

Section 11. SOILS

11.1. SOIL SURVEY MAP AND REPORT

Flycatcher conducted a soil survey for the proposed Project that included three soil survey classes. Class type was determined based on proposed Project use and existing site conditions to meet the requirements of the MDEP Site Law standards for wind power projects. The on-site soil survey investigations were completed between November 27 and December 1, 2017, between October 31 and December 13, 2019, and between December 21 and December 24, 2020.

Flycatcher conducted the Class L level survey for the proposed turbine array, for proposed new roads, and for existing roads that require significant upgrades to be used for the Project. A Class D–level survey was conducted for the proposed underground collection lines. A Class B–level survey was conducted for the proposed operations and maintenance facility and substation. The Soil Report is included as Exhibit 11-1.

Similar to other developed wind projects in the state, the soil survey results identified areas that would require engineered designs to address the limiting factors for a proposed wind power project. However, with proper planning, engineering, and construction techniques, the soils are appropriate for the proposed Project. Prior to construction, a geotechnical investigation of key areas for project components will be performed. The results of the geotechnical investigation will determine the final turbine foundation design at each turbine location.

11.2. HYDRIC SOILS MAPPING

A wetland delineation was performed prior to the on-site soil survey investigation. Hydric soil determinations were based on the technical criteria described in the U.S. Army Corps of Engineers Corps of Engineers Wetlands Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)8; USDA NRCS Field Indicators of Hydric Soils in the United States A Guide for Identifying and Delineating Hydric Soils (version current at time of fieldwork); the Field Indicators for Identifying Hydric Soils in New England (version current at time of fieldwork); and the Maine Association of Professional Soil Scientists (MAPSS) Key for the Identification of Soil Drainage Class. The wetland delineation included preparation of Corps paired data plots and, as part of this process, a representative wetland soil and adjacent upland soil exploration was described to document soil texture and drainage characteristics. The Flycatcher soil scientist reviewed the Corps paired data plot information, observed the delineated wetland and watercourse feature boundaries on-site, and dug test pits and auger borings in several wetlands to obtain additional detailed soil information. The wetland boundaries mapped during the delineation, along with the additional information, were used to guide hydric soil boundary placement. The location and extent of hydric soils is generally consistent with the delineated wetlands.

⁸ U.S. Army Corps of Engineers. 2012. Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0), ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.



⁷ Environmental Laboratory. 1987. *Corps of Engineers Wetlands Delineation Manual.* Technical Report Y-87-1. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS.



EXHIBIT 11-1: SOIL SURVEY REPORT



SOIL SURVEY REPORT PROPOSED DOWNEAST WIND PROJECT

Apex Clean Energy Columbia and Surrounding Area, Maine

February 24, 2021

Revision 1 Date: March 12, 2021



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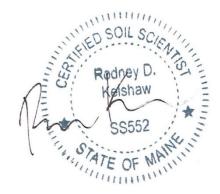
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1.0 SIGN-OFF SHEET

This soil narrative report entitled "Soil Survey Report; Proposed Downeast Wind Project", accompanying soil profile descriptions and soil survey maps, dated February and March 2021, were completed in accordance with the standards adopted by the Maine Association of Professional Soil Scientists, February 1995, as amended, was prepared by Rodney D. Kelshaw LSS #552 of Flycatcher LLC.





2.0 INTRODUCTION AND PURPOSE

Apex Clean Energy (Apex) and TRC, Inc. (TRC) requested that Stantec Consulting Services Inc. (Stantec) conduct a soil survey for the proposed Downeast Wind Project (Project). Maine Licensed Soil Scientist (R. Kelshaw, LSS #552) completed the soil survey from 2017 to 2021. The proposed Project is located in Columbia and T18 MD BPP and T24 MD BPP, in Washington County, Maine (see Figure 1). The Project consists of 33 proposed turbine locations (30 proposed and three proposed alternate sites), three proposed meteorological evaluation towers (MET) (one permanent MET and two temporary power performance towers), a substation, an operations and maintenance (O&M) building, a temporary laydown yard, and associated infrastructure including access roads and electrical collector lines.

The purpose of this soil survey is to provide project planners with site-specific soil information which describes the ability or limitation of the soil to support the proposed use at this site and to aid in project design. A soil survey is tailored to the specific project; as such, the report may not be suitable for other uses because the soil limitations and properties that are suitable for one proposed development may not be suitable for another. The results of this survey will be used to inform designers and engineers during design of a proposed wind energy generation facility.

The soil survey fieldwork and this report were developed to meet the typical requirements of the Maine Department of Environmental Protection (MDEP) under the Site Location of Development Act (Site Law) and the Maine Land Use Planning Commission (LUPC) for wind power projects. This report provides a description of the methods and findings of the soil survey. This report also describes the identified soil properties, discusses potential limitations for project design and may be used as part of the regulatory permit application process. It includes information on the ability or limitation of the soil to support the activities inherent to the construction and operation of the proposed Project. This soil survey was developed through a compilation of on-site soil and wetland investigation data supported by publicly available information from the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil surveys for Washington County.¹ Potential limitations for development identified in this report are intended for this specific Project and should not be used for other purposes.

3.0 SURVEY AREA DESCRIPTION

3.1 Location

In general, the Project is located between Routes 1 and 9 and east of Route 193 in Washington County, Maine, both to the north and south of Schoodic Lake. The survey area extends across an area approximately 12 miles from north to south and 6 miles from east to west. The Project is situated in the unorganized townships of T24MD BPP and T18MD BPP and the town of Columbia. The Project area also includes a 4.8-acre parcel located on Route 1 in Columbia, that may be used as an O&M building.

3.2 General Survey Area Description & Land Use

The site is primarily located in the Level IV Ecoregion "Downeast Coast" with small portions of the western and northern areas extending into the "Eastern Maine-Southern New Brunswick Plains." This section of Maine has a unique history of geologic and soil forming processes which resulted in an interspersion of

¹ Wilkinson, D. E. 2008. *Soil Survey of Washington County Area, Maine*. Natural Resources Conservation Service.



soil parent materials and phases of soil development. According to the NRCS Washington County soil survey, "The area consists of till-mantled, rolling to hilly uplands in the northern part, gently sloping valleys terminating in coastal lowlands in the southern part, and glaciofluvial outwash plains and deltas in the west central part. Glaciomarine or glaciolacustrine sediments cover the coastal valleys. The elevation ranges from sea level to 1,076 feet on the crest of Spruce Mountain in Beddington." The Project site can be characterized by dense glacial till with a bouldery surface that is interspersed with the large glaciofluvial formed deltas, silty clay marine sediments, and deep organic materials.

The Project site extends across approximately 16,600 acres, which consist of undeveloped forest surrounding commercially managed lowbush blueberry (*Vaccinium angustifolium*) fields. These forested areas likely did not develop, or were not converted to blueberry production, due to either boulder surfaces and steep slopes or poor drainage and wetlands. The blueberry fields are dominated by lowbush blueberry, some of which have underground irrigation systems installed. Between some fields are rows of planted conifers serving as windbreaks. Most of these fields are situated on well-drained, sandy soils that lack boulders due to natural formation or being mechanically removed and piled along the field and treeline edge. Major watercourses located within the Project site are Pleasant River, Mopang Stream, Taylor Branch, Mudhole Brook, Heath Brook, Western Little River, and Great Heath.

Dominant tree species observed include white pine (*Pinus strobus*), balsam fir (*Abies balsamea*), red spruce (*Picea rubens*), birch (*Betula spp.*), aspen (*Populus spp.*), and red oak (*Quercus rubra*). Understory vegetation includes bracken fern (*Pteridium aquilinum*), leatherleaf (*Chamaedaphne calyculata*), and teaberry (*Gaultheria procumbens*). The wetlands are dominated by balsam fir, black spruce (*Picea mariana*), red maple (*Acer rubrum*), and shrubs including speckled alder (*Alnus incana*), Viburnum species (*Viburnum spp.*), and winterberry (*Ilex verticillata*). The blueberry fields and large wetlands are typically nearly level to gently sloping whereas the forests range from nearly level to rolling hills with steep slopes. There is an existing network of aggregate base roads that extend throughout the fields and forests across the site that are currently used for agriculture and forestry operations.

4.0 Soil Survey Area Description

The Soil Survey Area is located on a portion of the 16,600-acre Project area. The proposed Project facility and infrastructure layout and locations have shifted from their initial locations being primarily in the blueberry fields to the current locations which are primarily in forested areas. Further micro-siting to avoid and minimize natural resource alteration resulted in the soil survey being performed in an area larger than the current layout. The Soil Survey Area includes the forests and blueberry fields described in Section 3.2. Three classes of soil survey were performed for this Project and there is a more detailed site description in the corresponding sections of this report. The Soil Survey Area referenced in this report will describe the areas within the currently proposed Project. Soil explorations located outside the current Project Area are depicted on Project plans as that information was used in development of this report.



5.0 METHODS

5.1 Standards

The soil survey methodology and format of this report were designed to meet the typical requirements of Section 11 of the application for a Site Law permit.² This report and associated maps were completed in accordance with the standards adopted by the Maine Association of Professional Soil Scientists (MAPSS) in the "Guidelines for Maine Certified Soil Scientists for Soils Identification and Mapping" (revised 2009)³ and follows the standards detailed in the USDA NRCS "Soil Survey Manual."⁴ Soils are described using the standard soil terminology developed by the USDA NRCS and the MAPSS Key to Soil Drainage Classes, as well as a list of regional indicators for identification of hydric soils Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Regional Supplement⁵ and the Field Indicators for Identifying Hydric Soils in New England, Version 4.⁶

A combination of three soil survey classes were completed in different areas across the Project site. A Class L (linear) survey was conducted for the proposed turbine array, which includes the turbine pads, access roads that require significant construction and crane paths, and collector line within the turbine array area where it is co-located with other infrastructure. A Class B (medium/high intensity) survey was conducted for the proposed substation (located within the turbine array area) and the O&M building (located on Route 1 in Columbia). A Class D (medium intensity) survey was conducted for the proposed electrical collector line corridors where it is not co-located with other Project infrastructure.

A State of Maine Licensed Soil Scientist conducted the on-site soil survey between November 27 to December 1, 2017, between October 31 and December 13, 2019, and December 22 and 23, 2020. Temperatures ranged from approximately 15 to 50 degrees Fahrenheit in 2017, 15 to 60 degrees Fahrenheit in 2019, 30 to 40 degrees Fahrenheit in 2020. At times and in some areas, there was a light snow cover on the soil surface; however, it did not limit data collection and there was no frost in the ground. During the 2019 survey, there was a significant rain event that raised the seasonal water table and impeded identification of some soil morphological features. This made it difficult to record the depth of redoximorphic features in somewhat poorly drained soil pits, yet it did not limit the ability to identify soil series or drainage class. A wetland delineation was performed by Stantec and TRC prior to the soil survey fieldwork. The Soil Survey Area is encompassed within the larger wetland delineation survey area. There are portions of the Project site where the wetland delineation was conducted, but soil survey was not required or conducted. Some proposed Project component locations were adjusted during the soil survey fieldwork leading to soil explorations outside of the proposed Project limits. These explorations

⁶ New England Hydric Soils Technical Committee. 2019 Version 4, Field Indicators for Identifying Hydric Soils in New England. New England Interstate Water Pollution Control Commission, Lowell, MA.



² State of Maine, Bureau of Land and Water Quality, Department of Environmental Protection Site Location of Development 38 M.R.S.A. §§ 481-490, Revised October 2015

³ Maine Association of Professional Soil Scientists. 2009. *Guidelines for Maine Certified Soil Scientists for Soils Identification and Mapping*.

⁴ Soil Science Division Staff. 2017. *Soil Survey Manual, ed.* C. Ditzler, K.Scheffe, and H.C. Monger, USDA Handbook 18. Government Printing Office, Washington, D.C.

⁵ U.S. Army Corps of Engineers. 2012. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region (Version 2.0)*, ed. J.S. Wakeley, R.W. Lichvar, and C.V. Noble. ERDC/EL TR-12-1. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

are depicted on the Project soil survey maps because they informed some map unit boundary determinations.

The Soil Survey Area boundaries were established based on offsets from the proposed Project infrastructure layouts that were provided to Stantec in 2017 by Apex, and in 2019 and 2020 by TRC. In the Class L soil survey area, the soil survey boundary for turbine pads are 300-foot offsets from the proposed turbine location. Where new roads to turbine pads are proposed or where existing roads require significant upgrade for use, the survey area is typically a 100-foot offset from the proposed road centerline (200-foot survey width), yet in some cases was the edge of proposed grading. However, the survey area did not extend beyond the wetland delineation survey boundary, so in some areas it was narrower than 200 feet.

The Class B soil survey was conducted in two areas: approximately 14 acres around the proposed substation and an additional 4.8 acres at the proposed O&M building location off Route 1 in Columbia.

The Class D soil survey for the collector lines was based on a 100-foot offset from the proposed electrical lines as the center of the corridor; with a typical width of approximately 200 feet. However, it is wider where electrical lines will be co-located.

The entire soil survey area was encompassed by the wetland delineation site investigation limits. The wetland delineation was performed prior to the on-site soil survey. Wetland scientists from TRC and Stantec performed the on-site wetland and watercourse delineation. The delineation included preparation of U.S. Army Corps of Engineers (USACE) paired data plots. As part of this process, a representative wetland soil and adjacent upland soil exploration was described to document soil texture and drainage characteristics. To increase efficiency and accuracy of the soil survey, TRC provided shapefile data for wetland boundaries, watercourse locations, and USACE paired plot locations. This information was used to help determine hydric soil boundaries, surface water flow and soil series/map units. The soil scientist observed the delineated wetland and watercourse feature boundaries on-site and dug additional test pits and auger borings in several wetlands to obtain additional detailed soil information. An iPad equipped with a mapping grade Global Positioning System (GPS) and base layers including aerial photography, topography, NRCS soil boundary mapping, Project site boundaries, proposed turbine, road and collector line locations, soil survey and wetland delineation investigation limits, and on-site identified wetlands and streams was used for site orientation and data collection.

5.2 Desktop Review

This soil survey was developed through a compilation of on-site soil investigation observations and supported by publicly available data from the USDA NRCS soil surveys for Washington County.⁷ Prior to the on-site fieldwork, Flycatcher reviewed available data sources, including:

- Wetland delineation and proposed project maps provided by TRC;
- United States Geological Survey (USGS) topographic mapping;
- NRCS medium-intensity soil survey mapping; and
- Recent and historic aerial photography.

⁷ Source: NRCS Web Soil Survey URL: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx; Various versions; reviewed multiple times between 20017 and 2021.



5.3 Data Collection

Site orientation and data collection was accomplished in the field using the ESRI Collector application. Collector provides online ArcGIS map integration that allows the field user to view various base layer maps (e.g., USGS topographic maps, aerial photographs, etc.). The base layers listed above were overlaid on the proposed project plans to help determine the locations for test pits and auger borings. Field geolocation data were collected using a mapping-grade GPS antenna (i.e., Juniper Systems Geode).

Hand dug test pits, hand auger borings, pits, ditches, and road cuts were used to observe soil morphology and characteristics. Investigations extended to a depth of refusal or to the length of the hand auger or hand probe (typically 24 to 48 inches). Other factors used to determine soil boundaries included changes in vegetation, slope, aspect, observations of surface stones, and human influence. Test pit and hand auger boring locations were chosen in an attempt to observe and collect soil data which could be used to determine the soil series or phase.

5.4 Soil Map Requirements

Class B (High Intensity) standards were developed to provide information for proposed projects with intensive uses where hydric soil boundaries or the location of suitable areas for moderate to heavy soil disturbance require site specific soil information. The Class L (for Linear Projects) standards were developed by MAPSS to provide the minimum soil information necessary to allow for the design and construction of long but narrow projects with little or no adjacent development. Class D (Medium Intensity) surveys are designed to be utilized for projects that will require minor to moderate soil disturbance or design that will require less site-specific soil information. These standards were the basis of this soil survey and are detailed in Appendix D: MAPSS Standards for Soil Surveys. The accompanying soil figures/maps meets the requirements of Class B, L, and D soil surveys, as outlined by the MAPSS Guidelines.

5.5 Soil Map Units

The soil survey map units conform with National Cooperative Soil Survey standards. Soil profiles are observed and then classified at the series level according to the current Keys to Soil Taxonomy. Soil map units depicted on the soil survey maps and described in this report are phases of soil series.

A soil survey map unit consists of a portion of the landscape composed of the identified soil and associated landscape properties, such as similar topography, aspect, stoniness, vegetation, depth to seasonal groundwater table, or depth to bedrock. The area enclosed by a map unit boundary has a minimum of 75% of the soil(s) that provide the name of that map unit or similar soil (i.e., soils that differ so little from the named soil(s) in the map unit that there are no important differences in interpretations). No inclusion is greater in size than the named soil(s). The total amount of dissimilar soils (soils that differ sufficiently from the named soil(s) to affect major interpretations) do not exceed 25% of the map unit.

Soil map unit boundaries are depicted on the accompanying soil survey maps. Each map unit is composed of the named soil and smaller areas of other soil series or phases (inclusions). Most inclusions have properties or patterns that are similar to those of the dominant soil in the map unit and generally do not affect use and management.



6.0 FINDINGS

6.1 Class B Soil Survey: Substation and O&M Building

The Class B soil survey areas are a combination of two locations and encompass a total of approximately 18.8 acres (14 acres for the proposed substation area and 4.8 acres for the proposed O&M building). The proposed substation is located on Pineo Ridge, north of Baseline Road and southeast of Schoodic Lake. It is situated along the northern edge of an existing electrical transmission line. The site is dominated by forest, except the southwest corner which is managed blueberry fields. The site is encompassed within two map units, both of which are Monadnock–Hermon Complex, very bouldery surface. The dominant slopes range from 8% to 15% (slope group B) and 15% to 35% (slope group C). There is an inclusion of nearly level land that is devoid of surface stones, which is the improved blueberry fields along the western boundary. The proposed O&M building is situated on the southeastern side of Route 1 in Columbia, south of the Ridge Road intersection. The property was the site of a small restaurant and the associated development. The developed area encompasses the southern portion of the parcel and a wetland complex and native upland encompasses the northern portion. Review the Map Unit Descriptions in conjunction with the attached figures to understand where these soils occur and the site limitations.

6.1.1 Substation: Monadnock-Hermon Complex (Mh)

The Hermon series consists of somewhat excessively drained soils on upland till plains, hills and ridges formed in glacial till. The Monadnock series consists of well-drained soils that formed in loamy over sandy melt-out till on hills and mountains in glaciated uplands. Boulders cover between 35% and 60% of the ground surface in the forested area. Surface stones and boulders were removed from the blueberry fields to facilitate agricultural activities. The Class B Soil Survey Map (Figure 2) is included as a report attachment.

The mapped soils do not appear to have physical or chemical properties that would have a significantly negative effect for the proposed Project components planned for this area.

6.1.2 O&M Site: Human Altered and Human Transported Materials (HAHT)

This map unit includes the altered and improved lands surrounding the former restaurant site. Typical conditions include maintained lawn surrounding the building, paved parking, gravel parking and fill and a subsurface wastewater disposal system. The surface soil is gravelly sandy loam fill over the original soil horizon(s) consisting of very fine sandy loam and silty clay loam marine sediment. There are redoximorphic features within 10-inches of the soil surface which indicates that even within the filled areas the seasonal groundwater table could be a limiting factor where rutting could occur during construction, along with leaking for subgrade infrastructure, increased frost action, and the potential for corrosion of concrete and steel. These factors can likely be overcome by planning appropriate engineering techniques.

6.1.3 O&M Site: Scantic silty clay loam (ScA)

The Scantic series is a poorly drained (hydric) soil that is shallow to a dense substratum yet very deep to bedrock. Scantic soil forms in glaciomarine and glaciolacustrine deposits on coastal lowlands and river valleys. On this site, Scantic is the predominant soil series mapped in wetlands. The most limiting factors for development would be the seasonal high-water table, which could result in rutting during construction, leaking for subgrade infrastructure, increased frost action, and the potential for corrosion



of concrete and steel. These factors can be overcome by planning appropriate engineering techniques. However, since these soils are also mapped as wetland, they should be avoided during construction and operation of the facility. Impacts to wetlands may require permitting.

6.1.4 O&M Site: Swanton sandy loam over silty clay loam (SwA)

The Swanton series consists of very deep, somewhat poorly drained soils that formed in a thin mantle of loamy outwash materials over clayey marine or lacustrine deposits on lake and marine plains, and outwash plains and deltas. These soils were mapped in the northern portion of the restaurant property along the wetland boundary in the upland. The most limiting factors for development would be the seasonal high-water table, which could result in rutting during construction, leaking for subgrade infrastructure, increased frost action, and the potential for corrosion of concrete and steel. These factors can be overcome by planning appropriate engineering techniques.

