SUB-METER CAPABLE TRIMBLE GPS. DATA WAS POST-PROCESSED ACCORDING TO MANUFACTURER'S RECOMMENDED POST-PROCESSING SETTINGS USING CORS REFERENCE STATIONS.
3. THIS MAP SHOULD BE USED AND INTERPRETED WITH THE ACCOMPANYING SOIL SURVEY REPORT, TITLED "CLASS B - HIGH INTENSITY AND CLASS L - LINEAR SOIL SURVEY, SILVER MAPLE WIND PROJECT, CLIFTON, MAINE" BY JOHANNA SZILLERY, CSS #494, AND DATED SEPTEMBER 15, ,32020.

SOIL LEGEND

BrB	Bryaton loam, 3 to 8 percent slopes
CnB	Colonel gravelly sandy loam, 3 to 8 percent slopes
PeB	Peru cobby loam, 3 to 8 percent slopes
PeC	Peru gravelly loam, 8 to 15 percent slopes
PeD	Peru cobbly loam, 15 to 25 percent slopes
PTD	Peru-Tunbridge complex, 15 to 25 percent slopes

LEGEND:

DESCRIPTION	*EXISTING SYMBOL*
LIMIT OF SOIL SURVEY	
SOIL BOUNDARY	
10' CONTOUR	90
2' CONTOUR	92
EDGE OF GRAVEL	
PROPERTY LINE	
CULVERT	
SILT FENCE	NA
GRAVEL SURFACE	
STORMWATER BUFFER	NA
WETLAND	
TREE LINE	NA
TEST PIT	TP-6

Machias
Lewiston
Bar Harbor
Brewer
Presque Isle
Skowhegan
Saco
BRAK, a division of CES, Inc.
CES INC
Engineers • Environmental Scientists • Surveyors

PROJECT TITLE
SILVER MAPLE WIND ENERGY PROJECT
CLIFTON, MAINE

SHEET TITLE
CLASS B - HIGH INTENSITY AND CLASS C - LINEAR SOIL SURVEY

REV.	DESCRIPTION	DATE	DRAWN BY	CHECKED BY
R7				
R6				
R5				
R4				
R3				
R2				
R1				

ISSUE STATUS
FOR CONSTRUCTION

SCALE	1"=100'
DATE	2019-07-24
DRAWN BY	BLQ
CHECKED BY	TRB
DESIGNED BY	LF
APPROVED BY	TRB
JOB NUMBER	11657.006

DRAWING NUMBER
C001

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APPENDIX C

SOIL CONDITIONS SUMMARY TABLE
TEST PIT LOGS

PAGE 1 OF 1

FORM E Rev. 07/11

SOIL CONDITIONS SUMMARY TABLE

SUMMARY LOG OF SUBSURFACE EXPLORATIONS AT PROJECT SITES

Project Name:	Applicant Name:	Project Location (municipality):
Silver Maple Wind		Clifton

Lot No.	Exploration Symbol (TP 1, B 2, etc.)	✖ if at SSWD Field	Description of subsurface materials by: ● Soil profile/condition (if by S.E.), ● Soil series name (if by C.S.S.), or by ● Geologic unit (if by C.G.)	Depths to (inches): Redoximorphic Features	Bedrock	Hydraulically Restrictive Layer	Limit of Exploration	Ground Surface Slope (%)	Ground Surface Elevation
	TP 1	☐	Peru loam	22	–	22	22		
	2	☐	Peru grav silo	20	–	20	27		
	3	☐	Peru grav loam	21	–	21	28		
	4	☐	Peru grav loam	20	–	20	25		
	5	☐	Tunbridge loam	–	? 21	–	21		
	6	☐	Lyman fsl	–	15	-	15		
	7	☐	Peru grav silo	22	–	22	30		
	8	☐	Peru grav loam	21	–	21	30		
	9	☐	Peru grav loam	25	-	25	30		
	10	☐	Brayton loam	0	-	0	20		
	11	☐	Colonel cobb loam	16	–	16	30		
	12	☐	Peru fsl	24	–	24	30		
		☐							
	A 1	☐	Peru grav silo	22	–	22	96		
	2	☐	Peru grav silo	28	72	25	72		
	3	☐	Lyman grav silo	11	16	11	16		
	4	☐	Peru grav fsl	26	-	26	72		
	5	☐	Peru grav fsl	27	–	27	72		
	6	☐	Colonel grav SL	17	–	17	36		
	7	☐	Peru grav SL	24	–	24	50		
		☐							
		☐							
		☐							
		☐							
		☐							
		☐							
		☐							
		☐							
		☐							
		☐							
		☐							
		☐							

INVESTIGATOR INFORMATION AND SIGNATURE

Signature	Johanna Szillery	Date	9/14/2020
Name Printed	Johanna Szillery	Cert/Lic/Reg. #	CSS494

Qualification: ☐ Licensed Site Evaluator ☒ Certified Soil Scientist ☐ Certified Geologist ☐ Other:

STATE OF MAINE ★ JOHANNA E. SZILLERY NO. SS494 ★ SOIL SCIENTIST

affix professional seal

FORM F 2/02

SOIL PROFILE / CLASSIFICATION INFORMATION

DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project	Owner Name:	Project Location (municipality):
Silver Maple Wind Energy		Clifton

