

SECTION 11

Soils

Section 11. Soils

A. Narrative.

The following report was prepared to document the existing soil conditions within the project area of the Silver Maple wind project located in Clifton, Maine. The information presented represents research of published information by the Natural Resources Conservation Services and field investigations of the project area. This information is generally considered a Class D (Medium Intensity) Soil Survey.

The proposed project will include the development of five wind turbine generators (WTGs) located in two development areas. These areas are located on the top section areas of the Pisgah Mountain range in Clifton, Maine. These two sites are separated by approximately 3000 ft and are on separate mountain range ridges, however soil conditions were found to be very similar in both areas. Currently both sites are wooded with a regeneration growth generally consisting of Red Maple, White Birch, Red Spruce, Eastern Beech and Red Oak. Both sites were heavily cut within the last 30 years. There are a series of wood harvesting roadway and skidder trails located throughout both areas.

Field inspection did not identify any areas of significant erosion or unstable soil conditions. Due to the location of the areas on top of the mountain ridge, only minimal concentration of surficial runoff occurs, and no significant drainages or channelization of stormwater flows was noted.

The results of the investigation determined that most of the soils associated with the project area include the following soil series types: Monadnock, Tunbridge and Peru. Other soils identified include Abram and Knob Lock, but to a lesser extent. The following provides a brief description of these soils.

Monadnock Series – These soils consist of very deep, well-drained soils formed in a loamy mantle underlain by sandy glacial till. They are generally associated with upland hill, plains and mountain side slopes. Slopes range from 3 to 20 percent in the project area. The till layer generally contains stones or boulders. These soils are very well suited for roadway and building construction due to their drainage and stability.

Tunbridge Series – These soils consist of moderately deep, well drained soils on glaciated uplands. They formed in loamy glacial till. They are generally associated with mountain side slopes, mountain Tops, mountain ridges, hill tops and hill slopes. Slopes range from 0 to 15 percent in the project area. These soils are very well suited for roadway and building construction due to their drainage and stability.

Peru Series – These soils consist of very deep, moderately well- drained soils that formed in compact, loamy glacial till. They are generally associated with drumlins and sloping areas of glaciated uplands. Slopes range from 0 to 10 percent in the project area. These areas are also suited for construction but may require drainage provisions.

Abram Series – These soils consist of very shallow, excessively drained soils formed in thin mantle of glacial till. They are generally level on the project site and are associated with the tops of mountains and ridges. These soils are generally associated with shallow ledge conditions. Construction will need to account for ledge in planning.

Knob Lock Series – These soils consist of very shallow and shallow, well-drained and excessively-drained organic soils located on mountain tops. They are underlain in most locations by a very thin mineral horizon over bedrock (1”-20”). These soils are generally associated with shallow ledge conditions. Construction will need to account for the presence of ledge in the planning phase of the project.

The investigations of the project sites determined that approximately 90% of the project improvements and stormwater treatment buffers will be located on the described Monadnock and Tunbridge soils. These soils are very well suited for the proposed construction and will provide effective treatment of stormwater runoff due to their high permeability characteristics. Two tower sites were found to be associated with the Abram and Knob Lock soils. These areas are located on the extreme top of ridge lines and deeper soil conditions were found just outside the construction areas which will provide effective stormwater buffer areas. The Peru soils were found just slightly outside the proposed project construction area and would only be utilized for natural and or stormwater buffer areas.

Attached is a copy of the Natural Resource Conservation Service Map, with the project areas noted as well as map key information and soil complex series descriptions. See Exhibit 11.1.

Exhibit 11.1

Soil Map—Penobscot County, Maine, Southern Part
(Silver Maple Wind)



Map Scale: 1:13,600 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84












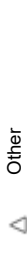

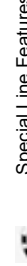





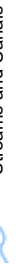



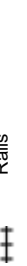

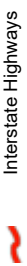














Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

6/24/2019
Page 1 of 3

MAP LEGEND

 Area of Interest (AOI)	 Spoil Area
 Soils	 Stony Spot
 Soil Map Unit Polygons	 Very Stony Spot
 Soil Map Unit Lines	 Wet Spot
 Soil Map Unit Points	 Other
 Special Point Features	 Special Line Features
 Blowout	 Streams and Canals
 Borrow Pit	 RAILS
 Clay Spot	 Interstate Highways
 Closed Depression	 US Routes
 Gravel Pit	 Major Roads
 Gravelly Spot	 Local Roads
 Landfill	 Aerial Photography
 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	

MAP INFORMATION

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

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: Penobscot County, Maine, Southern Part
Survey Area Data: Version 4, Sep 11, 2018