Appendix A (Figures) contains the Class B Soil Survey Maps (Figure 2: Page 1-3). The identified soil map units are depicted on the proposed project site plans at a scale of 1-inch equals 100 feet (1:1,200). Appendix B (Forms) includes test pit and auger boring data on the Soil Conditions Summary Table (Form E) and the test pit detailed information on the Soil Profile Classification/Information (Form F). Appendix C are the Soil Map Unit Descriptions. Appendix D are the MAPSS Soil Survey standards. Appendix E provides a Glossary of terms.

6.2 Class L Soil Survey

The Class L soil survey encompassed approximately 663 acres and was conducted for the proposed turbine array and new roads and for existing roads that require significant upgrades to be used for the Project. On-site soils identified were formed through multiple, active geologic process and described earlier in this report. The evidence suggests that glaciers advanced and receded multiple times creating multiple end moraines and resulted in a combination of dense glacial till and melt out till where debris carried by the glacier melted out in place and draped across the landscape. Associated glaciofluvial deposits observed were eskers and large outwash plains that formed when the sea level encroached landward from its current location and was within the Project boundary. This also resulted in the proximal marine sediments and large areas of lacustrine sediments and existing swamps and bogs with deep organic surface soil. Appendix A (Figures) contains the Class L Soil Survey Maps (Figure 3: Pages 1 – 39). The identified soil map units are depicted on the proposed project site plans at a scale of 1-inch equals 200 feet (1:2,400).

6.3 Class D Soil Survey: Proposed Tree Clearing Area

The Class D soil survey encompassed approximately 654 acres and was conducted for the proposed electrical collector lines. These figures depict the Class D soil survey boundary overlaid onto an aerial photograph and the NRCS Washington County Area published mapping data at a scale of 1-inch equals 400 feet (1:4,800). This was an Order 3 Soil Survey, completed at a scale of 1:24,000, with a published date of 2008, with the major fieldwork being completed by NRCS in 2001. The NRCS mapping is supplemented with on-site mapped wetlands. Soils identified were formed through multiple, active geologic process and described earlier in this report. Appendix A (Figures) contains the Class D Soil Survey Maps (Figure 4: Pages 1 – 23).

⁸ Wilkinson, D E. 2008. *Soil Survey of Washington County Area, Maine*. Natural Resources Conservation Service.



7.0 Conclusions and Survey Limitations

Results of this soil survey conclude that in some areas this site could require engineered designs to address the limiting factors for a proposed wind power generating facility. However, with proper planning, engineering, and construction techniques, the soils are appropriate for the proposed Project and are not significantly dissimilar from limitations at other successfully developed wind power projects constructed in Maine. The most limiting factors at this site are surface and subsurface stoniness and boulders, steep slopes, and high-water tables and lateral surface flow in some non-wetland areas.

Development in or disturbance of the wetlands should be avoided and minimized, if possible, because it typically requires additional local, state, and federal oversight and permitting. The soil drainage in poorly and somewhat poorly drained soil can also be a concern for construction and long-term project use, such as rutting, freeze/thaw cycles, and other issues associated with a high-water table. Steep slopes increase the likelihood for soil erosion in areas of soil disturbance. Increasing the impervious area can increase stormwater surface flow quantity and velocity. Engineering techniques to control stormwater flow and runoff during construction will be important to minimize the potential for impacts to downslope resources. Long-term engineering controls that can be utilized include vegetated buffers and structures that do not constrict surface and subsurface flow.

The scope of this investigation was conducted in accordance with the Class B, L, and D soil survey standards and guidelines established by MAPSS. The conclusions and recommendations presented in this soil report are based on data obtained from on-site investigation and supplemental USDA NRCS soil maps and information. This soil report and associated soil figures were prepared for exclusive use by Apex Clean Energy for specific application to their proposed construction of the Downeast Wind Project.



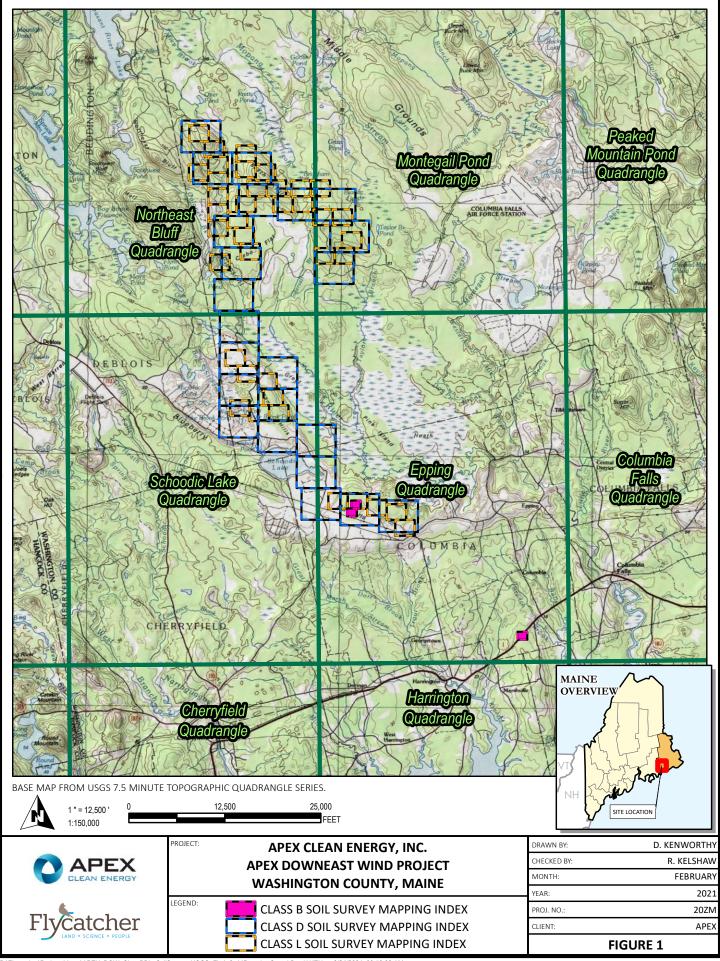
APPENDIX A. Figures

Figure 1. Study Area Location Map

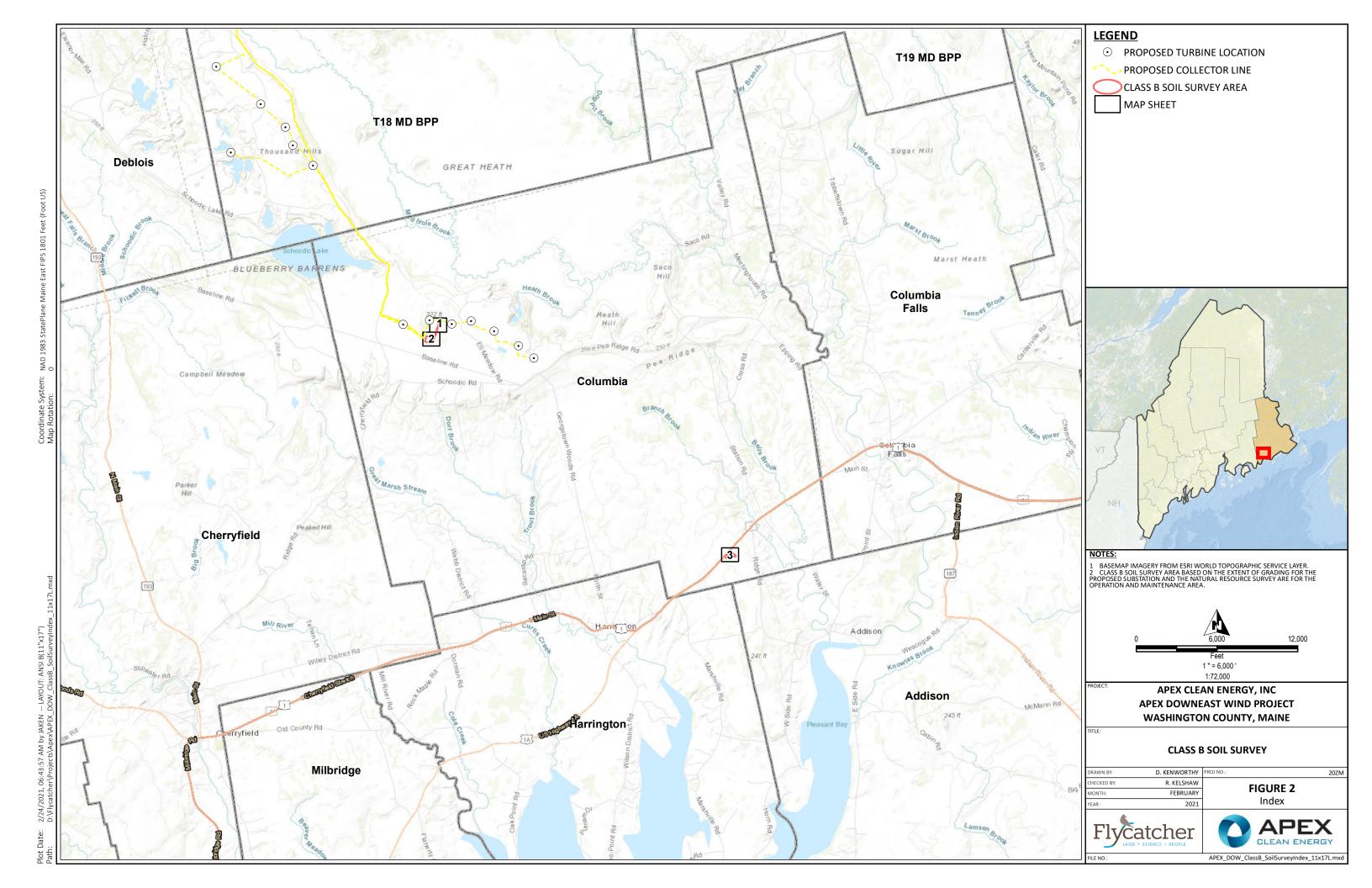
Figure 2. Class B High Intensity Soil Survey Map

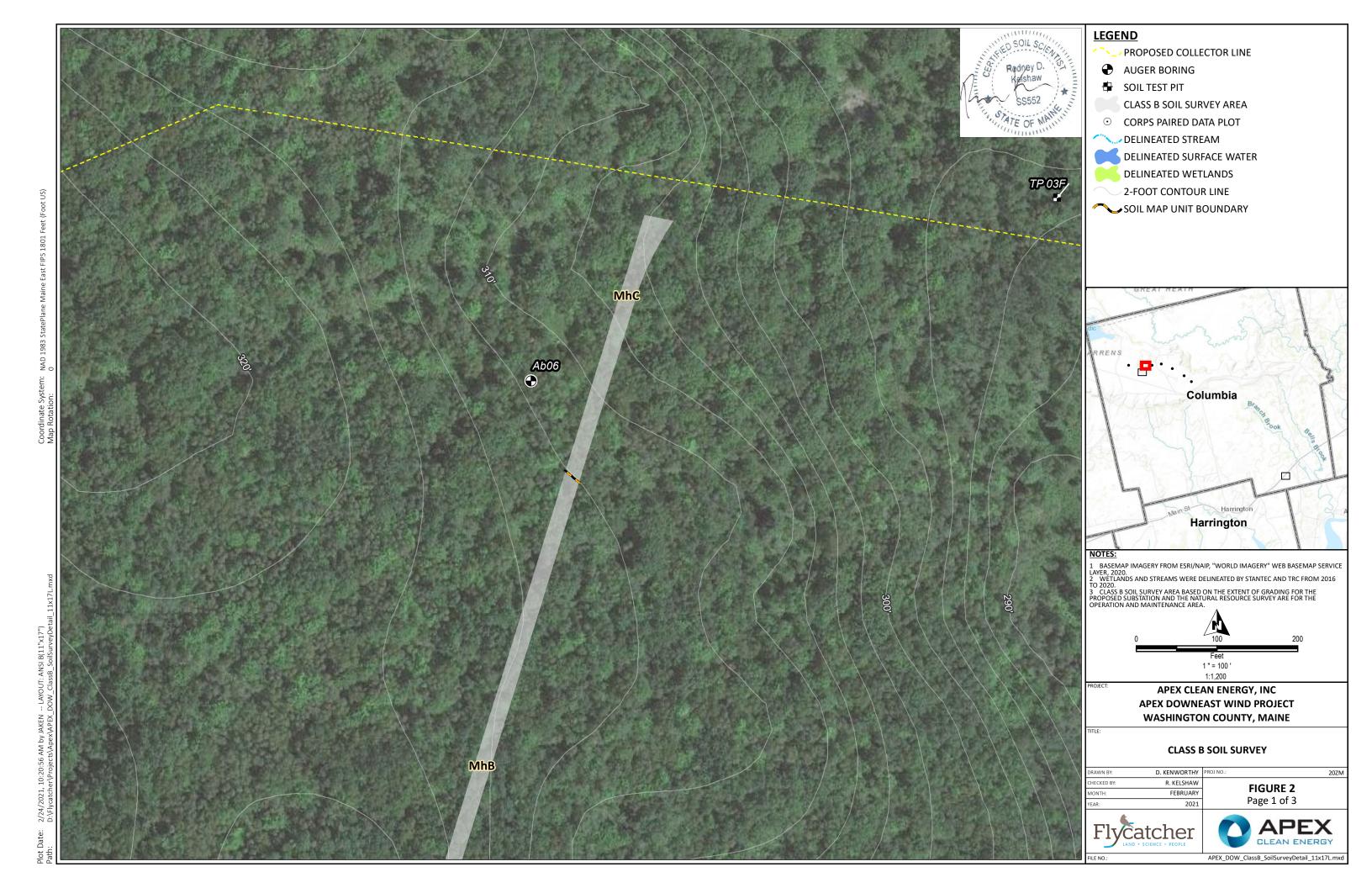
Figure 3. Class D Medium Intensity Soil Survey Map

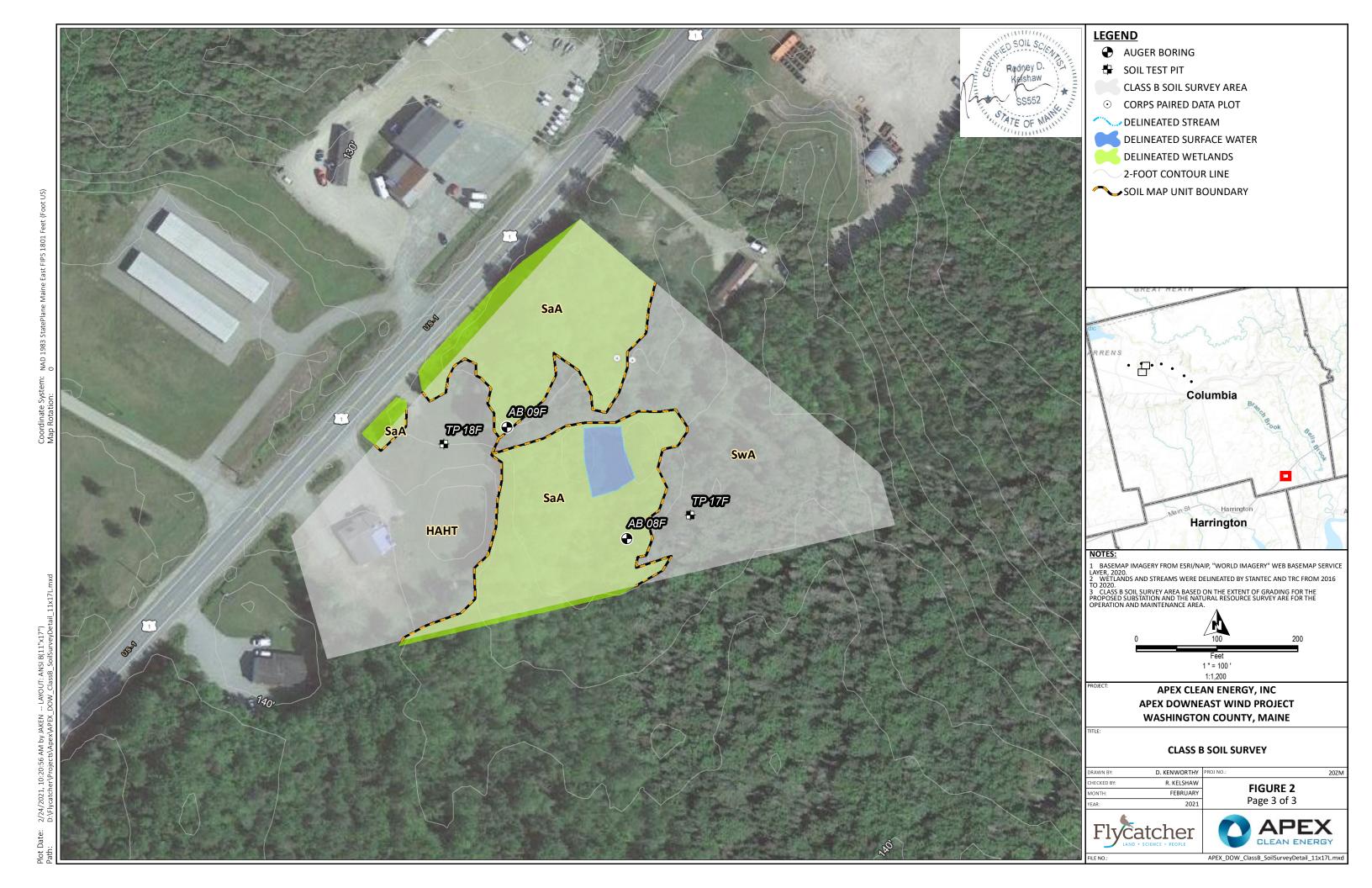




CLASS B SOIL SURVEY MAP LEGEND				
Map Unit Symbol	Map Unit Name	Hydrologic Soil Group (HSG)		
MhB	Monadnock-Hermon complex, very bouldery surface, 8-15% slopes	A/B		
MhC	Monadnock-Hermon complex, very bouldery surface, 15-35% slopes	A/B		
HAHT	Human Altered Human Transported Materials	D		
SaA	Scantic silt loam, 0-3% slopes	D		
SwA	Swanton sandy loam over silt loam, 0-3% slopes	D		