Exploration Symbol: 1 ☒ Test Pit ☐ Boring

8 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)

	Texture	Consistency	Color	Mottling
0				
BHS 1	loam	very friable	7.5YR 2.5/3	
6				none
2			7.5YR 3/3	
12		friable		
BS			7.5YR 4/4	
18				
BC			10YR 5/4	
24				
30				
		Limit of Observation		
36		= 22"		
42				
48				

soil data by S.E.	Soil Profile	Classification Condition	Slope Percent	Limiting Factor > 22" Depth	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock
soil data by S.S.	Soil series/phase name: Peru		☐ Hydric ☒ Non-hydric	Hydrologic C/D Soil Group	

Exploration Symbol: 2 ☒ Test Pit ☐ Boring

2 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)

	Texture	Consistency	Color	Mottling
0				
6	grav silt loam	friable	7.5YR 4/4	none
12			10YR 4/6	
18				
24	cobbly silo	firm	2.5Y 5/6	10YR 4/6
30				
		Limit = 27"		
36				
42				
48				

soil data by S.E.	Soil Profile	Classification Condition	Slope Percent	Limiting Factor 20" Depth	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock
soil data by S.S.	Soil series/phase name: Peru		☐ Hydric ☒ Non-hydric	Hydrologic C/D Soil Group	

Exploration Symbol: 3 ☐ Test Pit ☒ Boring

4 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)

	Texture	Consistency	Color	Mottling
0				
6	grav loam	friable	7.5YR 4/4	none
12				
18	grav silt loam		10YR 4/6	
24	cobb silo	firm	2.5Y 5/6	10YR 4/6
30		Limit = 28"		
36				
42				
48				

soil data by S.E.	Soil Profile	Classification Condition	Slope Percent	Limiting Factor 21" Depth	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock
soil data by S.S.	Soil series/phase name: Peru		☐ Hydric ☒ Non-hydric	Hydrologic C/D Soil Group	

Exploration Symbol: 4 ☒ Test Pit ☐ Boring

2 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)

	Texture	Consistency	Color	Mottling
0				
6	gravelly loam	friable	7.5YR 3/3	none
12			10YR 4/6	
18				
24	cobbly sandy loam	firm	10YR 5/6	10YR 4/4
30		Limit = 25"		
36				
42				
48				

soil data by S.E.	Soil Profile	Classification Condition	Slope Percent	Limiting Factor 20" Depth	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock
soil data by S.S.	Soil series/phase name: Peru		☐ Hydric ☒ Non-hydric	Hydrologic C/D Soil Group	

INVESTIGATOR INFORMATION AND SIGNATURE

Signature: Johanna Szillery	Date: 5/21/2020
Name Printed/typed: Johanna Szillery	Cert/Lic/Reg. # CSS 494

Title: ☐ Licensed Site Evaluator ☒ Certified Soil Scientist ☐ Certified Geologist ☐ Other:

STATE OF MAINE ★ JOHANNA E. SZILLERY NO. SS494 ★ SOIL SCIENTIST

affix professional seal

FORM F 2/02

SOIL PROFILE / CLASSIFICATION INFORMATION

DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project	Owner Name:	Project Location (municipality):
Silver Maple Wind Energy		Clifton

Exploration Symbol: 5 ☒ Test Pit ☐ Boring

3 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	loam	friable	10YR3/3	none
6–12			10YR4/6	
12–18				
18–24		refusal	21"	
24–30			(potential bedrock?)	
30–36				
36–42				
42–48				

soil data by S.E.: Soil Profile / Classification Condition / Slope Percent / Limiting Factor 21" Depth / ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock (?)

soil data by S.S.: Soil series/phase name: Tunbridge / ☐ Hydric ☒ Non-hydric / Hydrologic Soil Group C

Exploration Symbol: 6 ☒ Test Pit ☐ Boring

0 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	fine sandy loam	very fr.	10YR4/4	none
6–12		friable	10YR4/6	
12–18				
18–24		refusal	@15"	
24–30				
30–36				
36–42				
42–48				

soil data by S.E.: Soil Profile / Classification Condition / Slope Percent / Limiting Factor 15" Depth / ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock (?)

soil data by S.S.: Soil series/phase name: Lyman / ☐ Hydric ☒ Non-hydric / Hydrologic Soil Group D

Exploration Symbol: 7 ☒ Test Pit ☐ Boring

4 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	grav silt loam	friable	10YR6/2	none
6–12			7.5YR3/3	
12–18			10YR 4/4	
18–24	cobb silo	firm	10YR5/6	7.5YR 4/4
24–30				
30–36				
36–42				
42–48				

soil data by S.E.: Soil Profile / Classification Condition / Slope Percent / Limiting Factor 22" Depth / ☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

soil data by S.S.: Soil series/phase name: Peru / ☐ Hydric ☒ Non-hydric / Hydrologic Soil Group C/D

Exploration Symbol: 8 ☒ Test Pit ☐ Boring

2 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	grav. loam	very friable	10YR4/2	none
6–12			7.5YR3/3	
12–18		friable	10YR4/6	
18–24	cobb silo	firm	2.5Y5/6	10YR4/4
24–30				
30–36				
36–42				
42–48				

soil data by S.E.: Soil Profile / Classification Condition / Slope Percent / Limiting Factor 21" Depth / ☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

soil data by S.S.: Soil series/phase name: Peru / ☐ Hydric ☒ Non-hydric / Hydrologic Soil Group C/D