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

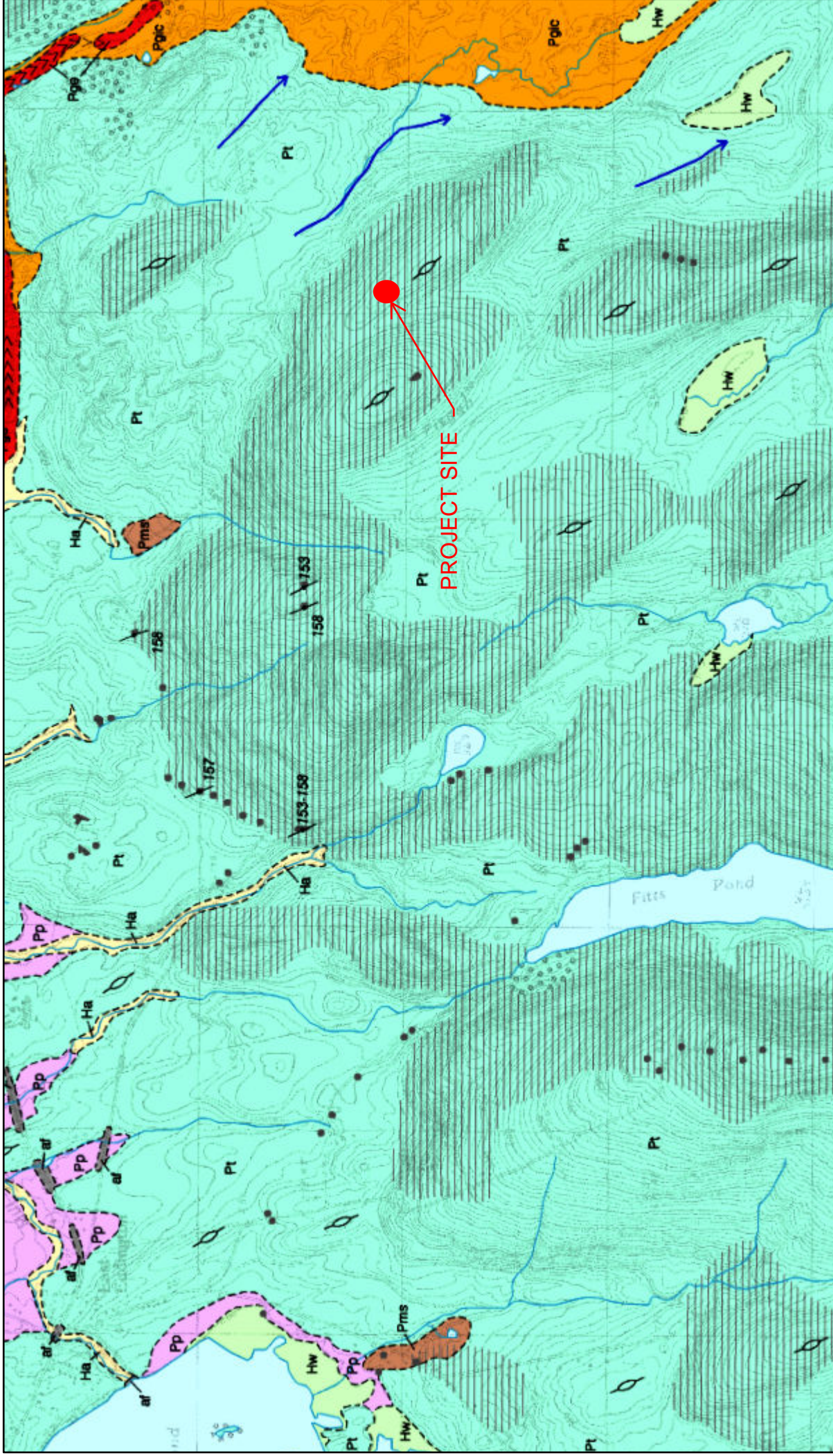
Date(s) aerial images were photographed: Jul 27, 2010—Aug 31, 2010

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
AKD	Abram-Knob Lock-Rock outcrop complex, 3 to 30 percent slopes	33.5	3.4%
AKF	Abram-Knob Lock-Rock outcrop complex, 30 to 100 percent slopes	41.6	4.3%
BPA	Brayton-Peacham complex, 0 to 3 percent slopes, extremely stony	32.8	3.4%
BRB	Brayton-Colonel complex, 0 to 8 percent slopes, very stony	42.9	4.4%
BSC	Becket-Skerry complex, 3 to 15 percent slopes, very bouldery	68.5	7.0%
BW	Bucksport and Wonsqueak mucks, 0 to 2 percent slopes, ponded	16.1	1.7%
BYB	Brayton-Colonel-Lyman complex, 0 to 8 percent slopes, rocky	6.1	0.6%
CDB	Colonel-Peru-Brayton complex, 0 to 8 percent slopes, very stony	11.6	1.2%
HMC	Monadnock-Hermon complex, 3 to 15 percent slopes, extremely bouldery	131.1	13.4%
LKE	Lyman-Abram-Knob Lock complex, 30 to 80 percent slopes, very rocky	6.6	0.7%
LTC	Lyman-Tunbridge complex, 3 to 15 percent slopes, rocky	54.8	5.6%
LTD	Lyman-Tunbridge complex, 15 to 30 percent slopes, rocky	73.7	7.5%
MND	Monadnock-Tunbridge association, 15 to 30 percent slopes, very bouldery	124.9	12.8%
PCC	Peru-Colonel-Tunbridge association, 3 to 15 percent slopes, very stony	183.8	18.8%
SKB	Skerry-Becket-Colonel complex, 0 to 8 percent slopes, very bouldery	37.1	3.8%
TPD	Tunbridge-Peru-Lyman association, 15 to 30 percent slopes, very stony	112.0	11.5%
Totals for Area of Interest		977.2	100.0%

Surficial Geology Map



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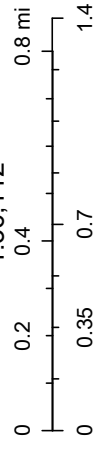
Ptd

Thin-drift areas - Areas with generally less than ten feet of drift covering bedrock. Till overlies bedrock on hillslopes and ridge crests; Presumpscot Formation silty clay is present in depressions; and nearshore deposits overlie till, Presumpscot Formation, and bedrock on hillslopes and at the base of these slopes. Small rock outcrops, and areas of numerous small outcrops are shown as solid gray areas.

Pt

Till - Gravelly to bouldery, sandy-matrix diamiction.

1:36,112



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, Geobase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community, Maine Geological Survey