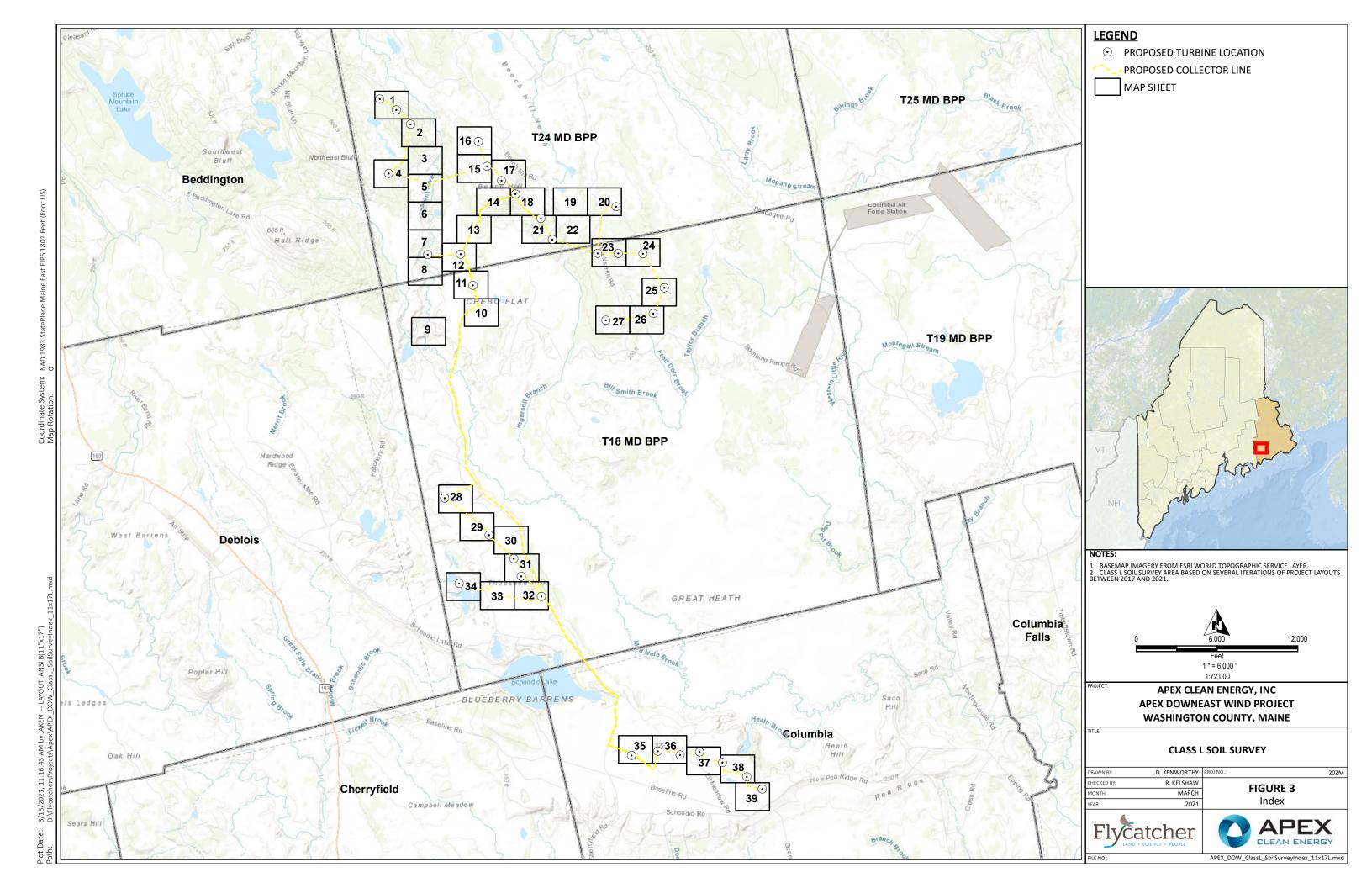




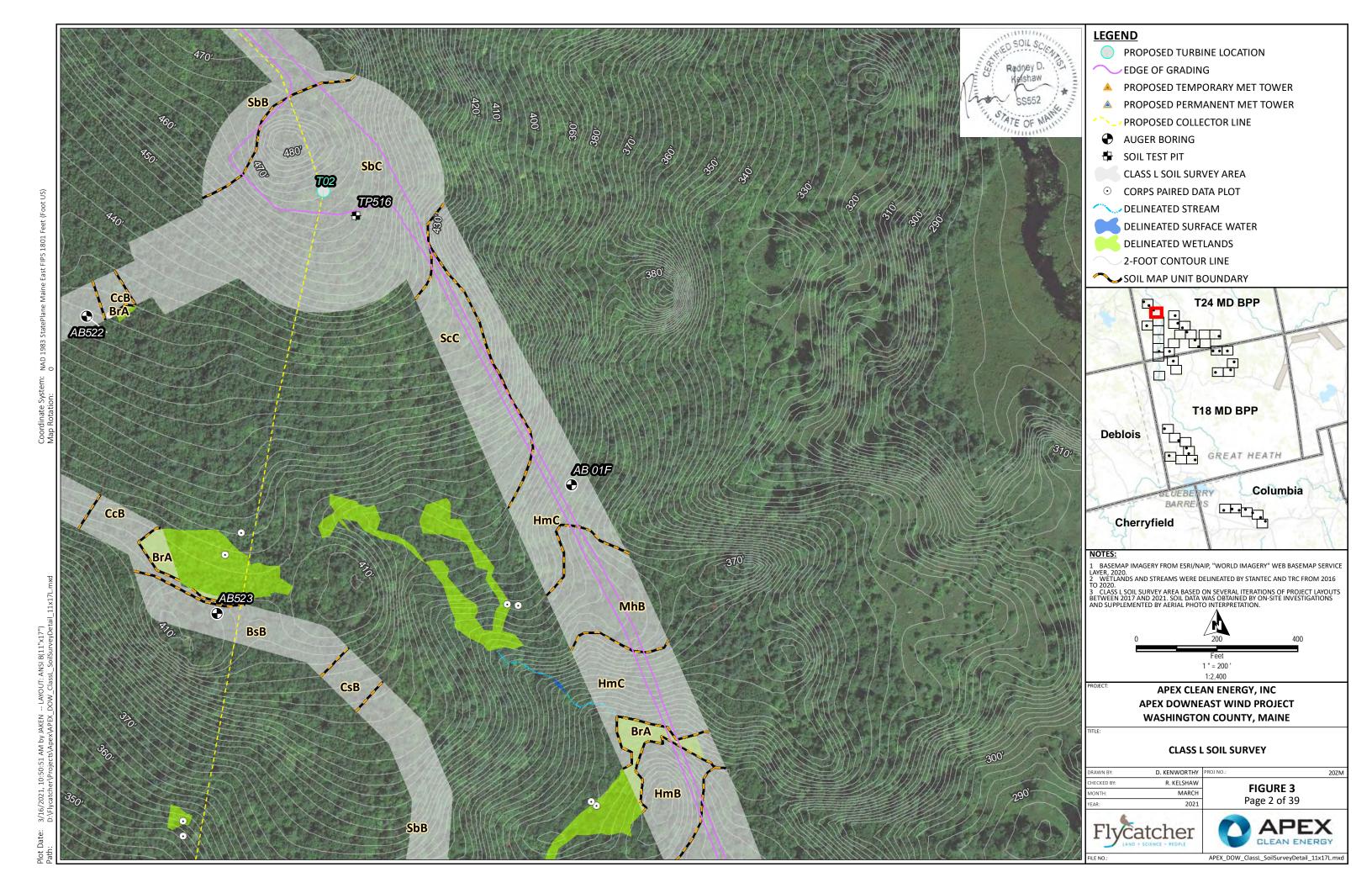


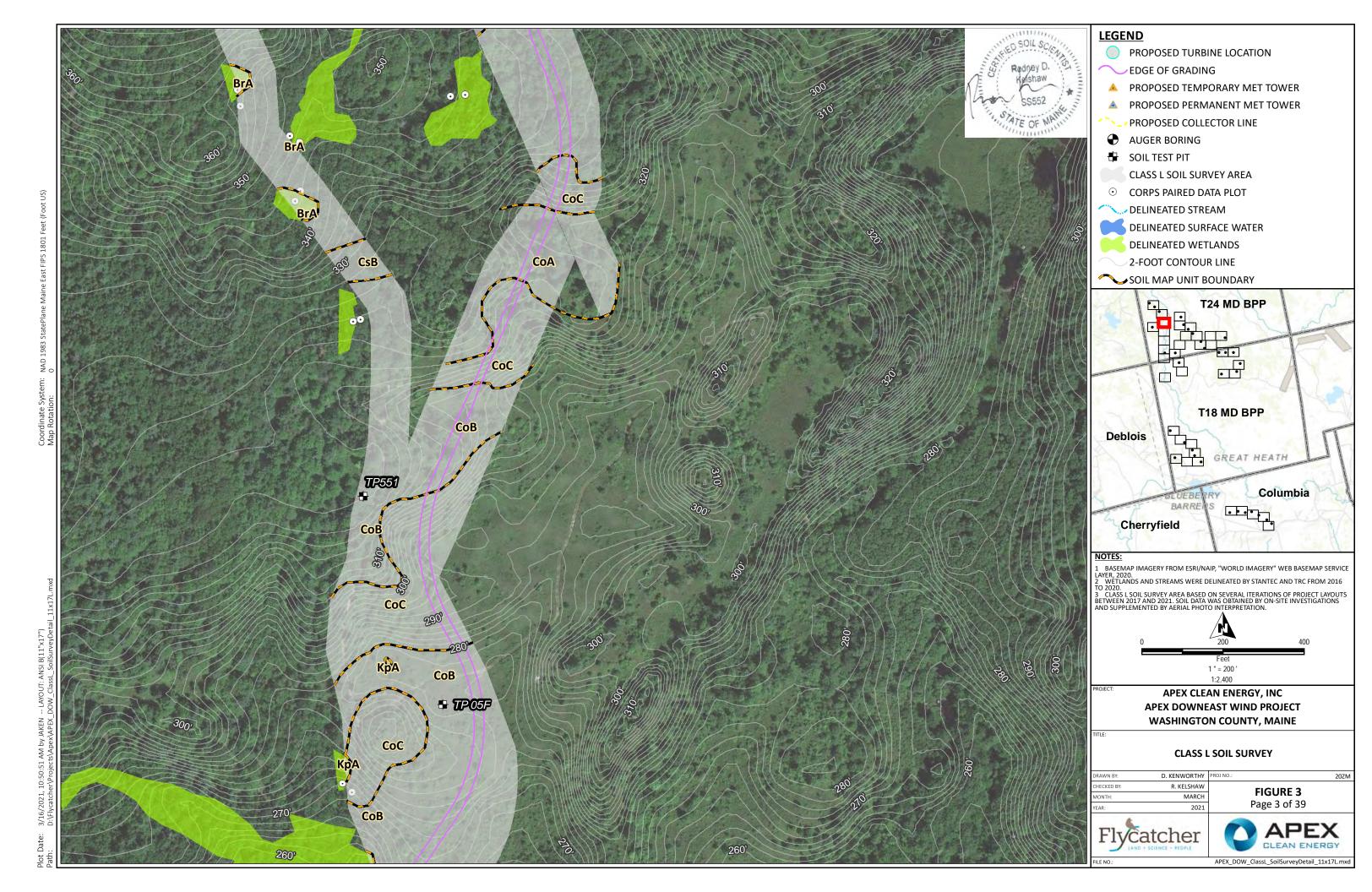
CLASS L SOIL SURVEY MAP LEGEND

Map Unit Symbol	Map Unit Name	Hydrologic Soil Group (HSG)
AdA	Adams loamy sand, 0-8% slopes	Α
AdC	Adams loamy sand, 15-35% slopes	Α
BrA	Brayton sandy loam, 0-8% slopes	D
BsB	Becket-Skerry complex, 8-15% slopes	C/D
BsC	Becket-Skerry complex, 15-35% slopes	C/D
CcA	Colonel stony sandy loam, 0-8% slopes	D
CcB	Colonel stony sandy loam, 8-15% slopes	D
CoA	Colton gravelly loamy sand, 0-8% slopes	Α
CoB	Colton gravelly loamy sand, 8-15% slopes	Α
CoC	Colton gravelly loamy sand, 15-35% slopes	Α
CoD	Colton gravelly loamy sand, >35% slopes	Α
CrA	Croghan fine sandy loam, 0-8% slopes	Α
CsB	Colonel-Skerry association, 8-15% slopes	D
CsC	Colonel-Skerry association, 15-35% slopes	D
HmB	Hermon-Monadnock complex, very bouldery, 8-15% slopes	A/B
HmC	Hermon-Monadnock complex, very bouldery, 15-35% slopes	A/B
HmD	Hermon-Monadnock complex, very bouldery, >35% slopes	A/B
КрА	Kinsman sand, poorly drained, 0-8% slopes	D
КрВ	Kinsman sand, poorly drained, 8-15% slopes	D
KsA	Kinsman sand, somewhat poorly drained, 0-8% slopes	D
KsB	Kinsman sand, somewhat poorly drained, 8-15% slopes	D
MaA	Masardis sandy loam, 0-8% slopes	Α
MaC	Masardis sandy loam, 15-35% slopes	Α
MaD	Masardis sandy loam, >35% slopes	Α
MhA	Monadnock-Hermon complex, very bouldery surface, 8-15% slopes	A/B
MhB	Monadnock-Hermon complex, very bouldery surface, 0-8% slopes	A/B
MhC	Monadnock-Hermon complex, very bouldery surface, 15-35% slopes	A/B
MhD	Monadnock-Hermon complex, very bouldery surface, >35% slopes	A/B
SbB	Skerry-Becket complex, 8-15% slopes	C/D
SbC	Skerry-Becket complex, 15-35% slopes	C/D
ScA	Skerry-Colonel association, 0-8% slopes	D
ScB	Skerry-Colonel association, 8-15% slopes	D
ScC	Skerry-Colonel association, 15-35% slopes	D
ScD	Skerry-Colonel association, >35% slopes	D
SeA	Searsport mucky sand, 0-8% slopes	D
ShC	Skerry-Hermon-Monadnock complex, very bouldery surface, 15-35% slopes	A/B to C/D
WoA	Wonsqueak muck, 0-8% slopes	D









PROPOSED TURBINE LOCATION

→ EDGE OF GRADING

PROPOSED TEMPORARY MET TOWER

PROPOSED PERMANENT MET TOWER

PROPOSED COLLECTOR LINE

CLASS L SOIL SURVEY AREA

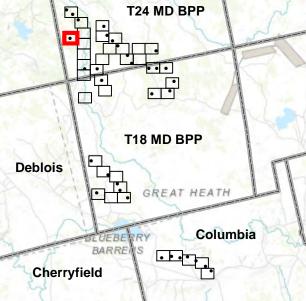
⊙ CORPS PAIRED DATA PLOT

DELINEATED STREAM

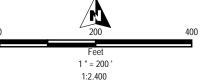
DELINEATED SURFACE WATER

DELINEATED WETLANDS

SOIL MAP UNIT BOUNDARY



- BASEMAP IMAGERY FROM ESRI/NAIP, "WORLD IMAGERY" WEB BASEMAP SERVICE LAYER, 2020. 2 WETLANDS AND STREAMS WERE DELINEATED BY STANTEC AND TRC FROM 2016
- 2 WEI LANDS AIM STREAMS WERE DELINEATED BY STAINTED AND THE PROMI 2016 TO 2020.
 3 CLASS L SOIL SURVEY AREA BASED ON SEVERAL ITERATIONS OF PROJECT LAYOUTS BETWEEN 2017 AND 2021. SOIL DATA WAS OBTAINED BY ON-SITE INVESTIGATIONS AND SUPPLEMENTED BY AERIAL PHOTO INTERPRETATION.



APEX CLEAN ENERGY, INC APEX DOWNEAST WIND PROJECT WASHINGTON COUNTY, MAINE

CLASS L SOIL SURVEY

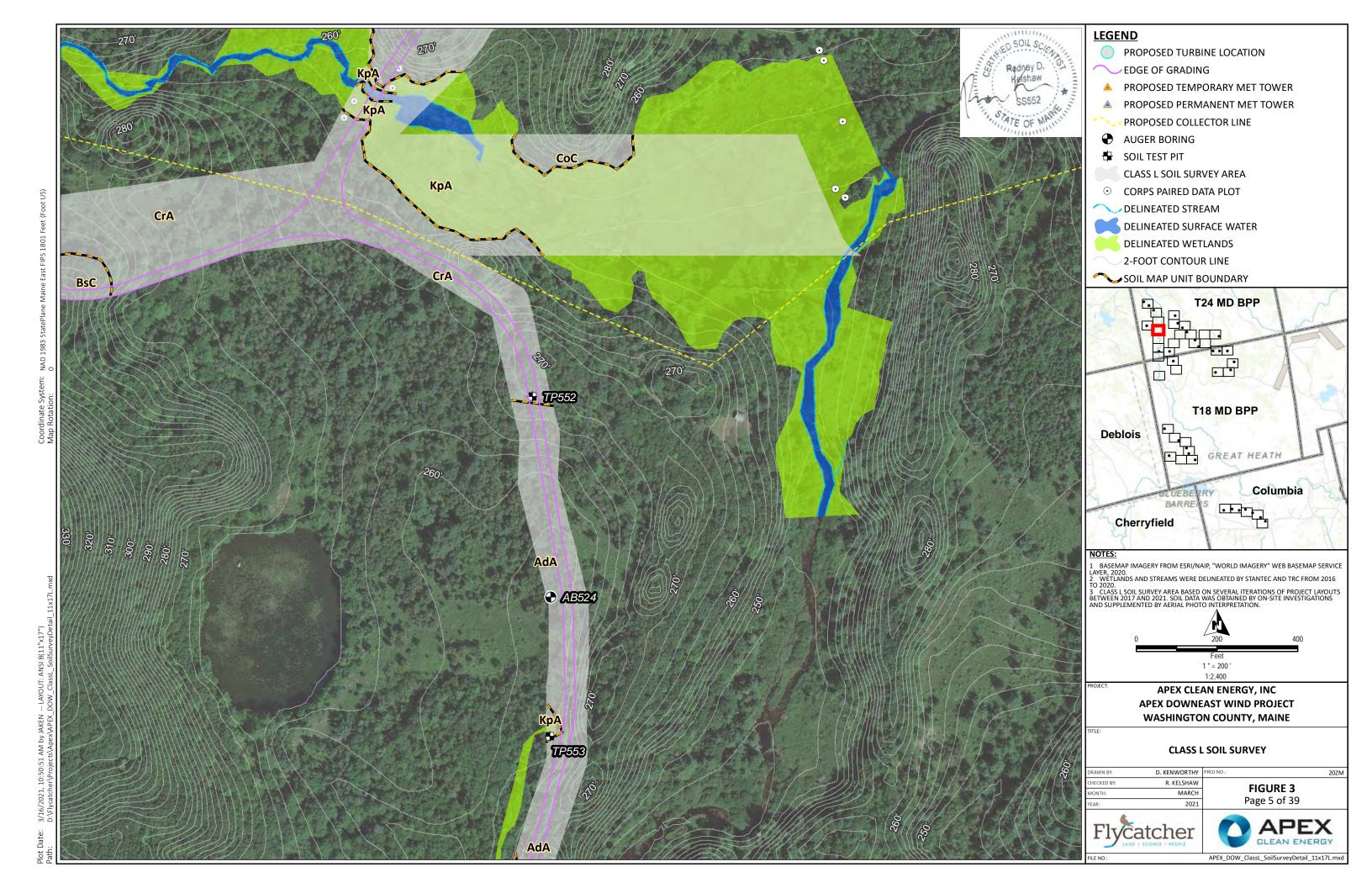
	ш			
<	DRAWN BY:	D. KENWORTHY	PROJ	
		CHECKED BY:	R. KELSHAW	
		MONTH:	MARCH	
		YEAR:	2021	