INVESTIGATOR INFORMATION AND SIGNATURE

Signature: Johanna Szillery	Date: 5/21/2020
Name Printed/typed: Johanna Szillery	Cert/Lic/Reg. # CSS 494

Title: ☐ Licensed Site Evaluator ☒ Certified Soil Scientist ☐ Certified Geologist ☐ Other:

STATE OF MAINE ★ JOHANNA E. SZILLERY NO. 55494 ★ SOIL SCIENTIST

affix professional seal

FORM F 2/02

SOIL PROFILE / CLASSIFICATION INFORMATION

DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project	Owner Name:	Project Location (municipality):
Silver Maple Wind Energy		Clifton

Exploration Symbol: 9 ☒ Test Pit ☐ Boring

4 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	grav loam	v. fr. friable	10YR 6/2 10YR 4/6	none
6–24	cobbly loam	firm	2.5Y 5/6	10YR 4/4
24–30		Limit = 30"		
30–48				

soil data by S.E.	Soil Profile	Classification Condition	Slope Percent	Limiting Factor 25 " Depth	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

soil data by S.S.	Soil series/phase name:	☐ Hydric ☒ Non-hydric	Hydrologic Soil Group
	Peru		C/D

Exploration Symbol: TP10 ☒ Test Pit ☐ Boring

9 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	Oa - mucky, sap			
6–18	cobb loam	firm	10YR 6/2	conc duple
18–30		Limit = 20"		
30–48				

soil data by S.E.	Soil Profile	Classification Condition	Slope Percent	Limiting Factor 0 " Depth	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

soil data by S.S.	Soil series/phase name:	☒ Hydric ☐ Non-hydric	Hydrologic Soil Group
	Brayton		

Exploration Symbol: TP11 ☒ Test Pit ☐ Boring

6 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	cobb loam	v fr	10YR 6/2	none
6–18	↓	friable	7.5Y 5/2 4/4	mott
18–30		firm	7.5YR 3/3	7.5YR 4/6 c,f
30–48		Limit = 30"		

soil data by S.E.	Soil Profile	Classification Condition	Slope Percent	Limiting Factor 16 " Depth	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock

soil data by S.S.	Soil series/phase name:	☐ Hydric ☒ Non-hydric	Hydrologic Soil Group
	Colonel		

Exploration Symbol: TP12 ☒ Test Pit ☐ Boring

5 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	fsl	v. fr	10YR 6/3	
6–18	cobb fsl	friable	10YR 3/6 10YR 5/4	none
18–30	↓	firm	2.5Y 4/4	mottled
30–48		Limit = 30"		

soil data by S.E.	Soil Profile	Classification Condition	Slope Percent	Limiting Factor 24 " Depth	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

soil data by S.S.	Soil series/phase name:	☐ Hydric ☒ Non-hydric	Hydrologic Soil Group
	Peru		

INVESTIGATOR INFORMATION AND SIGNATURE

Signature: Johanna Szillery	Date: 5/21/2020
Name Printed/typed: Johanna Szillery	Cert/Lic/Reg. # CSS 494

Title: ☐ Licensed Site Evaluator ☒ Certified Soil Scientist ☐ Certified Geologist ☐ Other:

STATE OF MAINE ★ JOHANNA E. SZILLERY NO. 55494 ★ SOIL SCIENTIST

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FORM F Rev. 07/11a

SOIL PROFILE / CLASSIFICATION INFORMATION

DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project Name: Silver Maple Wind | Applicant Name: | Project Location (municipality): Clifton

Exploration Symbol # A1

☒ Test Pit ☐ Boring ☐ Probe

7 " Organic horizon thickness Ground surface elev. _____

96 " Depth of exploration or to refusal

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Redox Features
E 0			7.5YR 5/2	
Bhs	grav silo	very friable	7.5YR 3/4	none
10				
2		friable	7.5YR 4/6	↓
20				
BC	grav + cobb silo	firm	2.5Y 5/4	mottled
30				
C	(veins of cos sand)		2.5Y 4/3	
40				
50				
		LIMIT OF OBS = 96		
60				

Soil Details by S.E. ▸▸ / S.S. ▸▸

Soil Classification	Slope	Limiting Factor	Groundwater / Restrictive Layer / Bedrock	Hydrologic
Profile: _____ Condition: _____	Percent: _____	22 " Depth	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock	
Soil Series/Phase Name: Peru			☐ Hydric ☒ Non-hydric	Soil Group: _____

Exploration Symbol # A2

☒ Test Pit ☐ Boring ☐ Probe

5 " Organic horizon thickness Ground surface elev. _____

72 " Depth of exploration or to refusal

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Redox Features
E 0			7.5YR 5/2	
Bhs	grav silo	v fr	7.5YR 3/4	none
10				
Bs		friable	7.5YR 4/6	↓
20				
BC				
		firm	2.5Y 4/3	10YR 4/6 c,f
30	grav + cobb silo w/ cos s	very firm		
C				
40				
50		bedrock = 72"		
60				