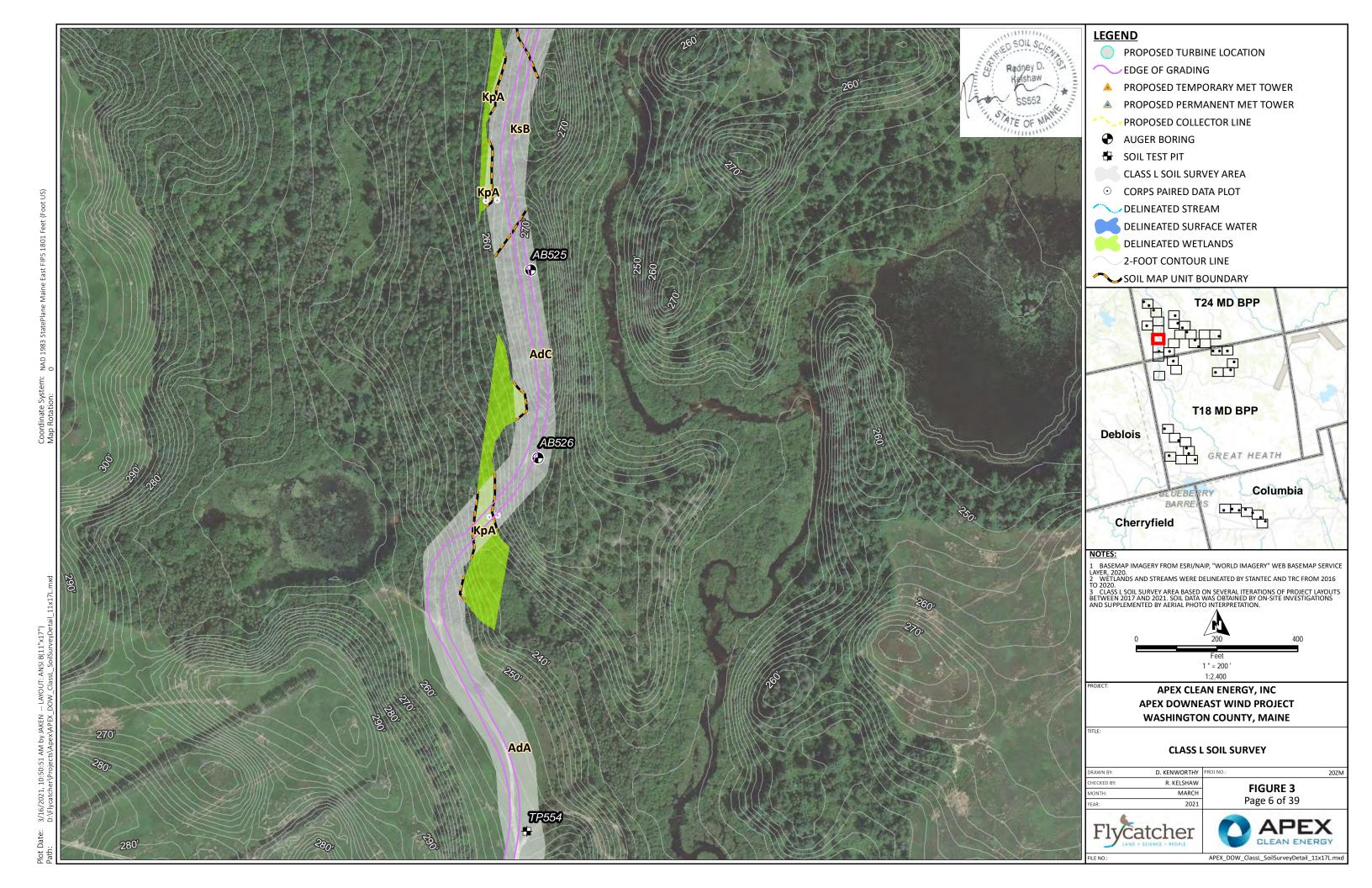
FIGURE 3 Page 4 of 39

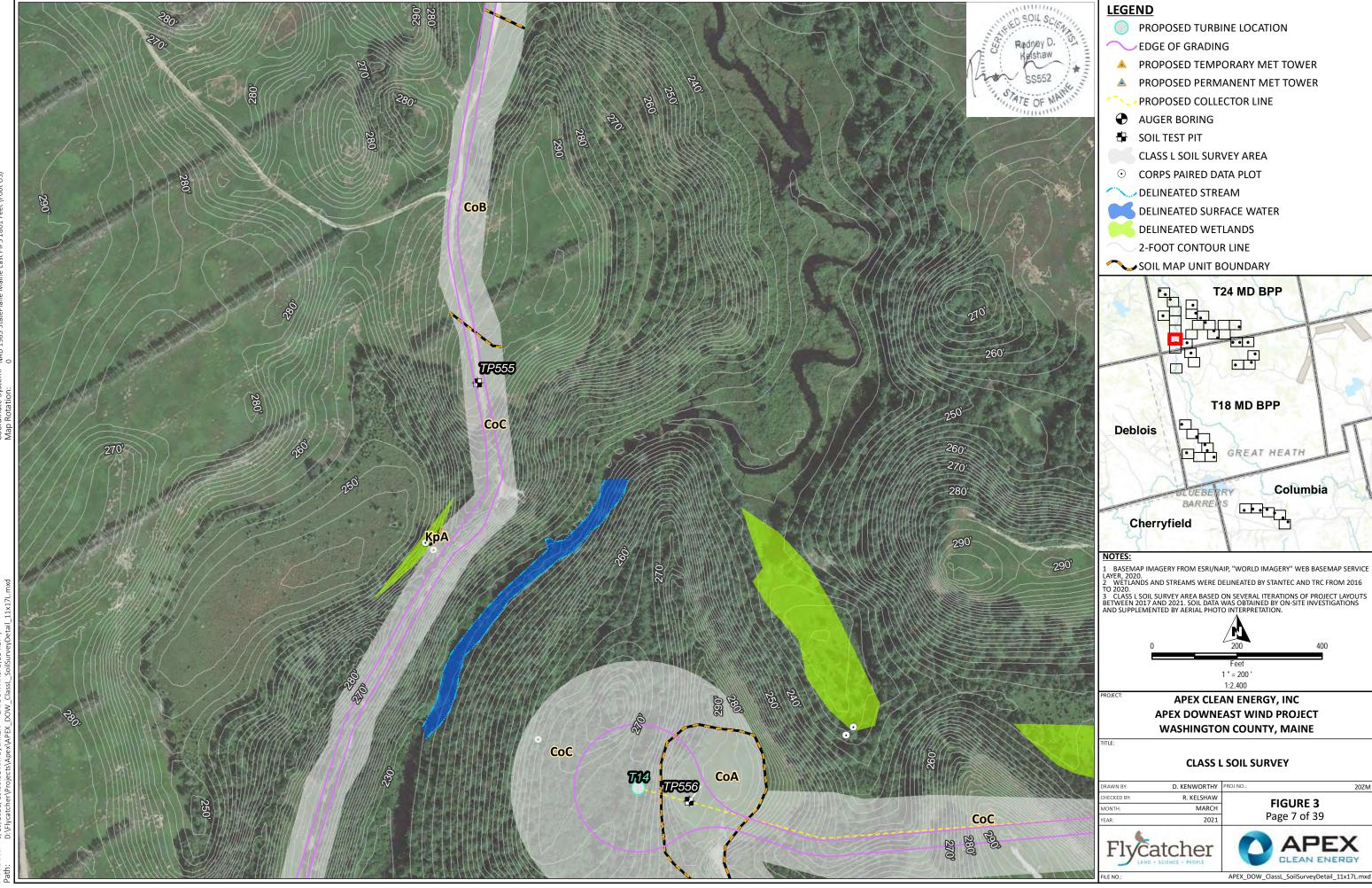




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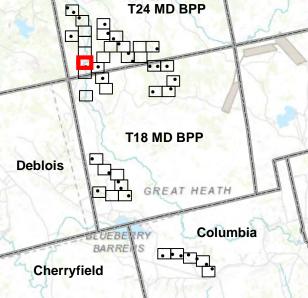


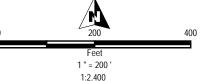




PROPOSED TEMPORARY MET TOWER

PROPOSED PERMANENT MET TOWER



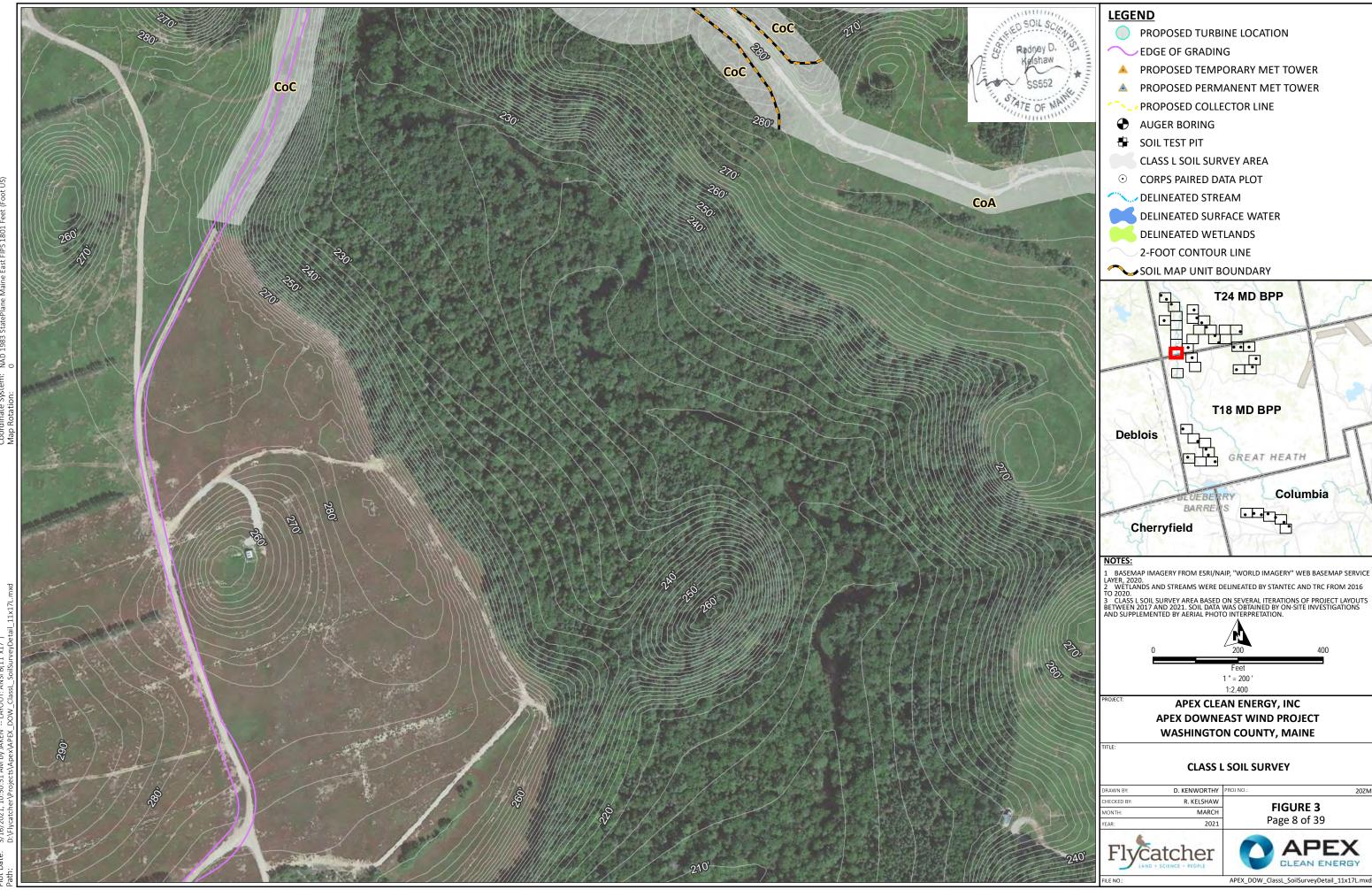


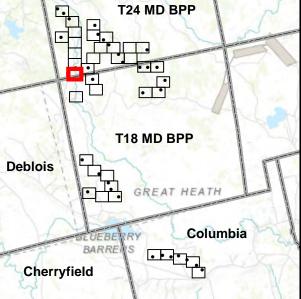
APEX CLEAN ENERGY, INC **APEX DOWNEAST WIND PROJECT**

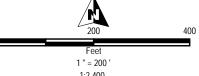
-	lake Survey	A DEV
YEAR:	2021	Page 7 of 39
MONTH:	MARCH	
CHECKED BY:	R. KELSHAW	FIGURE 3
DRAWN BY:	D. KENWORTHY	PROJ NO.: 20ZM



APEX_DOW_ClassL_SoilSurveyDetail_11x17L.mxd



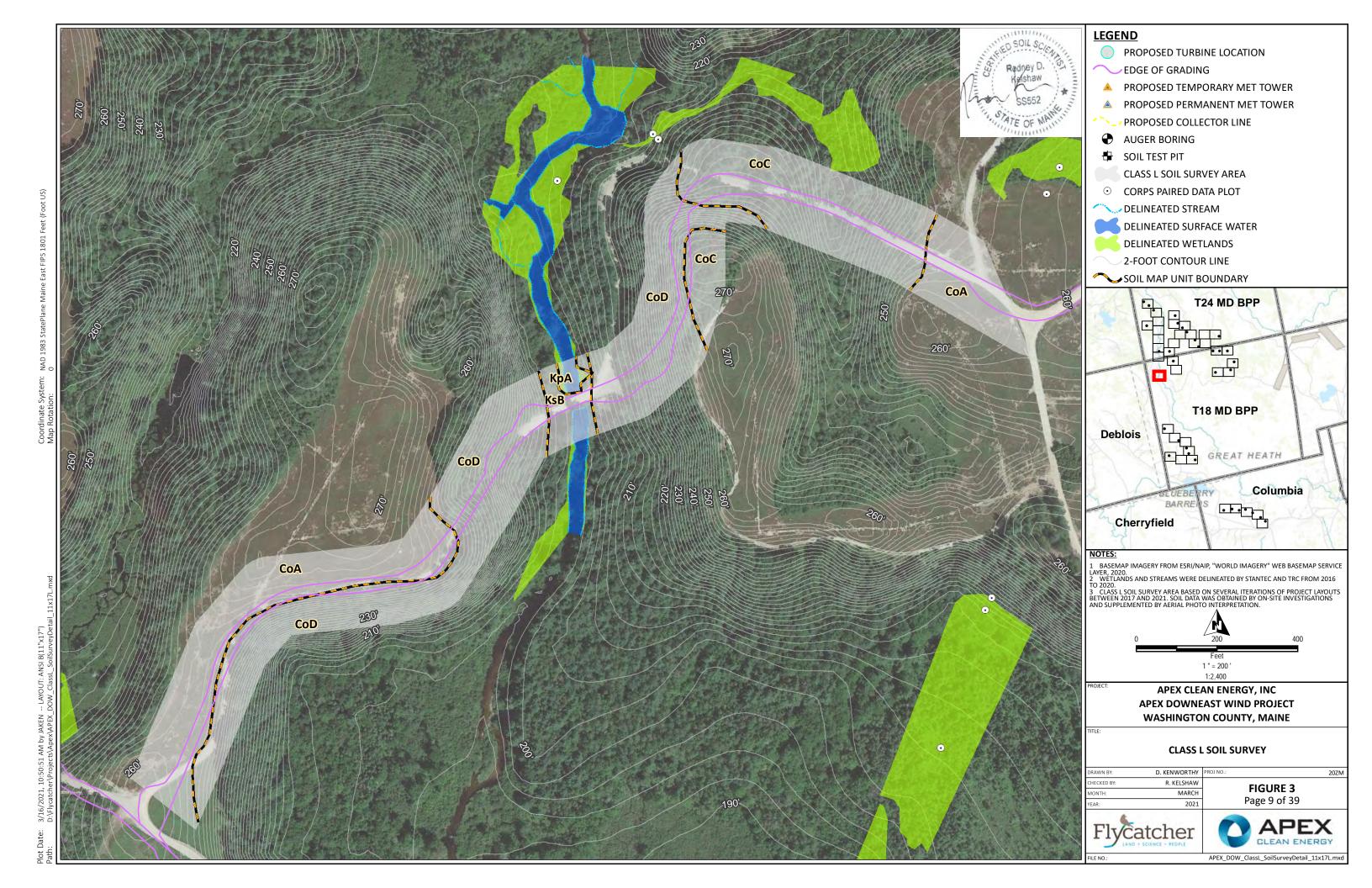


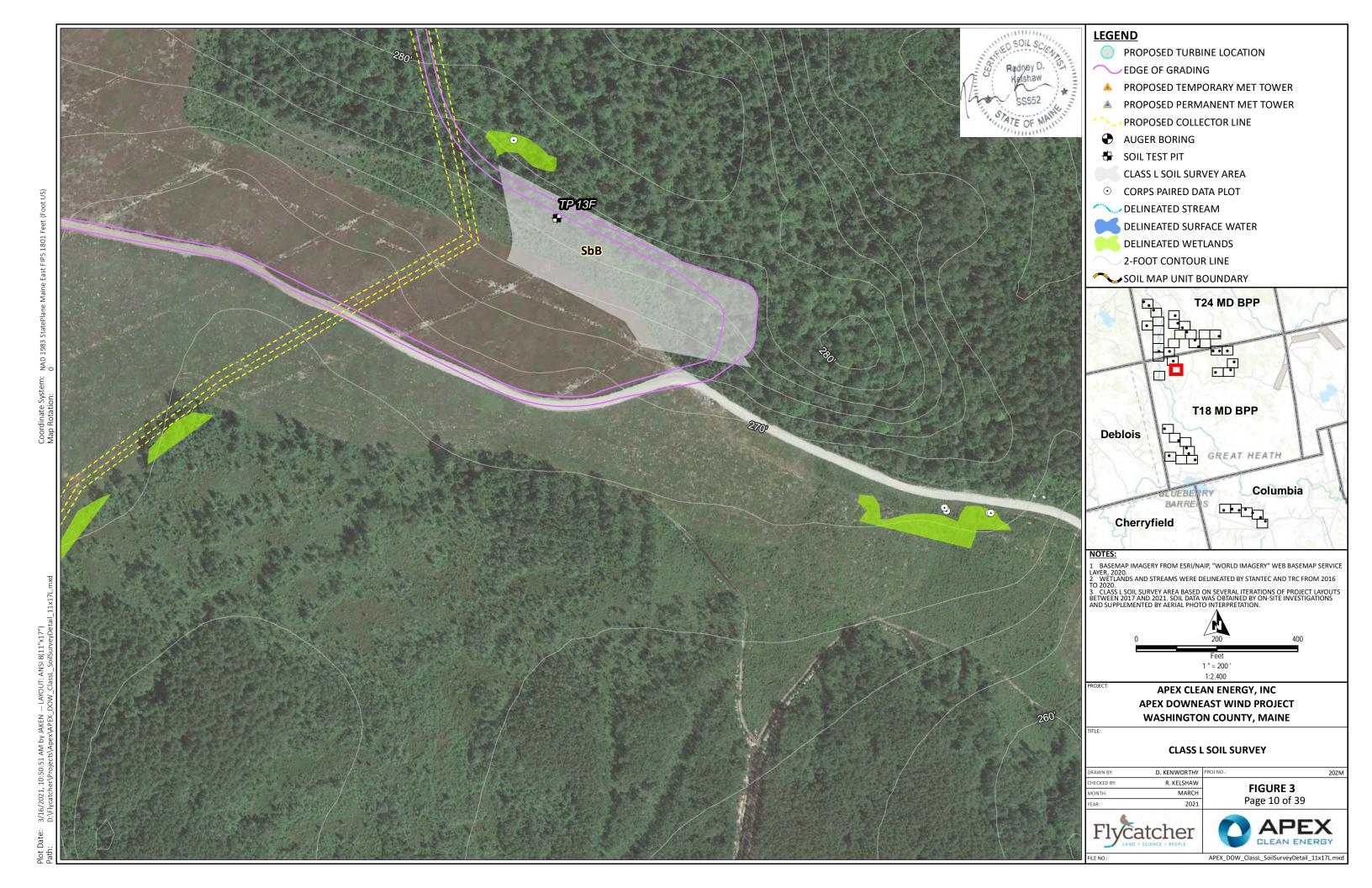


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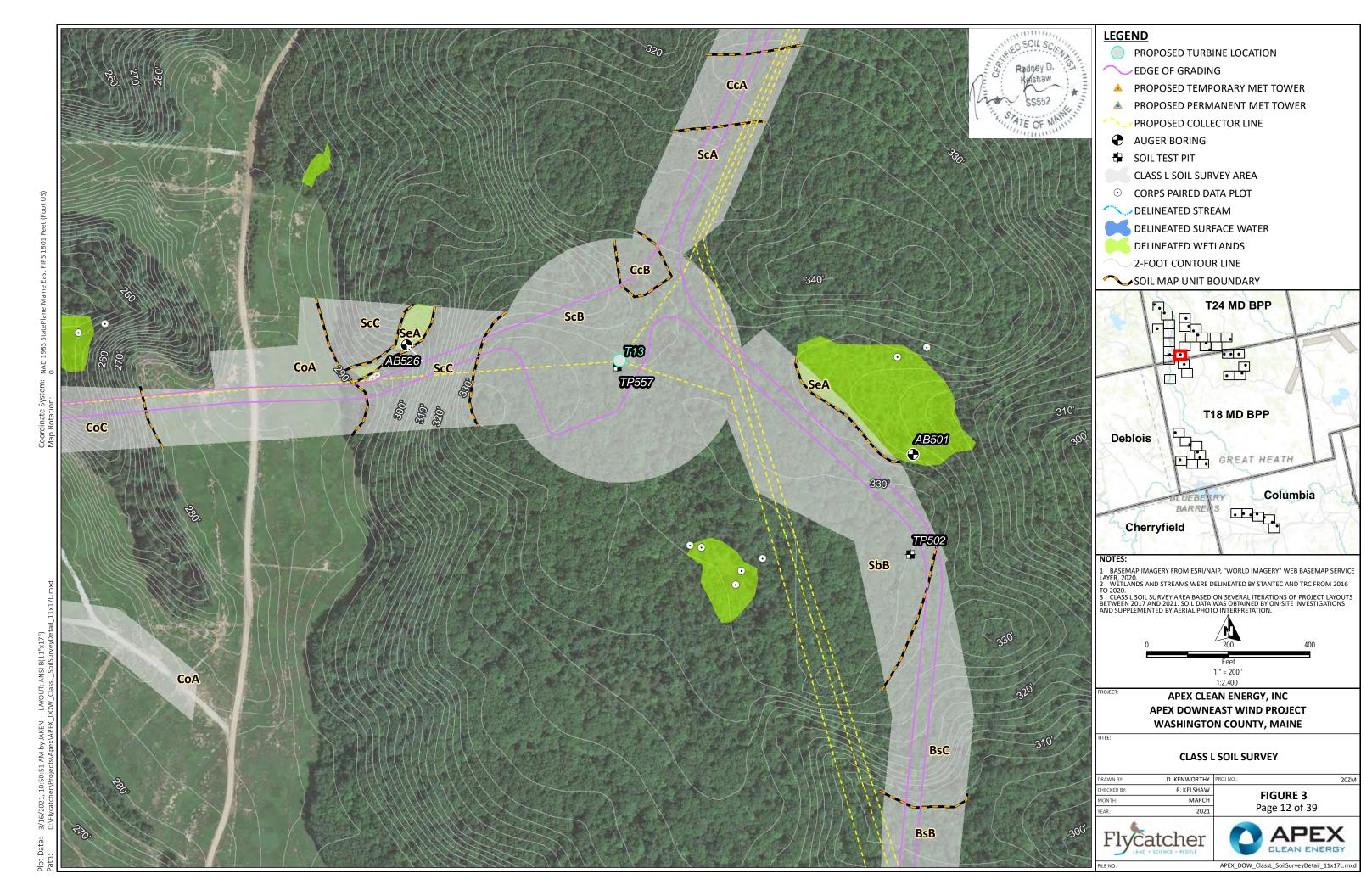


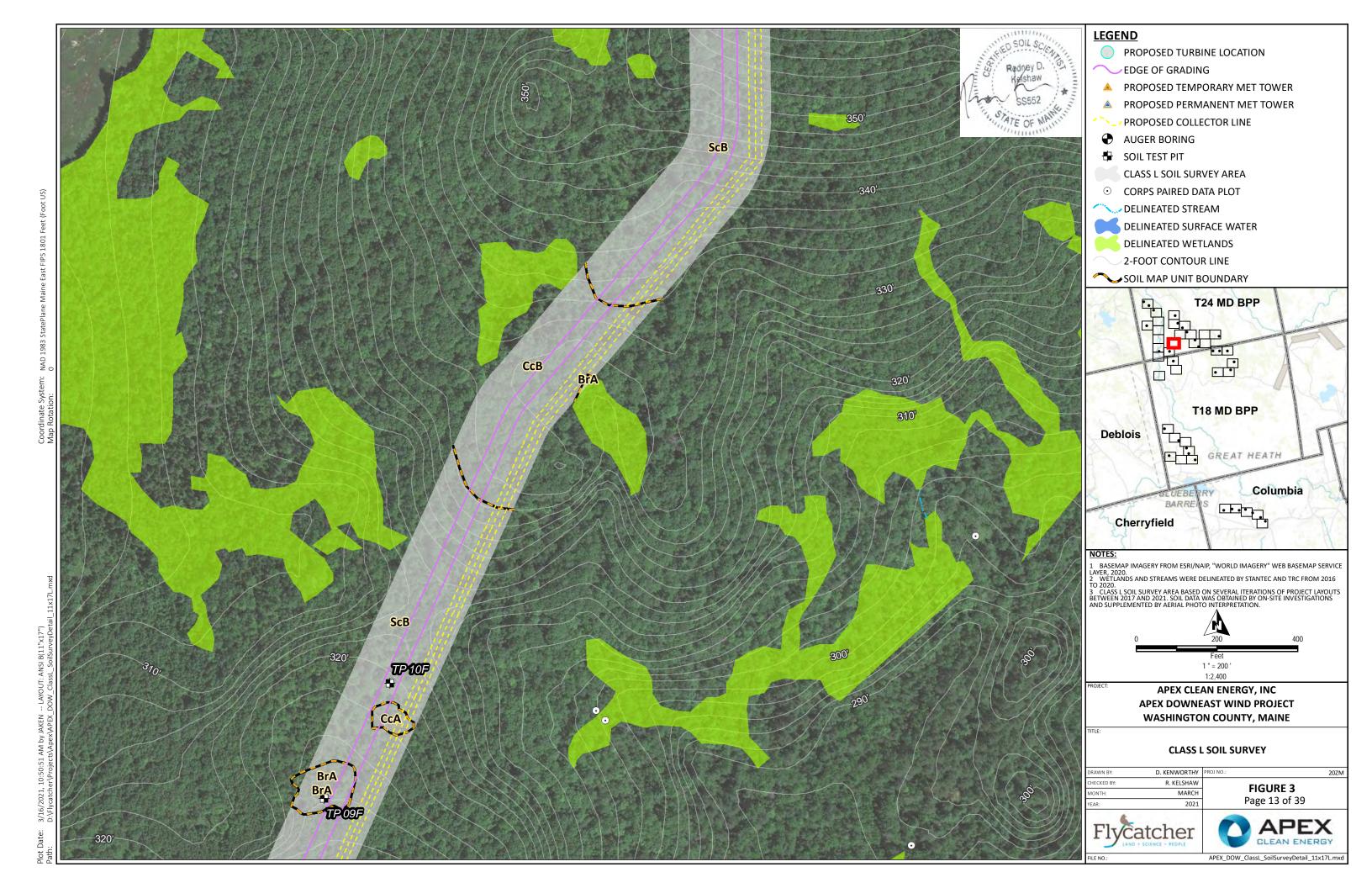
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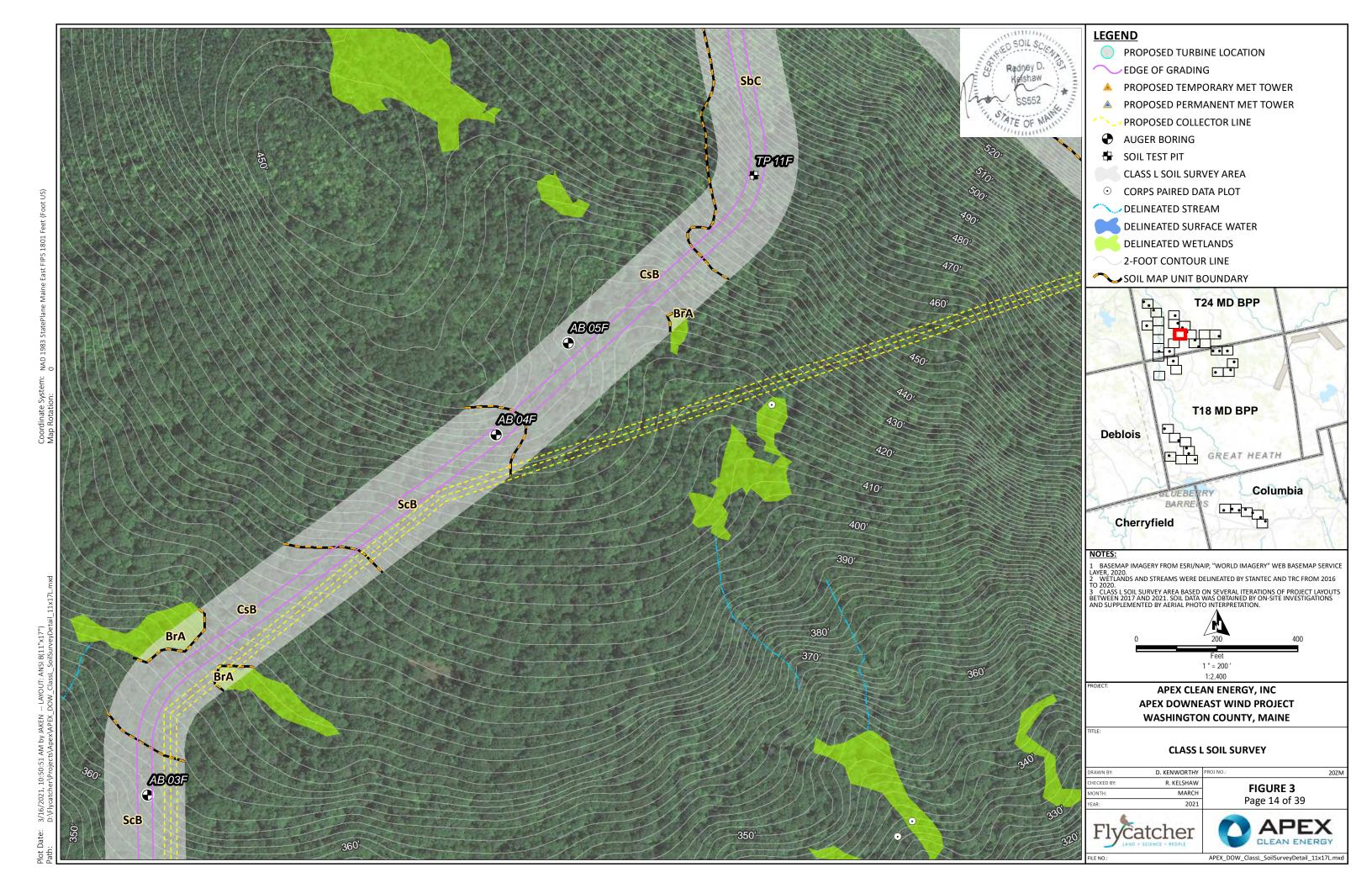