Soil Details by S.E. ▸▸ / S.S. ▸▸

Soil Classification	Slope	Limiting Factor	Groundwater / Restrictive Layer / Bedrock	Hydrologic
Profile: _____ Condition: _____	Percent: _____	25 " Depth	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock	
Soil Series/Phase Name: Peru			☐ Hydric ☒ Non-hydric	Soil Group: _____

Exploration Symbol # A3

☒ Test Pit ☐ Boring ☐ Probe

6 " Organic horizon thickness Ground surface elev. _____

16 " Depth of exploration or to refusal

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Redox Features
0				
Bhs	grav silo	v fr	7.5YR 2.5/3	none
BC 10		friable	7.5YR 3/3	
		firm	2.5Y 5/6	mott
20	bedrock = 16"			
30				
40				
50				
60				

Soil Details by S.E. ▸▸ / S.S. ▸▸

Soil Classification	Slope	Limiting Factor	Groundwater / Restrictive Layer / Bedrock	Hydrologic
Profile: _____ Condition: _____	Percent: _____	11/16" Depth	☒ Groundwater ☒ Restrictive Layer ☒ Bedrock	
Soil Series/Phase Name: Lyman			☐ Hydric ☒ Non-hydric	Soil Group: _____

Exploration Symbol # A4

☒ Test Pit ☐ Boring ☐ Probe

3 " Organic horizon thickness Ground surface elev. _____

72 " Depth of exploration or to refusal

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Redox Features
E 0		v fr	7.5YR 5/2	
Bhs	grav fsl		7.5YR 3/3	none
Bs 10				
	grav sl	friable	7.5YR 4/6	↓
20				
30	v. grav + cobb sl	firm	2.5Y 5/4	10YR 5/6 c,f
BC				
40		v. firm		
C				
50		LIMIT OF OBS = 72"		
60				

Soil Details by S.E. ▸▸ / S.S. ▸▸

Soil Classification	Slope	Limiting Factor	Groundwater / Restrictive Layer / Bedrock	Hydrologic
Profile: _____ Condition: _____	Percent: _____	26 " Depth	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock	
Soil Series/Phase Name: Peru			☐ Hydric ☒ Non-hydric	Soil Group: _____

INVESTIGATOR INFORMATION AND SIGNATURE

Signature	Johanna Szillery	Date	9/4 9/12
Name Printed	Johanna Szillery	Cert/Lic/Reg. #	CSS 494

Title ☐ Licensed Site Evaluator ☒ Certified Soil Scientist ☐ Certified Geologist ☐ Professional Engineer

STATE OF MAINE ★ JOHANNA E. SZILLERY NO. SS494 ★ SOIL SCIENTIST

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FORM F Rev. 07/11a

SOIL PROFILE / CLASSIFICATION INFORMATION

DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project Name: Silver Maple Wind | Applicant Name: | Project Location (municipality): Clifton

Exploration Symbol # A5 — ☒ Test Pit ☐ Boring ☐ Probe

7 " Organic horizon thickness Ground surface elev. _____

72 " Depth of exploration or to refusal

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Redox Features
0 E				
Bhs	grav ls	v fri.	7.5YR5/2	
Bs			7.5YR3/3	none
10 Bs2	grav sl	friable	10YR4/6	
20		↓		↓
30 Bc	v. cobb cos sl	firm	2.5Y4/4	mott. 10YR4/6 c,f
C				
50				
60				

Soil Details by S.E. ▸▸ S.S. ▸▸

Soil Classification: Profile / Condition	Slope: Percent	Limiting Factor: Depth		Hydrologic: Soil Group
		27 "	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock	
Soil Series/Phase Name: Peru			☐ Hydric ☒ Non-hydric	

Exploration Symbol # A6 — ☒ Test Pit ☐ Boring ☐ Probe

4 " Organic horizon thickness Ground surface elev. _____

36 " Depth of exploration or to refusal

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Redox Features
0 Bhs	grav sl	fr	7.5YR4/4	none
10 Bs			10YR4/6	
20 BC	v. grav. cobb sl	firm	2.5Y4/3	mott.
30		very firm		
40		machine refusal 36" (very firm/dense only?)		
50				
60				

Soil Details by S.E. ▸▸ S.S. ▸▸

Soil Classification: Profile / Condition	Slope: Percent	Limiting Factor: Depth		Hydrologic: Soil Group
		17 "	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock	
Soil Series/Phase Name: Colonel			☐ Hydric ☒ Non-hydric	

Exploration Symbol # A7 — ☒ Test Pit ☐ Boring ☐ Probe

4 " Organic horizon thickness Ground surface elev. _____

50 " Depth of exploration or to refusal

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Redox Features
0 Bhs	grav sl	fr	7.5YR3/3	none
10			7.5YR4/6	
20				
30	very grav. cobb sl	firm	2.5Y4/3	10YR5/6 c,f
40		very firm		
50		machine refusal 50" (very firm/dense?)		
60				

Soil Details by S.E. ▸▸ S.S. ▸▸

Soil Classification: Profile / Condition	Slope: Percent	Limiting Factor: Depth		Hydrologic: Soil Group
		24 "	☒ Groundwater ☒ Restrictive Layer ☐ Bedrock	
Soil Series/Phase Name: Peru			☐ Hydric ☒ Non-hydric	