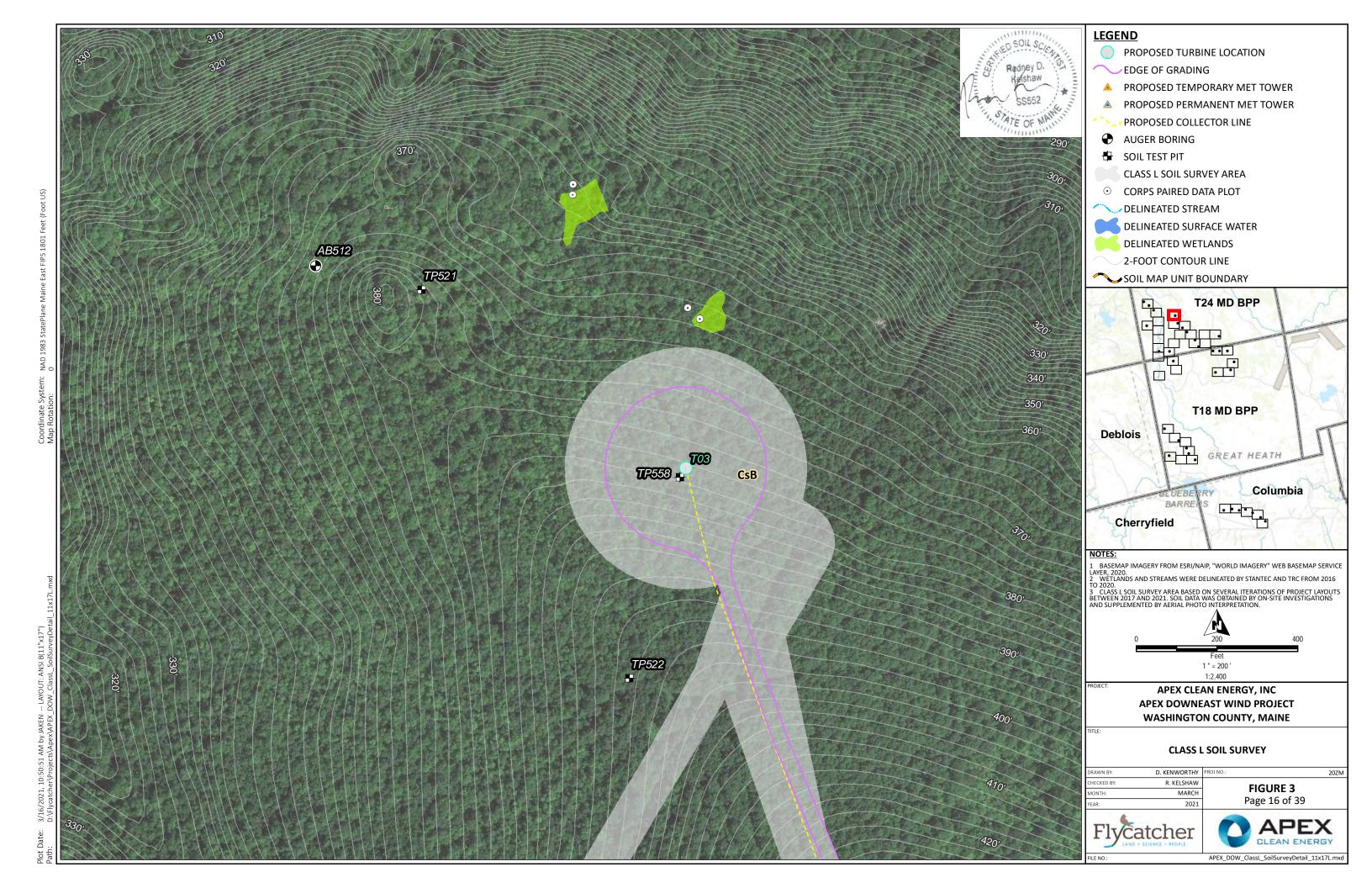






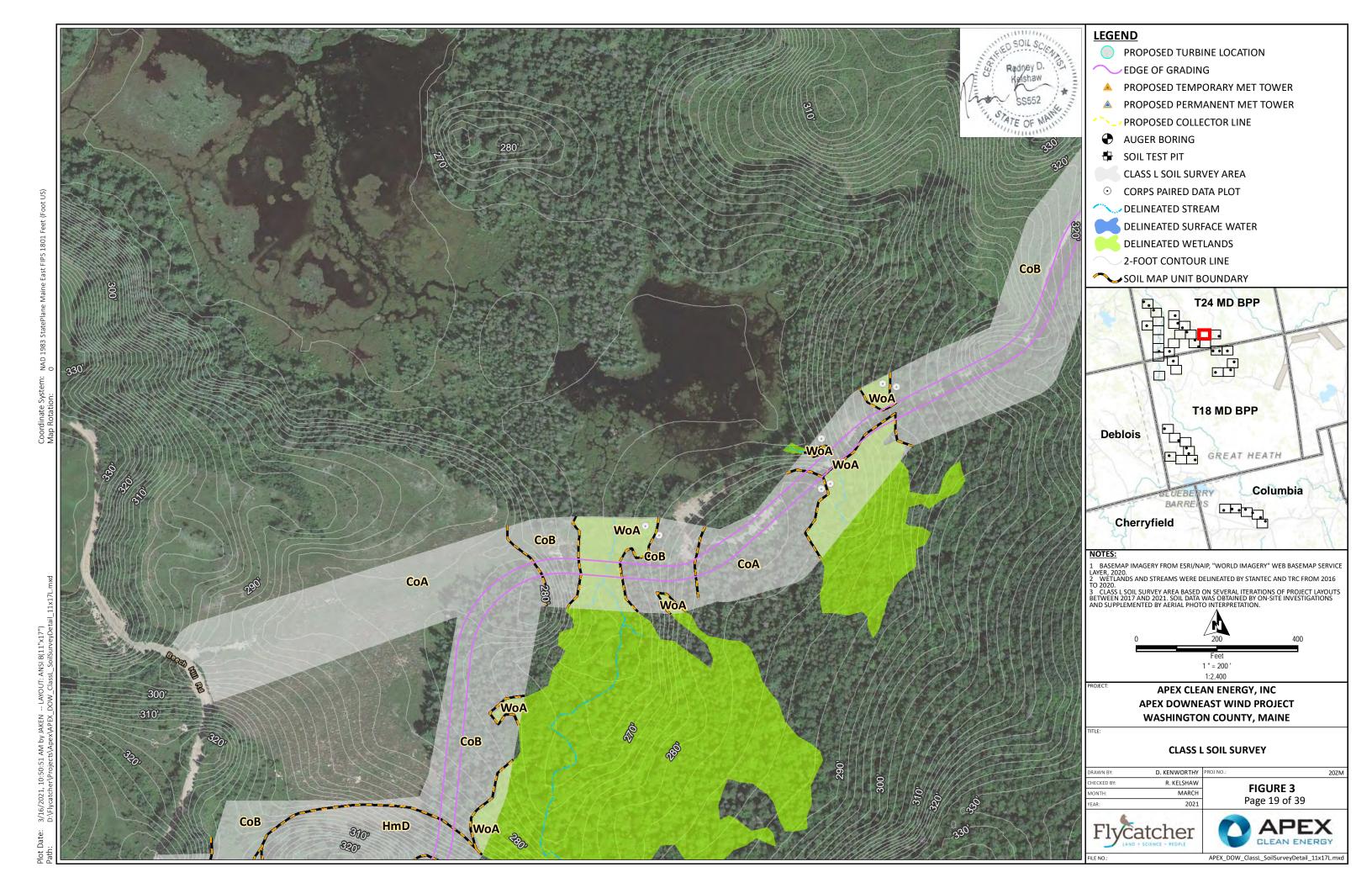


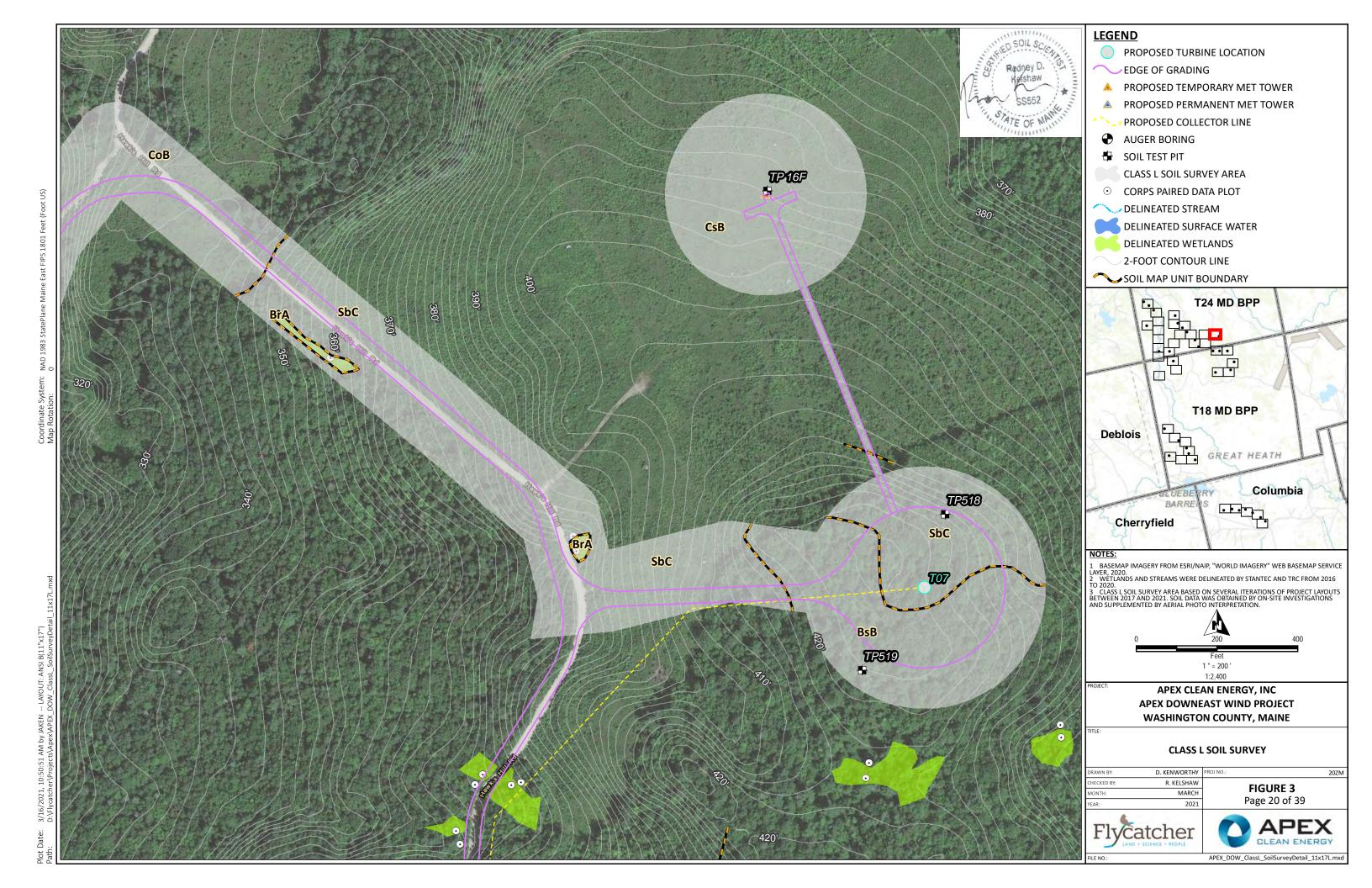


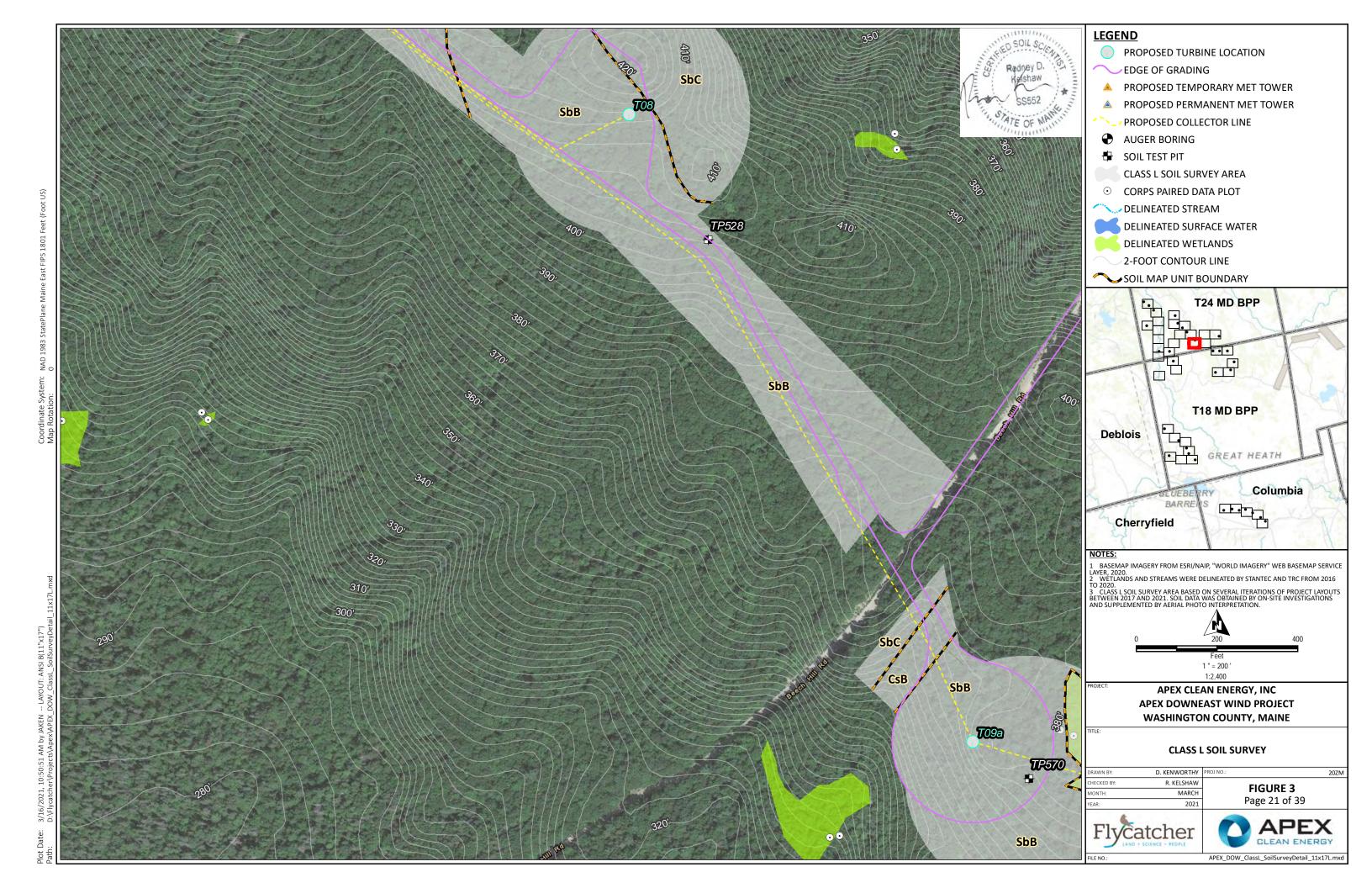


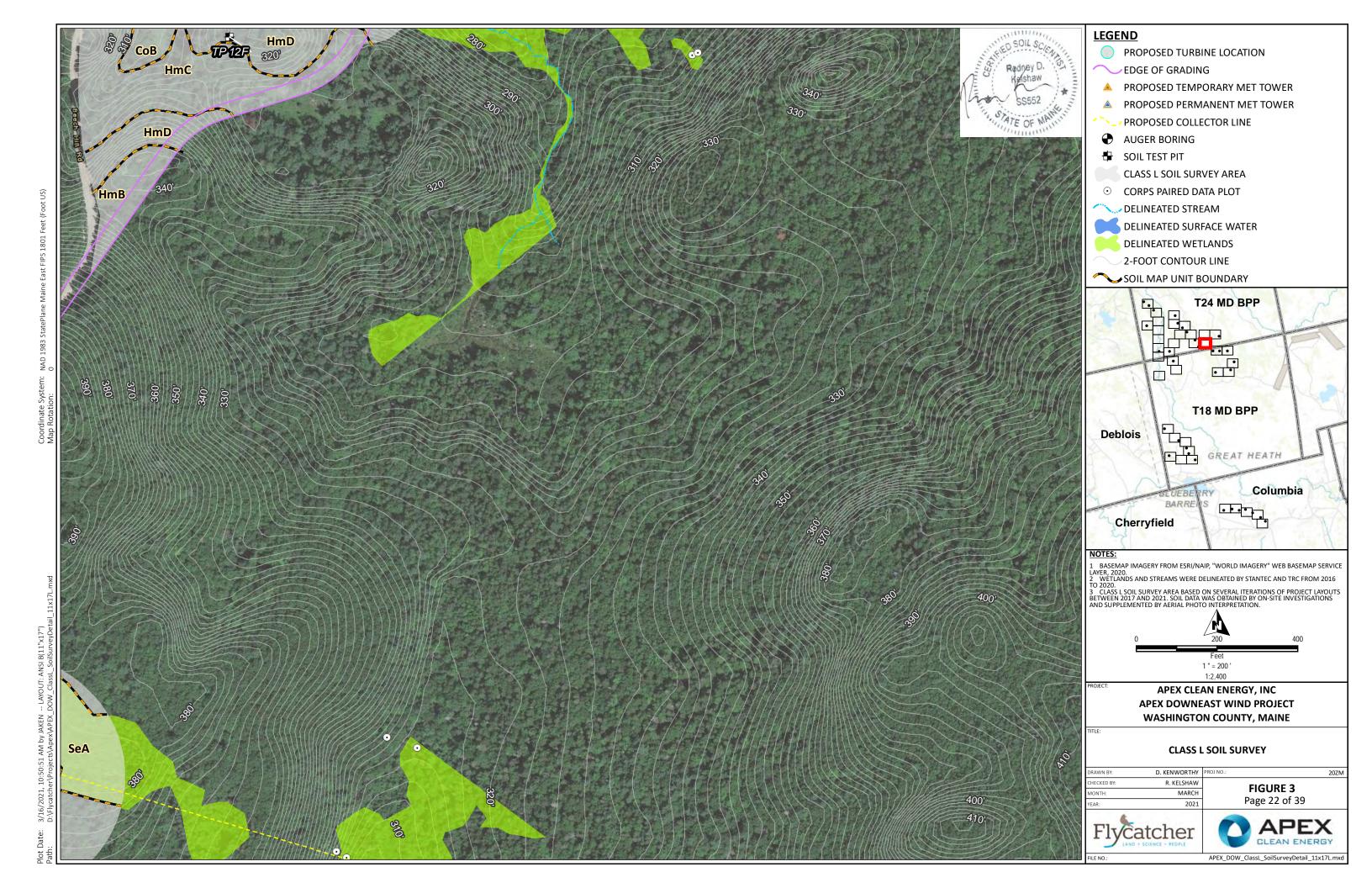


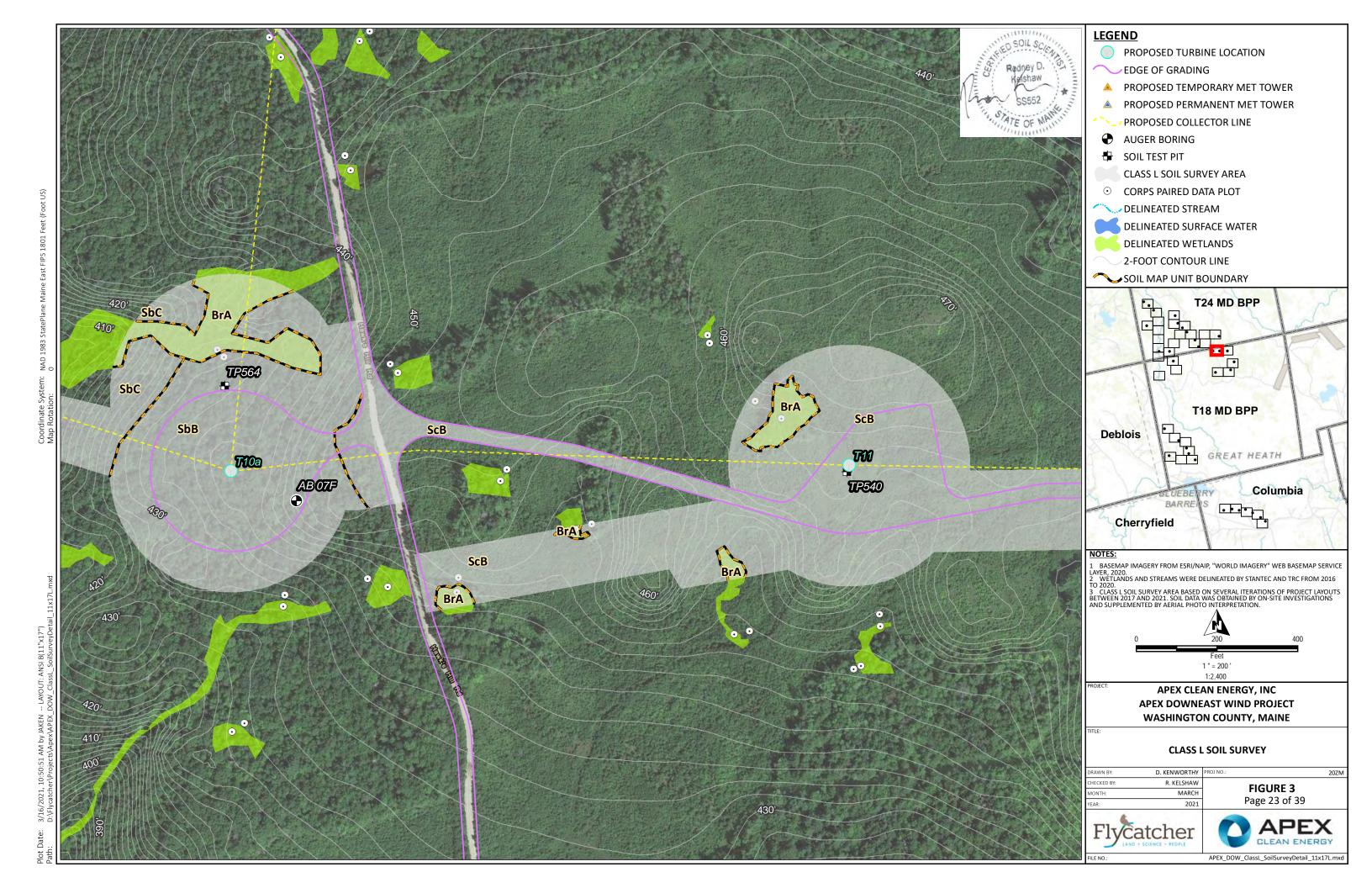




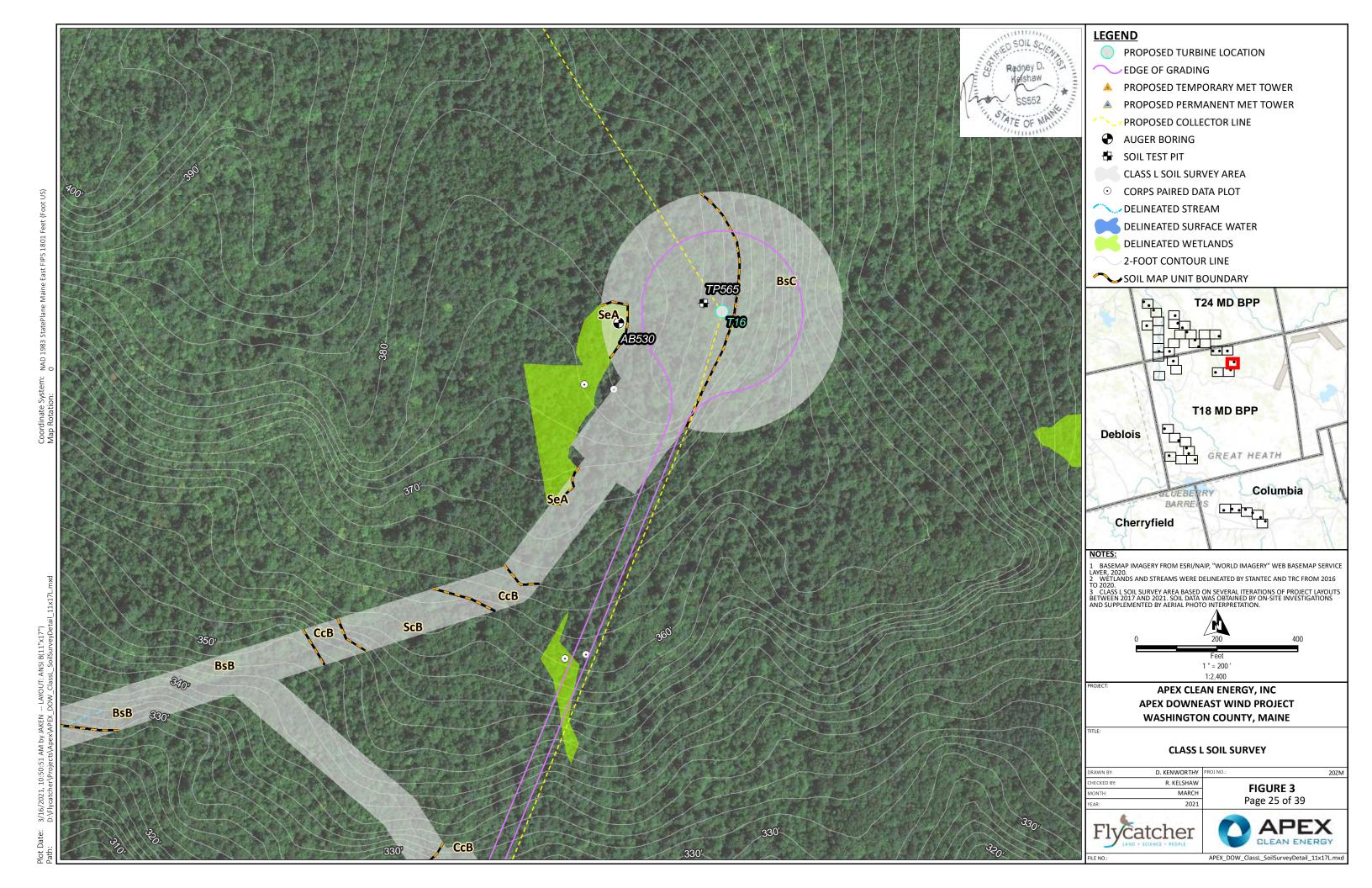


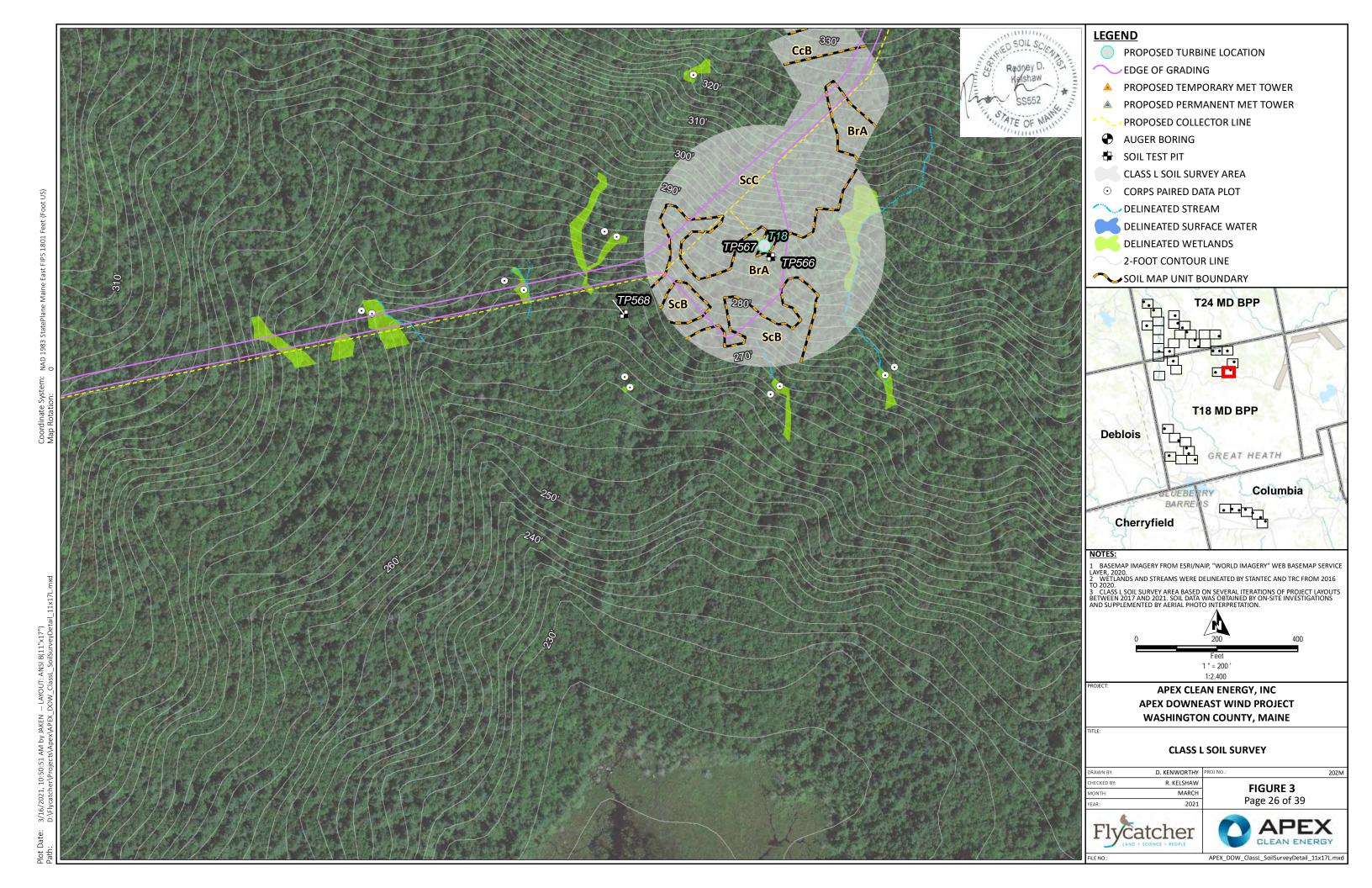


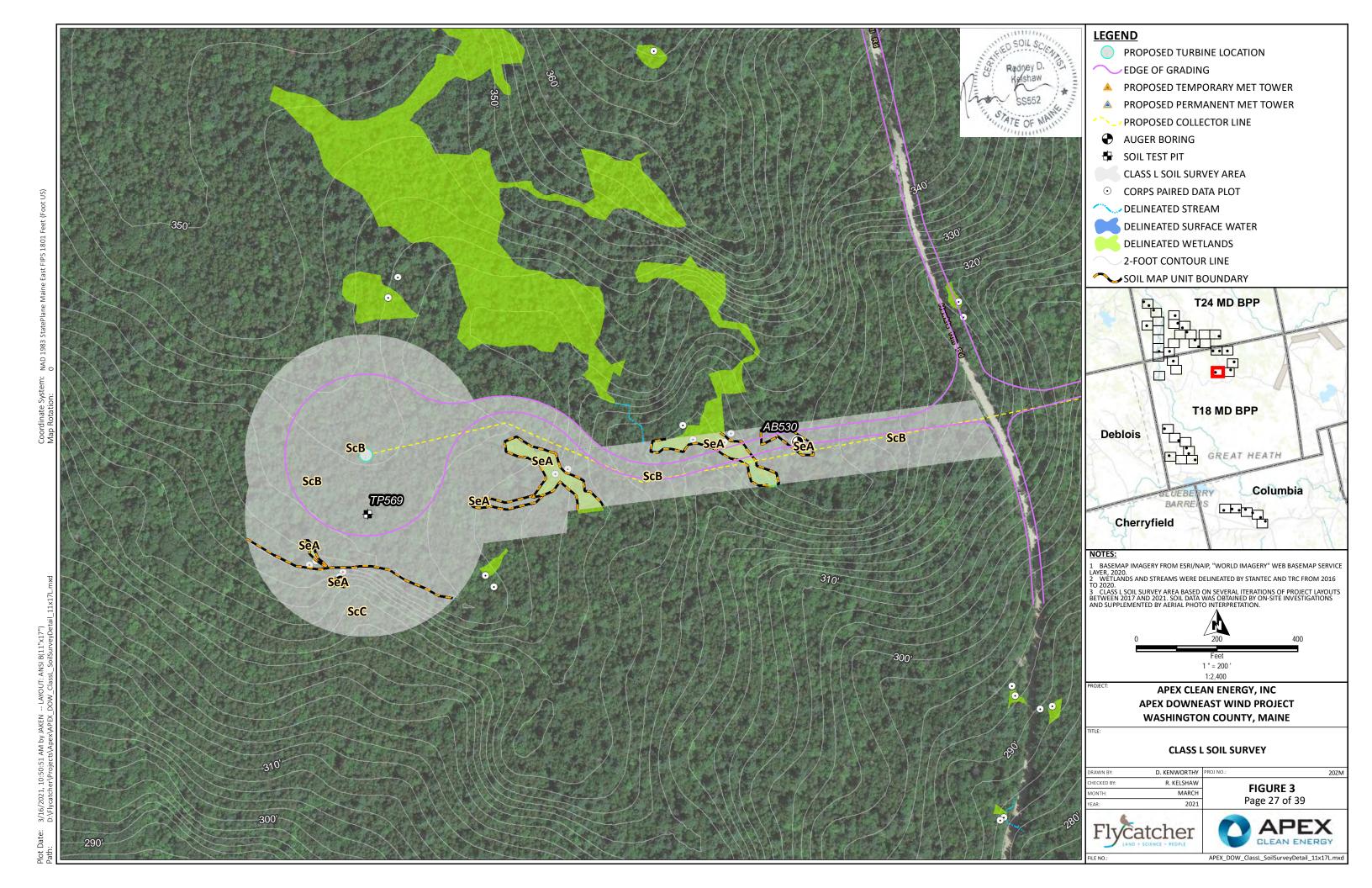


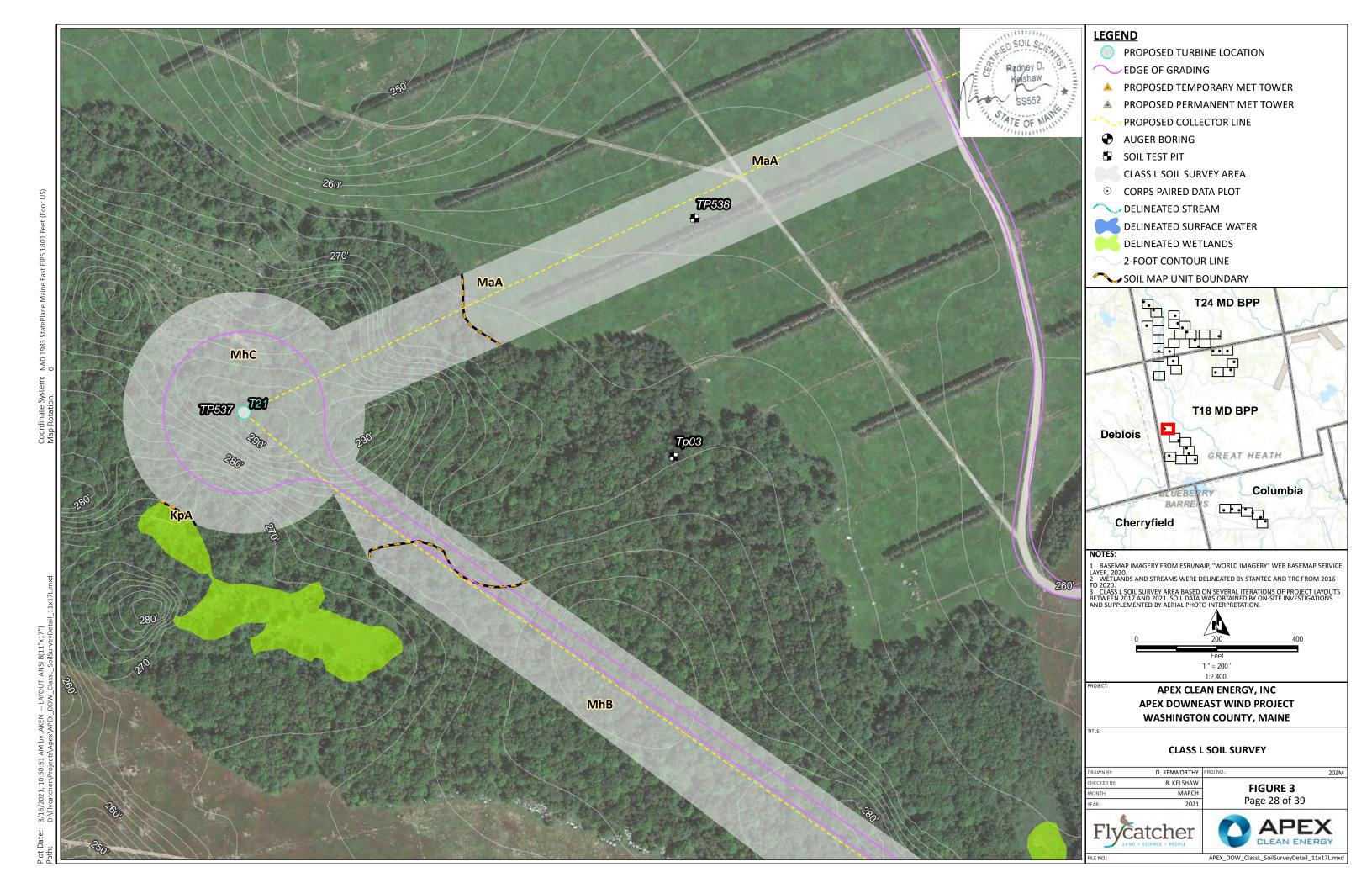


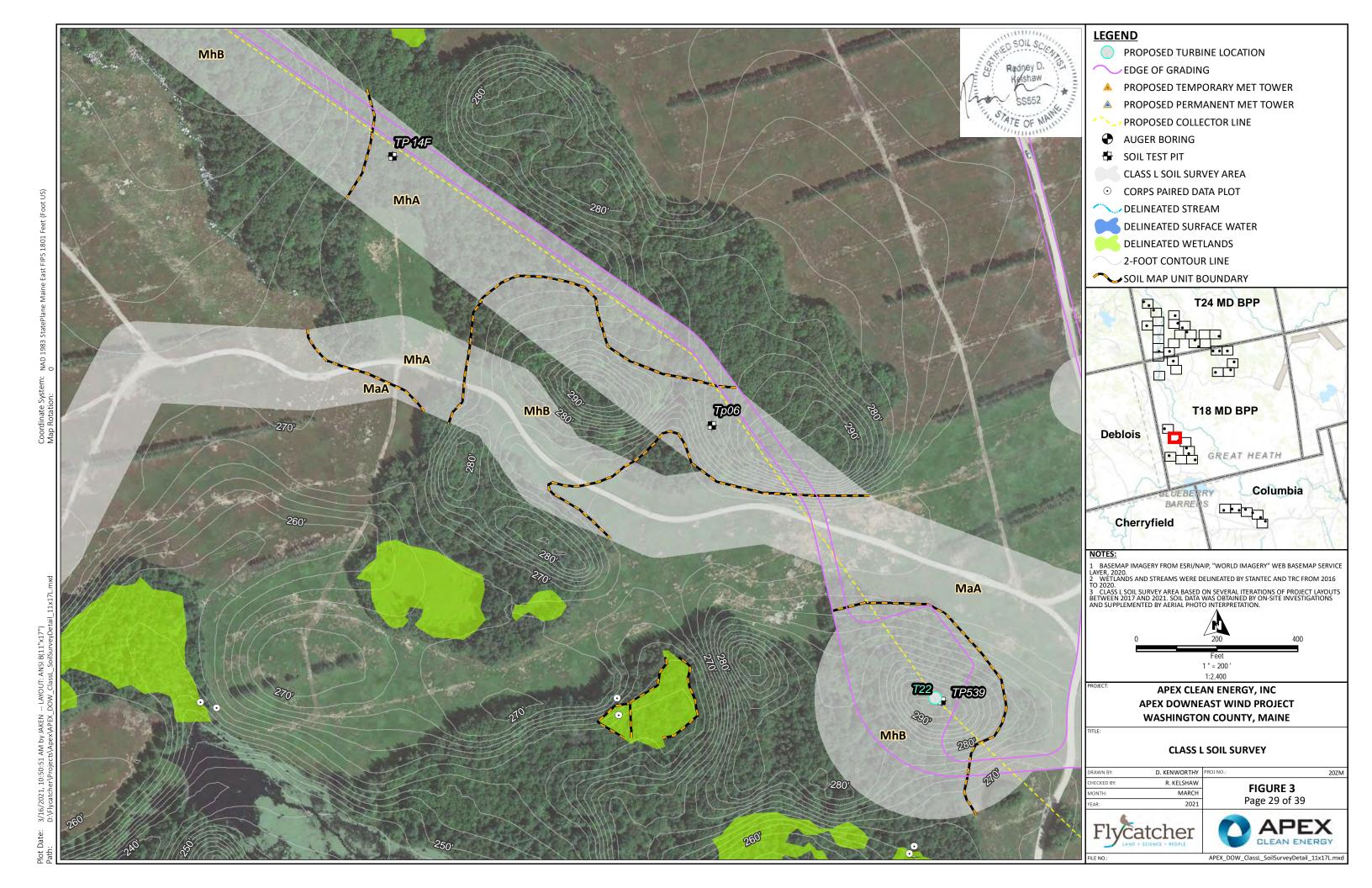


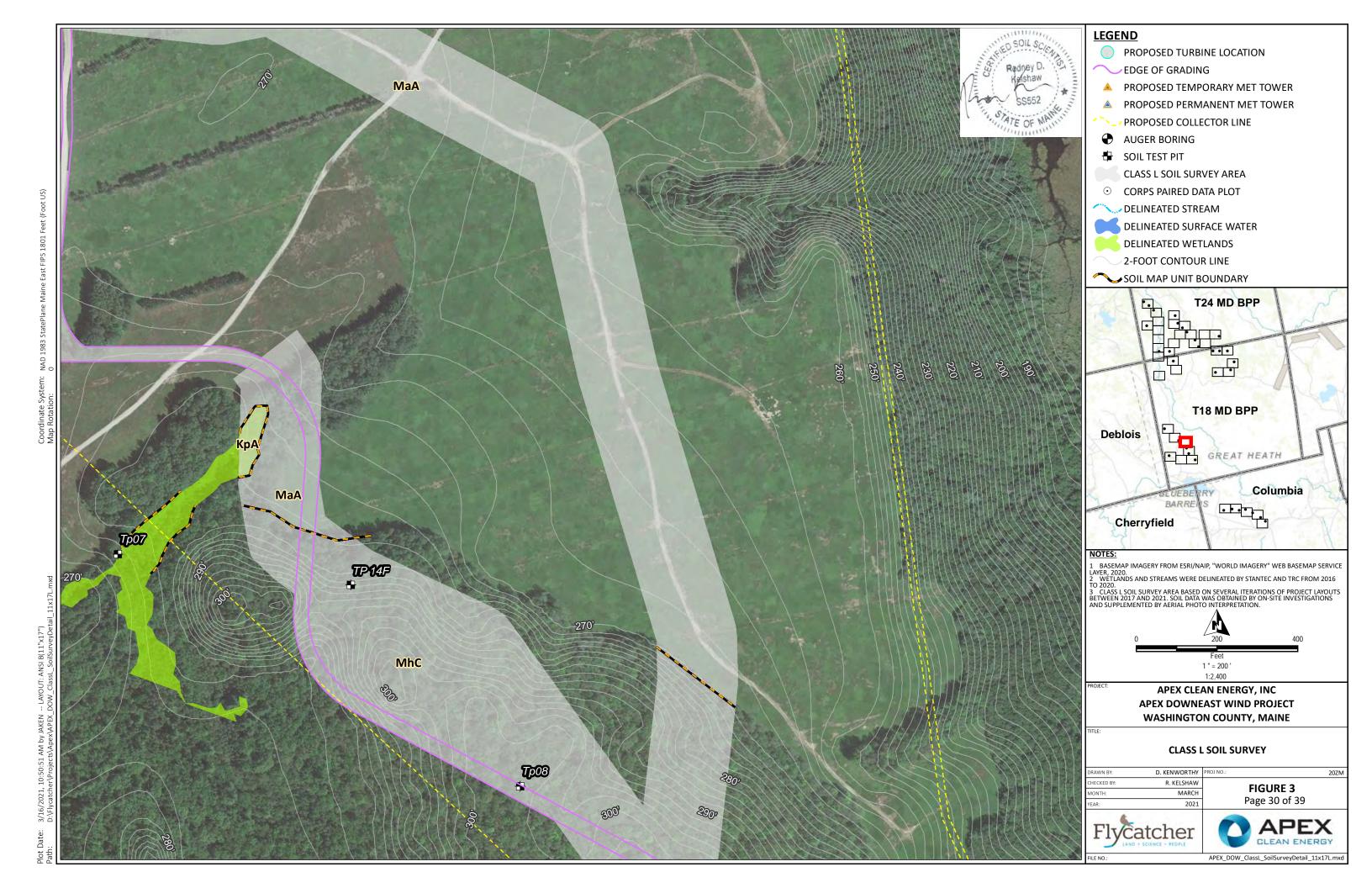


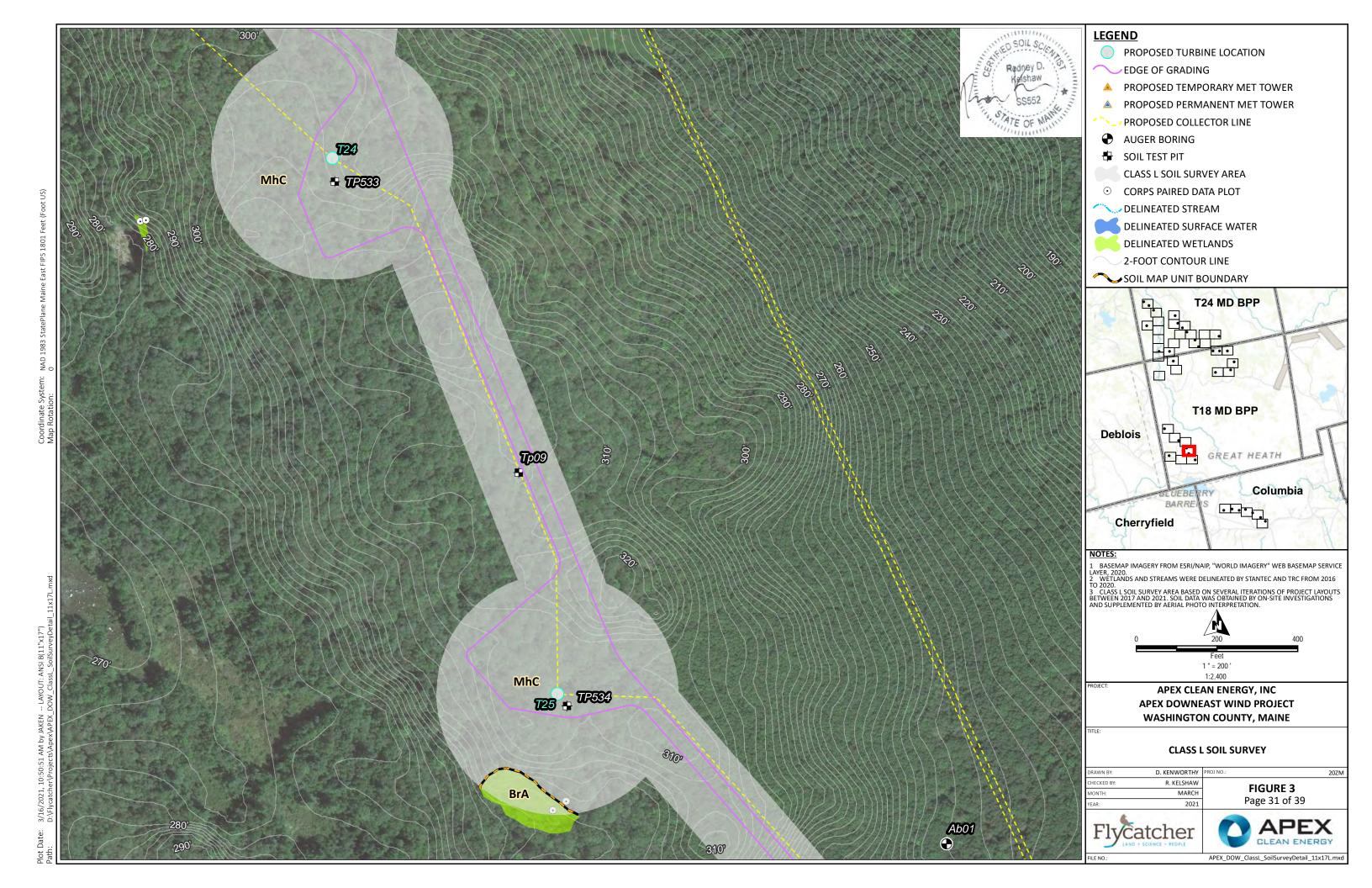


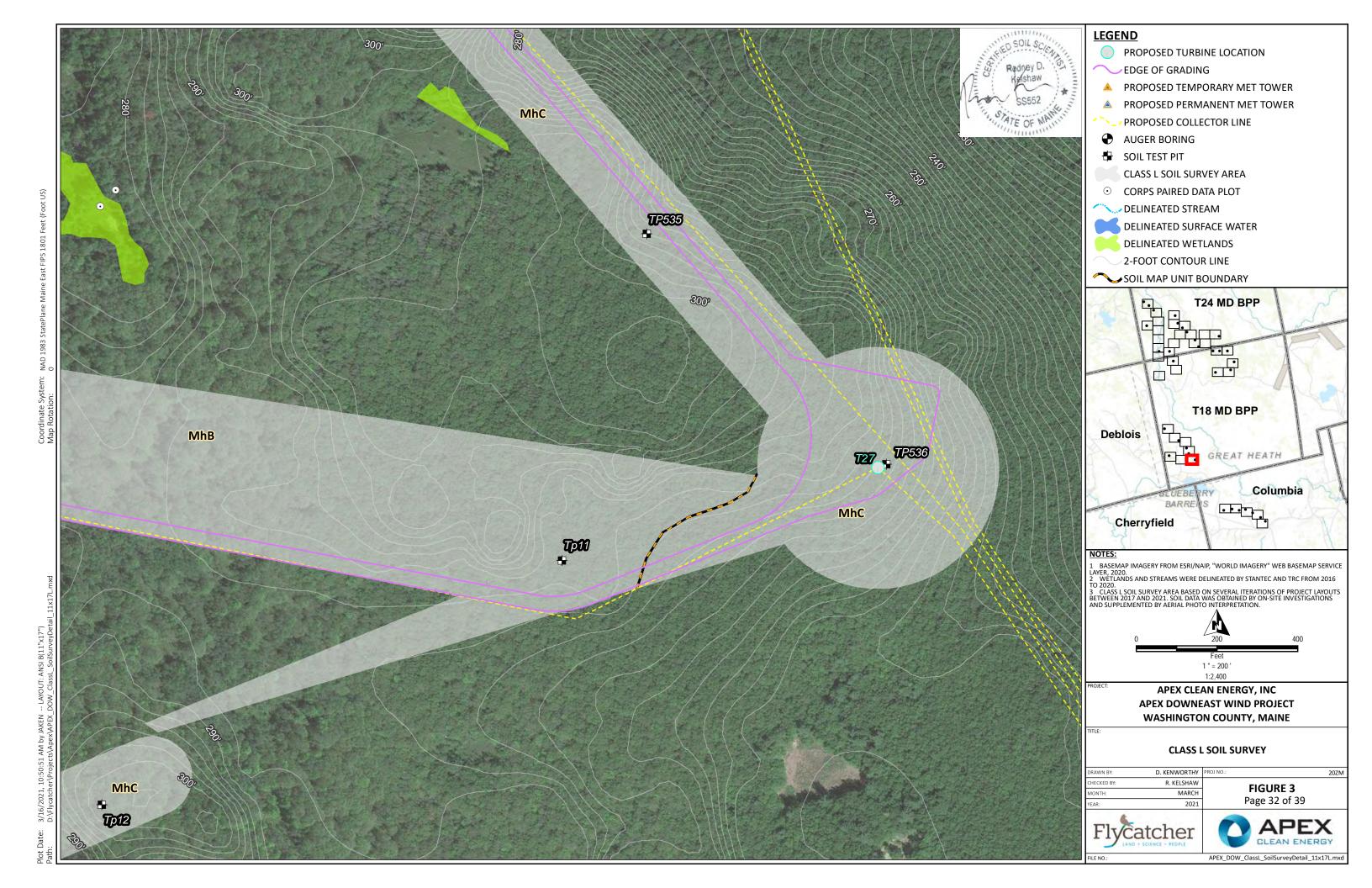


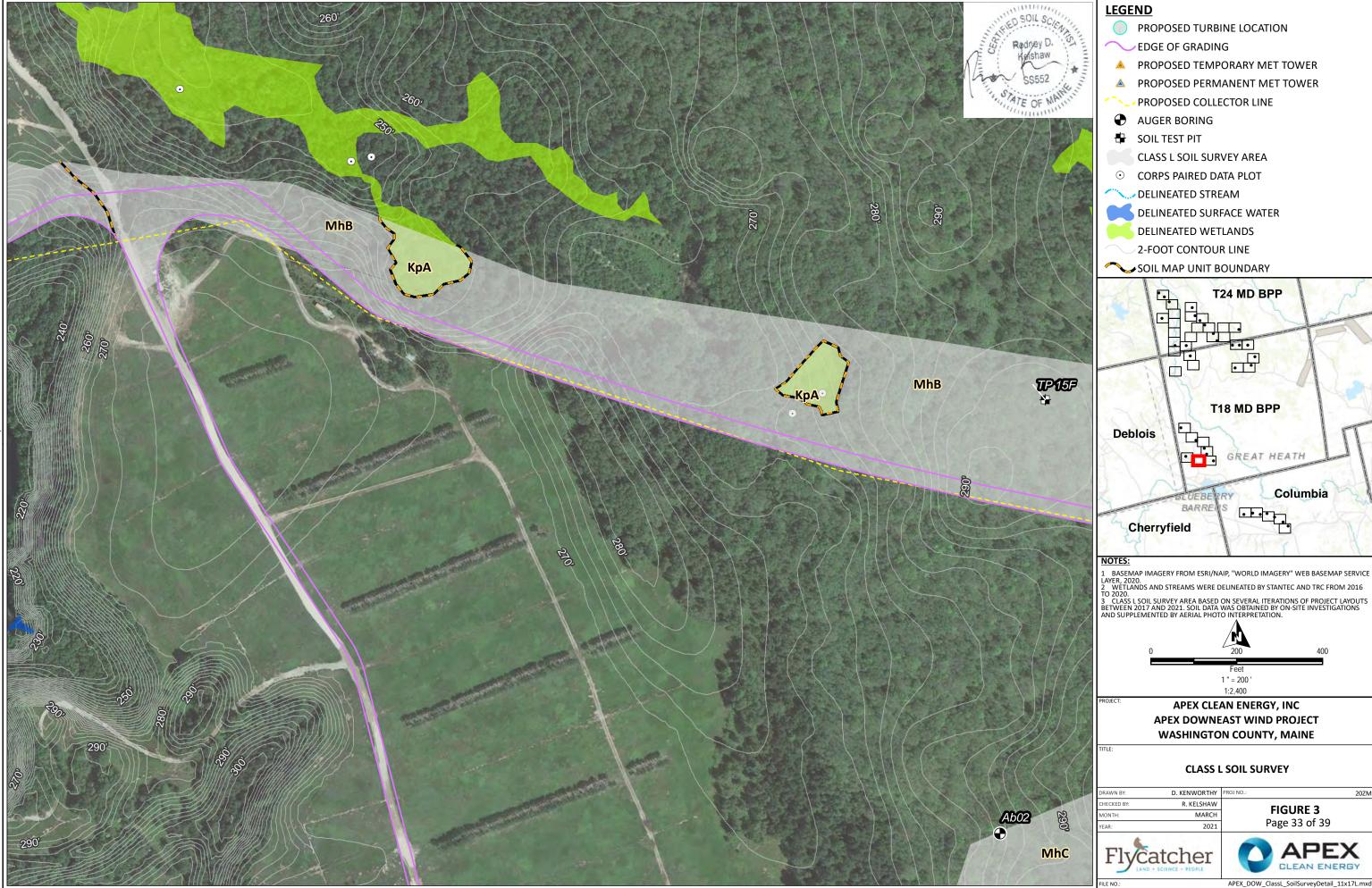










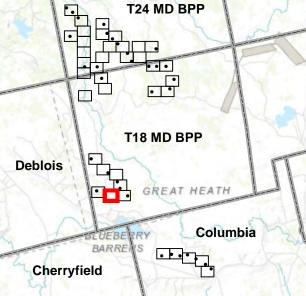


▲ PROPOSED TEMPORARY MET TOWER

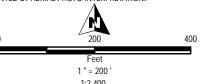
PROPOSED PERMANENT MET TOWER

PROPOSED COLLECTOR LINE

DELINEATED SURFACE WATER



- BASEMAP IMAGERY FROM ESRI/NAIP, "WORLD IMAGERY" WEB BASEMAP SERVICE



APEX CLEAN ENERGY, INC APEX DOWNEAST WIND PROJECT

CLASS L SOIL SURVEY

DRAWN BY:	D. KENWORTHY	PROJ NO.: 20ZM
CHECKED BY:	R. KELSHAW	FIGURE 3
MONTH:	MARCH	
YEAR:	2021	Page 33 of 39
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APEX_DOW_ClassL_SoilSurveyDetail_11x17L.mxd

LEGEND

PROPOSED TURBINE LOCATION

✓ EDGE OF GRADING

▲ PROPOSED TEMPORARY MET TOWER

PROPOSED PERMANENT MET TOWER

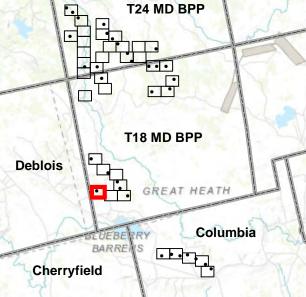
PROPOSED COLLECTOR LINE

CLASS L SOIL SURVEY AREA

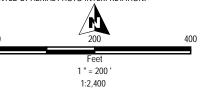
⊙ CORPS PAIRED DATA PLOT

DELINEATED SURFACE WATER

DELINEATED WETLANDS