Exploration Symbol # _____ — ☐ Test Pit ☐ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth of exploration or to refusal

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Redox Features
0				
10				
20				
30				
40				
50				
60				

Soil Details by S.E. ▸▸ S.S. ▸▸

Soil Classification: Profile / Condition	Slope: Percent	Limiting Factor: Depth		Hydrologic: Soil Group
		"	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock	
Soil Series/Phase Name:			☐ Hydric ☐ Non-hydric	

INVESTIGATOR INFORMATION AND SIGNATURE

Signature	Johanna Szillery	Date	9/4 9/12/20
Name Printed	Johanna Szillery	Cert/Lic/Reg. #	494

Title ☐ Licensed Site Evaluator ☒ Certified Soil Scientist ☐ Certified Geologist ☐ Professional Engineer

STATE OF MAINE — JOHANNA E. SZILLERY NO. SS494 — SOIL SCIENTIST — affix professional seal

APPENDIX D

MAP UNIT DESCRIPTION

SOIL SURVEY LEGEND

MAP UNIT SYMBOL	MAP UNIT NAME
BrB	Brayton loam, 3 to 8 percent slopes
CnB	Colonel gravelly sandy loam, 3 to 8 percent slopes
PeB	Peru cobby loam, 3 to 8 percent slopes
PeC	Peru gravelly loam, 8 to 15 percent slopes
PeD	Peru cobbly loam, 15 to 25 percent slopes
PTD	Peru-Tunbridge complex, 15 to 25 percent slopes

Brayton loam, 3 to 8 percent slopes (BrB)
Brayton (Aeric Endoaquepts)

SETTING

Parent Material: Dense Till
Landform: Glaciated uplands
Position in Landscape: Toe slopes and Depressions
Slope Gradient Ranges: 3 to 8 percent slopes

COMPOSITION AND SOIL CHARACTERISTICS

Typical Profile Description: Typical profile was described for this soil at TP 10.

Surface Layer: The surface was covered with 9 inches of mucky, saturated, highly decomposed organic matter.

Subsurface: The subsurface is 12 inches of firm, olive brown cobbly loam, to an observed depth of 20 inches.

Drainage Class: Poorly drained, seasonal high-water table at or near the soil surface for portions of the year.

Hydrologic Group: D

Surface Run Off: Low to medium

Saturated Hydraulic Conductivity:
4.23-14.11 micro m/sec in the surface and subsurface

Depth to Bedrock: Very deep, greater than 60 inches of mineral soil over bedrock.

Potential for Frost Action: High

Erosion Factor (Kf): .20 in the surface; .28 in the subsurface and subsoil; .24 in the substratum

Brayton loam, 3 to 8 percent slopes (BrB)

INCLUSIONS WITHIN MAP UNIT

Similar: Monarda
Dissimilar: Colonel

USE AND MANAGEMENT

Brayton soils are hydric and may be part of jurisdictional wetlands if the other wetland parameters are met. Brayton soils are limited by a high seasonal water table and dense till at a relatively shallow depth. This impacts the hydraulic conductivity of this soil, related water and frost properties, and potential uses for roads, shallow excavations, and structures with basements.

Colonel gravelly sandy loam, 3 to 8 percent slopes (CnB)
Colonel (Aquic Haplorthod)

SETTING

Parent Material: Dense Till
Landform: Drumlins and till ridges
Position in Landscape: Shoulder slope
Slope gradient ranges: 3 to 8 percent slopes

COMPOSITION AND SOIL CHARACTERISTICS

Typical Profile Description: Typical profile was described for this soil at TP A6.

Surface Layer: The surface was covered with 4 inches of highly decomposed organic matter.

Subsurface: The subsurface is 7 inches of dark reddish brown gravelly sandy loam, underlain by 10 inches of strong brown gravelly sandy loam.

Subsoil Layer: The subsoil is firm, mottled, light olive brown very cobbly sandy loam,

Substratum: The subsoil graded into the substratum, which is mottled, very firm very cobbly sandy loam, to an observed depth of 36 inches.

Drainage Class: Somewhat poorly drained, seasonal high-water table 7 to less than 16 inches below the mineral soil surface. No potential for ponding or flooding.

Hydrologic Group: D

Surface Run Off: Low to medium

Saturated Hydraulic Conductivity:
4.23-14.11 micro m/sec in the surface and subsurface

Depth to Bedrock: Very deep, greater than 60 inches of mineral soil over bedrock.

Potential for Frost Action: High

Erosion Factor (Kf): .20 in the surface; .28 in the subsurface and subsoil; .24 in the substratum

Colonel cobbly loam, 3 to 8 percent slopes (CoB)

INCLUSIONS WITHIN MAP UNIT

Similar: Peru
Dissimilar: Tunbridge

USE AND MANAGEMENT

Colonel soils are limited by a high seasonal water table and dense till at a relatively shallow depth. This impacts the hydraulic conductivity of this soil, related water and frost properties, and potential uses for roads, shallow excavations, and structures with basements. Limitations due to a high seasonal water table can be mitigated by excavation and fill with a free-draining material, diversion of water from structures and roads, and avoidance of soils with high seasonal water table.

Peru cobbly loam, 3 to 8 percent slopes (PeB)
Peru (Aquic Haplorthods)

SETTING

Parent Material: Loamy Glacial Till
Landform: Hills and Mountains
Position in Landscape: Backslopes and Foot slopes
Slope gradient ranges: 3 to 8 percent slopes

COMPOSITION AND SOIL CHARACTERISTICS

Typical Profile Description: Typical profile was described for this soil at TP A8.

Surface Layer: The surface was covered with 2 inches of highly decomposed organic matter, underlain by 4 inches of gray gravelly loam.

Subsurface: The subsurface is 6 inches of dark reddish-brown gravelly loam, underlain by 11 inches of strong brown gravelly loam.

Subsoil Layer: The subsoil is firm, mottled, light olive brown cobbly loam, to an observed depth of 23 inches.

Substratum: The substratum is mottled, very firm gravelly loam.

Drainage Class: Moderately well drained with no potential for ponding or flooding.

Hydrologic Group: C

Surface Run Off: Low

Saturated Hydraulic Conductivity:
4.23-14.11 micro m/sec in the surface and subsurface

Depth to Bedrock: Very deep, greater than 60 inches of mineral soil over bedrock.

Potential for Frost Action: Moderate

Erosion Factor (Kf): 0.17 – 0.32

Peru cobbly loam, 3 to 8 percent slopes (PeB)

INCLUSIONS WITHIN MAP UNIT

Similar: Peru, other slope classes; Colonel
Dissimilar: Tunbridge

USE AND MANAGEMENT

Peru soils are limited by a high seasonal water table and dense till at a relatively shallow depth. This impacts the hydraulic conductivity of this soil, related water and frost properties, and potential uses for roads, shallow excavations, and structures with basements. Limitations due to a high seasonal water table can be mitigated by excavation and fill with a free-draining material, diversion of water from structures and roads, and avoidance of soils with high seasonal water table.

Peru gravelly loam, 8 to 16 percent slopes (PeC)
Peru (Aquic Haplorthods)

SETTING

Parent Material: Loamy Glacial Till
Landform: Hills and Mountains
Position in Landscape: Backslopes and Foot slopes
Slope gradient ranges: 8 to 16 percent slopes

COMPOSITION AND SOIL CHARACTERISTICS

Typical Profile Description: Typical profile was described for this soil at TP A1.

Surface Layer: The surface was covered with 7 inches of highly decomposed organic matter, underlain by 3 inches of gray gravelly silt loam.

Subsurface: The subsurface is 6 inches of dark reddish-brown loam, underlain by 11 inches of strong brown loam.

Subsoil Layer: The subsoil is firm, mottled, light olive brown cobbly loam, to an observed depth of 23 inches.

Substratum: The substratum is mottled, very firm gravelly loam.

Drainage Class: Moderately well drained with no potential for ponding or flooding.

Hydrologic Group: C

Surface Run Off: Moderate

Saturated Hydraulic Conductivity:
4.23-14.11 micro m/sec in the surface and subsurface

Depth to Bedrock: Very deep, greater than 60 inches of mineral soil over bedrock.

Potential for Frost Action: Moderate

Erosion Factor (Kf): 0.17 – 0.32

Peru gravelly loam, 8 to 16 percent slopes (PeC)

INCLUSIONS WITHIN MAP UNIT

Similar: Peru, other slope classes; Colonel
Dissimilar: Tunbridge

USE AND MANAGEMENT

Peru soils are limited by a high seasonal water table and dense till at a relatively shallow depth. This impacts the hydraulic conductivity of this soil, related water and frost properties, and potential uses for roads, shallow excavations, and structures with basements. Limitations due to a high seasonal water table can be mitigated by excavation and fill with a free-draining material, diversion of water from structures and roads, and avoidance of soils with high seasonal water table.

Peru gravelly loam, 15 to 25 percent slopes (PeD)
Peru (Aquic Haplorthods)

SETTING

Parent Material: Loamy Glacial Till
Landform: Hills and Mountains
Position in Landscape: Backslopes and Foot slopes
Slope gradient ranges: 15 to 25 percent slopes

COMPOSITION AND SOIL CHARACTERISTICS

Typical Profile Description: Typical profile was described for this soil at TP 2.

Surface Layer: The surface was covered with 2 inches of highly decomposed organic matter.

Subsurface: The subsurface is 8 inches of dark brown gravelly silt loam, underlain by 12 inches of strong brown gravelly silt loam.

Subsoil Layer: The subsoil is firm, mottled, olive brown cobbly silt loam, to an observed depth of 27 inches.

Drainage Class: Moderately well drained with no potential for ponding or flooding.

Hydrologic Group: C

Surface Run Off: High

Saturated Hydraulic Conductivity:
4.23-14.11 micro m/sec in the surface and subsurface

Depth to Bedrock: Very deep, greater than 60 inches of mineral soil over bedrock.

Potential for Frost Action: Moderate

Erosion Factor (Kf): 0.17 – 0.32

Peru gravelly loam, 8 to 16 percent slopes (PeD)

INCLUSIONS WITHIN MAP UNIT

Similar: Peru, other slope classes; Colonel
Dissimilar: Tunbridge

USE AND MANAGEMENT

Peru soils are limited by a high seasonal water table and dense till at a relatively shallow depth. This impacts the hydraulic conductivity of this soil, related water and frost properties, and potential uses for roads, shallow excavations, and structures with basements. Limitations due to a high seasonal water table can be mitigated by excavation and fill with a free-draining material, diversion of water from structures and roads, and avoidance of soils with high seasonal water table. These Peru soils are also limited by steepness.

Peru – Turnbridge complex, 15 to 25 percent slopes (PtD)
This complex consists of a regularly repeating pattern of approximately 80% Peru soil and approximately 20% Turnbridge soils.

SETTING

Parent Material: Loamy glacial till
Landform: Glaciated hills and mountains
Position in Landscape: Upper landforms, shoulder slopes, ridges
Slope gradient ranges: 15 to 25 percent slopes

Peru (Aquic Haplorthods)

COMPOSITION AND SOIL CHARACTERISTICS

Typical Profile Description: Typical profile was described for this soil at TP 2.

Surface Layer: The surface was covered with 2 inches of highly decomposed organic matter.

Subsurface: The subsurface is 8 inches of dark brown gravelly silt loam, underlain by 12 inches of strong brown gravelly silt loam.

Subsoil Layer: The subsoil is firm, mottled, olive brown cobbly silt loam, to an observed depth of 27 inches.

Drainage Class: Moderately well drained with no potential for ponding or flooding.

Hydrologic Group: C

Surface Run Off: High

Saturated Hydraulic Conductivity:
4.23-14.11 micro m/sec in the surface and subsurface

Depth to Bedrock: Very deep, greater than 60 inches of mineral soil over bedrock.

Potential for Frost Action: Moderate

Erosion Factor (Kf): 0.17 – 0.32

Tunbridge (Typic Haplorthods)

COMPOSITION AND SOIL CHARACTERISTICS

Typical Profile Description: Typical profile was described for this soil at TP 5.

Surface Layer: The surface was covered with 3 inches of highly decomposed organic matter.

Subsurface: The subsurface is 10 inches of dark reddish-brown loam, underlain by 11 inches of strong brown loam, to an observed depth of 21 inches. Bedrock is assumed to occur at 21 inches.

Drainage Class: Well drained. No potential for ponding or flooding.

Hydrologic Group: C/D

Surface Run Off: High

Saturated Hydraulic Conductivity:
4.23-14.11 micro m/sec in the surface and subsurface

Depth to Bedrock: 20 to 40 inches to bedrock material.

Potential for Frost Action: Low

Erosion Factor (Kf): 0.20 – 0.32

INCLUSIONS WITHIN MAP UNIT

Similar: Colonel, Lyman
Dissimilar:

USE AND MANAGEMENT

Peru soils are limited by a high seasonal water table and dense till at a relatively shallow depth. Turnbridge soils are limited by shallow depth to bedrock. Within this map unit, both soils are limited by steepness.

APPENDIX E

GLOSSARY OF SOIL SCIENCE TERMS

GLOSSARY OF SOIL SCIENCE TERMS

The following terms relate to the practice of soil science and classification of soils. These definitions are separated into terms which are used to describe a soil or soil profile, terms which relate to the practice of soils mapping, and terms which are interpreted based on the properties of a soil.

SOIL MAPPING TERMS

These terms relate to the soils survey map and the soils and landforms that are depicted on this map.

Association and Complex – Two or more dissimilar soils that occur in a regularly repeating pattern on the landscape. At the scale of mapping shown, these dissimilar soils could not be separated. (USDA, *Soil Survey Manual*)

Consociation – A delineated polygon which is dominated by one soil type or series and similar soils. (USDA, *Soil Survey Manual*)

Dissimilar soil – Soil inclusions within a mapped polygon which are different from the named map unit. The characteristics, properties, and use and management of a dissimilar soil are different enough that there are important differences between these soils for the purpose of the soil survey. (USDA, *Soil Survey Manual*; MAPSS, *Guidelines*)

Inclusion – Components within a delineated polygon that are not identified by the polygon name. These inclusions may be similar soils or dissimilar soils. Inclusions of dissimilar soil shall not exceed 25 percent of the map unit area, based on MAPSS Standards. (USDA*, Soil Survey Manual*; MAPSS*, Guidelines*)

Map Unit – An area that is defined and named the same in terms of its soil components and is named for the dominant soil component. Each map unit differs in some way from a differently named map unit. (USDA*, Soil Survey Manual*)

Map Unit Purity – Within a delineated polygon, the amount of the polygon that is made up of the named soil relative to the amount of polygon made up of inclusions, for which the polygon is not named. (USDA, *Soil Survey Manual*). MAPSS *Guidelines* indicate that 75% of a delineated map unit should be the named or similar soils; dissimilar soils shall not exceed 25% of a delineated map unit.

Phase – A subset of a soil series which can be significant for use and management. Phases may be differentiated for different classes of surface stoniness and slopes. (USDA*, Soil Survey Manual*)

Series – A group of soils that share similar defining characteristics. This is the most homogenous category of soil taxonomy: a given soil series has a relatively narrow range of properties. (USDA*, Soil Survey Manual*)

Similar Soil – Soil inclusions within a mapped polygon which are different from the named map unit; however, the properties, management, and interpretations of the similar soil are such that no important differences exist for the purpose of the soil survey. (USDA, *Soil Survey Manual*; MAPSS, *Guidelines*)

Taxajunct/Variant – A group of soils that have properties outside the range of any established soil series. These differences are small so that major interpretations are not affected. (USDA, *Soil Survey Manual*)

SOIL PROPERTIES TERMS

Consistence – As used in soil surveys, consistence is the resistance of a soil sample to crushing or penetration and is described as loose, friable, firm, and rigid. As used generally in soils, consistence also includes the plasticity, toughness, or stickiness of a puddled soil, and the behavior of a soil under compression. This property is based on the cohesion and adhesion of soil particles. (USDA, *Soil Survey Manual;* Brady and Weil, *The Nature and Properties of Soils*)

Depth classes – classes of soil depth to bedrock. In Maine, soils are categorized into five depth classes: (MAPSS, *Guidelines*)

1. Very shallow: Less than 10 inches of soil above bedrock.
2. Shallow: 10 to less than 20 inches of soil above bedrock.
3. Moderately deep: 20 to less than 40 inches of soil above bedrock.
4. Deep: 40 to less than 60 inches of soil above bedrock.
5. Very Deep: Greater than 60 inches of soil above bedrock.

Drainage classes – the frequency and duration of wet periods within the soil profile. The USDA defines seven drainage classes based on the length that the soil is inundated by water during the growing season, the depth to free water, and the restriction of plant growth. Maine USDA and soil scientists have correlated these seven drainage classes into observations of the seasonal high-water table in soils: (USDA, *Soil Survey Manual;* MAPSS, *Guidelines*)

1. Very poorly drained: Seasonal high-water table at or near the surface.
2. Poorly drained: Seasonal high-water table at or near the surface.
3. Somewhat poorly drained: Seasonal high-water table (redoximorphic features) less than 16 inches below the soil surface.
4. Moderately well drained: Seasonal high-water table (redoximorphic features) 16 to less than 40 inches below the surface.
5. Well drained: Seasonal high-water table (redoximorphic features) 40 inches or more below the surface.
6. Somewhat excessively drained: Soil depth is 10 to 20 inches to bedrock with specific textural properties; or soil depth is 20 inches or greater to bedrock with specific textural properties.
7. Excessively drained: Soil depth is 10 inches to bedrock; or specific textural properties.

Redoximorphic features – changes in soil color which are attributed to soil wetness. These features may be "concentrations" of color or "depletions" of color. Redoximorphic features are evidence of the seasonal high-water table. This was formerly called "mottling" or "redoximorphic mottling" (USDA, *Soil Survey Manual*).

Seasonal High-Water Table – a zone of saturation which occurs within the soil profile during the wettest part of the year. The depth of this zone is described at the highest average depth (i.e., closest to the surface) in the soil profile (USDA, *Soil Survey Manual*).

Structure – The arrangement of primary soil particles (sand, silt, and clay) into secondary units. These units are characterized by size, shape, and degree of distinctiveness. Common soil structure types include granular, angular and subangular blocky, platy, prismatic, single grain, and massive. (USDA, *Soil Survey Manual;* Brady and Weil, *The Nature and Properties of Soils*)

Texture – the relative proportion, by weight, of sand, silt, and clay in a soil. The soil textural class is a grouping of soils based on the relative proportions of sand, silt, and clay in a soil. Soils within a textural class have similar physical properties. Soil textural classes are, from coarse to fine: sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. (USDA, *Soil Survey Manual;* Brady and Weil, *The Nature and Properties of Soils*)

DESCRIPTIVE SOIL PROFILE OR SOIL CHARACTERISTIC TERMS

Erodibility factor (K factor) – a relative index of the susceptibility of bare, cultivated soil to particle detachment and transport by rainfall.

Hydraulic conductivity (saturated) (Ksat) - the factor relating soil water flow rate to the hydraulic gradient. Ksat is the reciprocal of the resistance of soil to water movement. (USDA, *Soil Survey Manual*)

Hydrologic soil group – groups of soils that have similar runoff potential under similar climatic and land cover conditions. In Maine, soils are place into one of four hydrologic groups: A, B, C, and D. These groups are described as follows:

A: Soils with low runoff potential when thoroughly wet. Water is transmitted freely throughout the soil. These soils tend to have less than 10% clay and more than 90% sand or gravel.

B: These soils have moderately low runoff potential when thoroughly wet, with unimpeded water transmission. These soils are typically 10-20% clay or silt and 50-90% sand.

C: Soils with a moderately high runoff potential when thoroughly wet. Water transmission is somewhat restricted in this soil. These soils are typically 20-40% clay or silt and less than 50% sand.

D: These soils have a high runoff potential when thoroughly wet, with restricted or very restricted water transmission. These soils are 40% or greater clay or silt, and less than 50% sand. (USDA, *National Engineering Handbook*)

LIMITATIONS

Permeability – the ease with which gases, liquids, or plant roots penetrate through a mass or layer of soil. (Brady and Weil, *The Nature and Properties of Soils*)

Soil Potential Ratings – classes that indicate the relative quality of a soil for a particular use as compared with other soils in a given area. The purpose of this rating system is to identify the relative suitability of soils for a given use for planning purposes. These ratings are developed at the Federal (USDA) level, and range from very high potential, high potential, medium potential, low potential, to very low potential. (USDA, *National Soil Survey Handbook*)

REFERENCES

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