- BASEMAP IMAGERY FROM ESRI/NAIP, "WORLD IMAGERY" WEB BASEMAP SERVICE LAYER, 2020. 2 WETLANDS AND STREAMS WERE DELINEATED BY STANTEC AND TRC FROM 2016
- 20 VEITANDS AND STREAMS WERE DELINEATED BY STANTEL AND TRUFFROM 2016
 3 CLASS L SOIL SURVEY AREA BASED ON SEVERAL ITERATIONS OF PROJECT LAYOUTS
 BETWEEN 2017 AND 2021. SOIL DATA WAS OBTAINED BY ON-SITE INVESTIGATIONS
 AND SUPPLEMENTED BY AERIAL PHOTO INTERPRETATION.



APEX CLEAN ENERGY, INC APEX DOWNEAST WIND PROJECT WASHINGTON COUNTY, MAINE

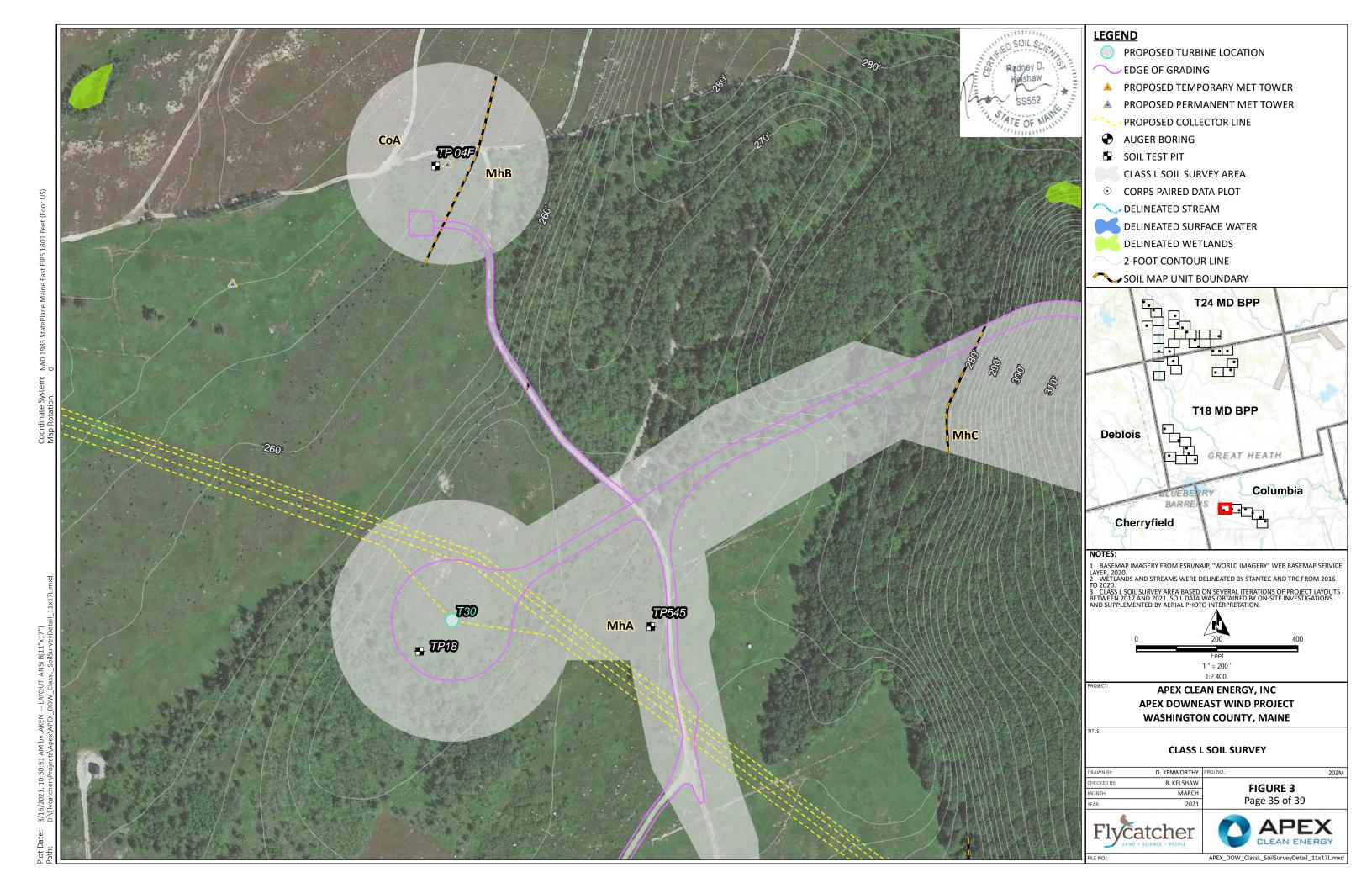
CLASS L SOIL SURVEY

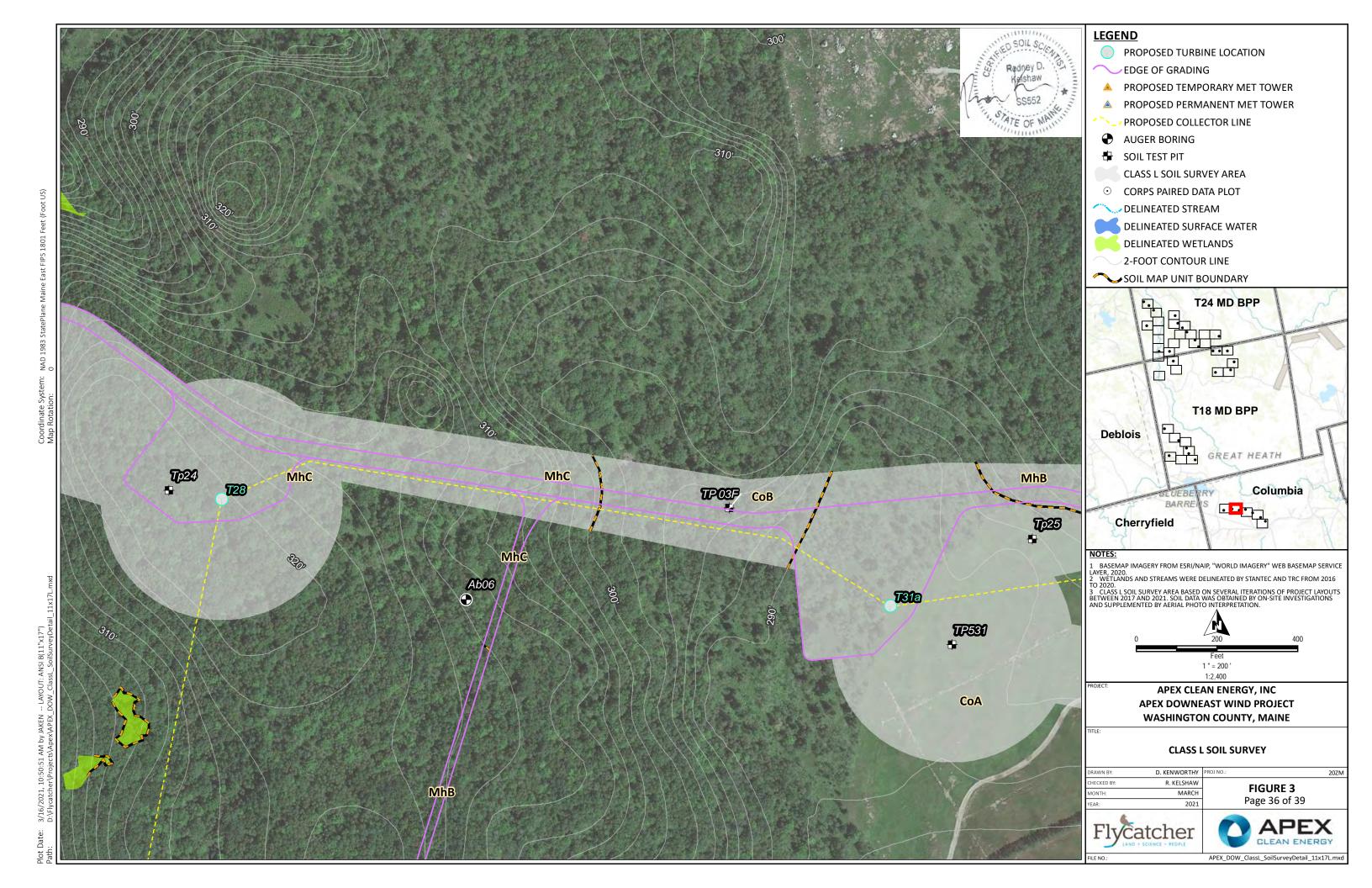
DRAWN BY:	D. KENWORTHY	PROJ NO.:
CHECKED BY:	R. KELSHAW	
MONTH:	MARCH	
YEAR:	2021	

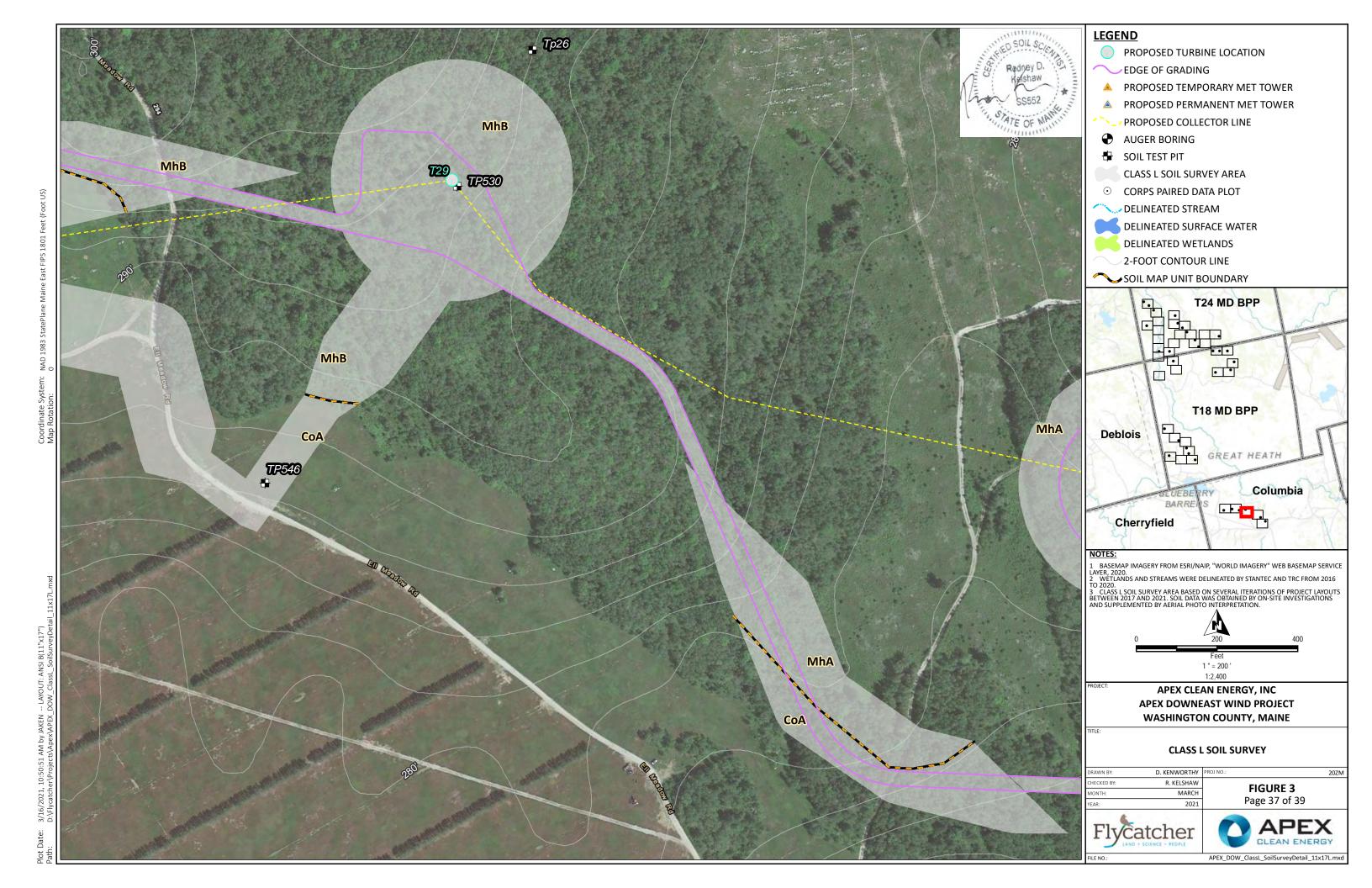
FIGURE 3 Page 34 of 39

CLEAN ENERGY

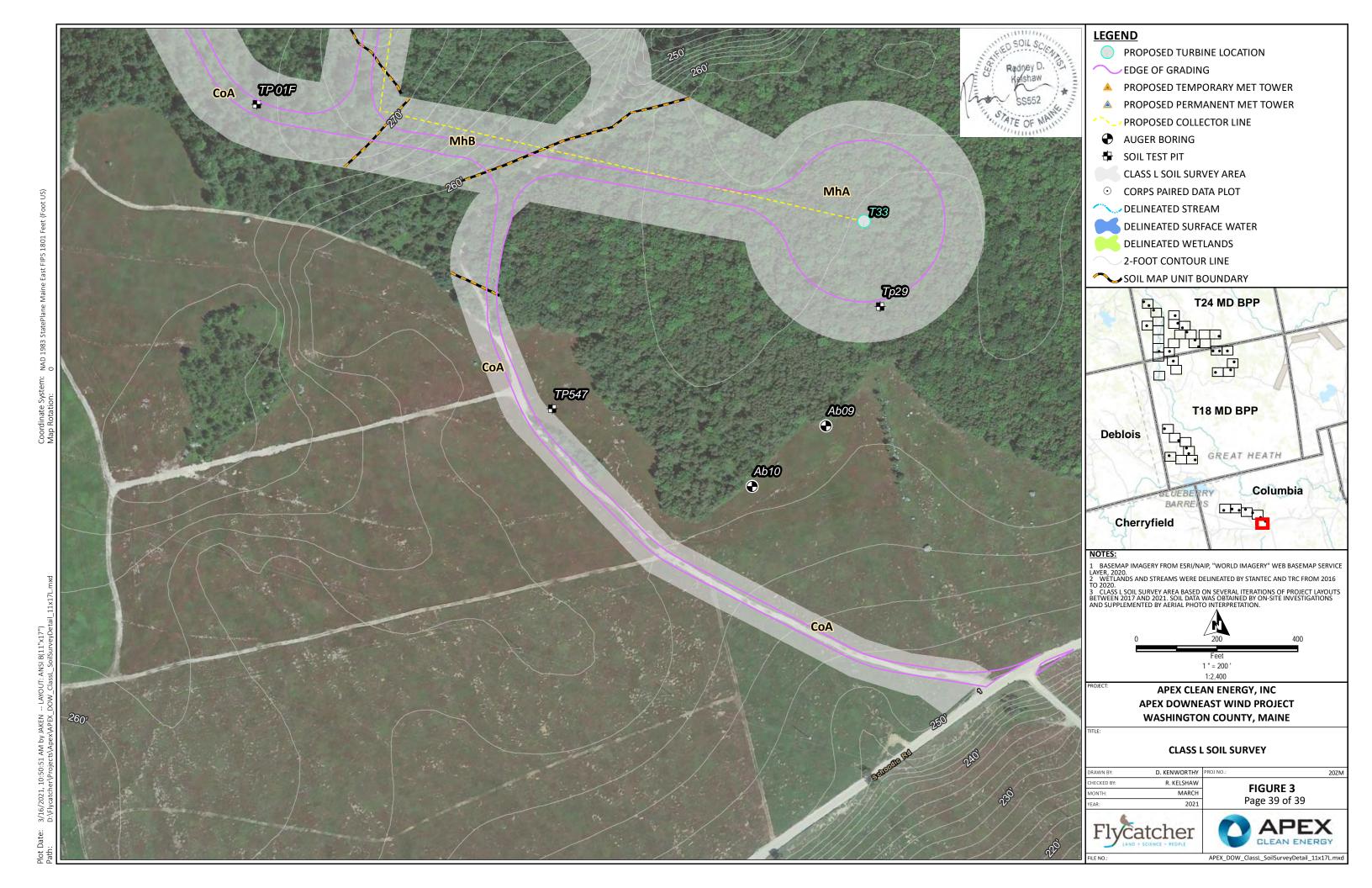
APEX_DOW_ClassL_SoilSurveyDetail_11x17L.mxd



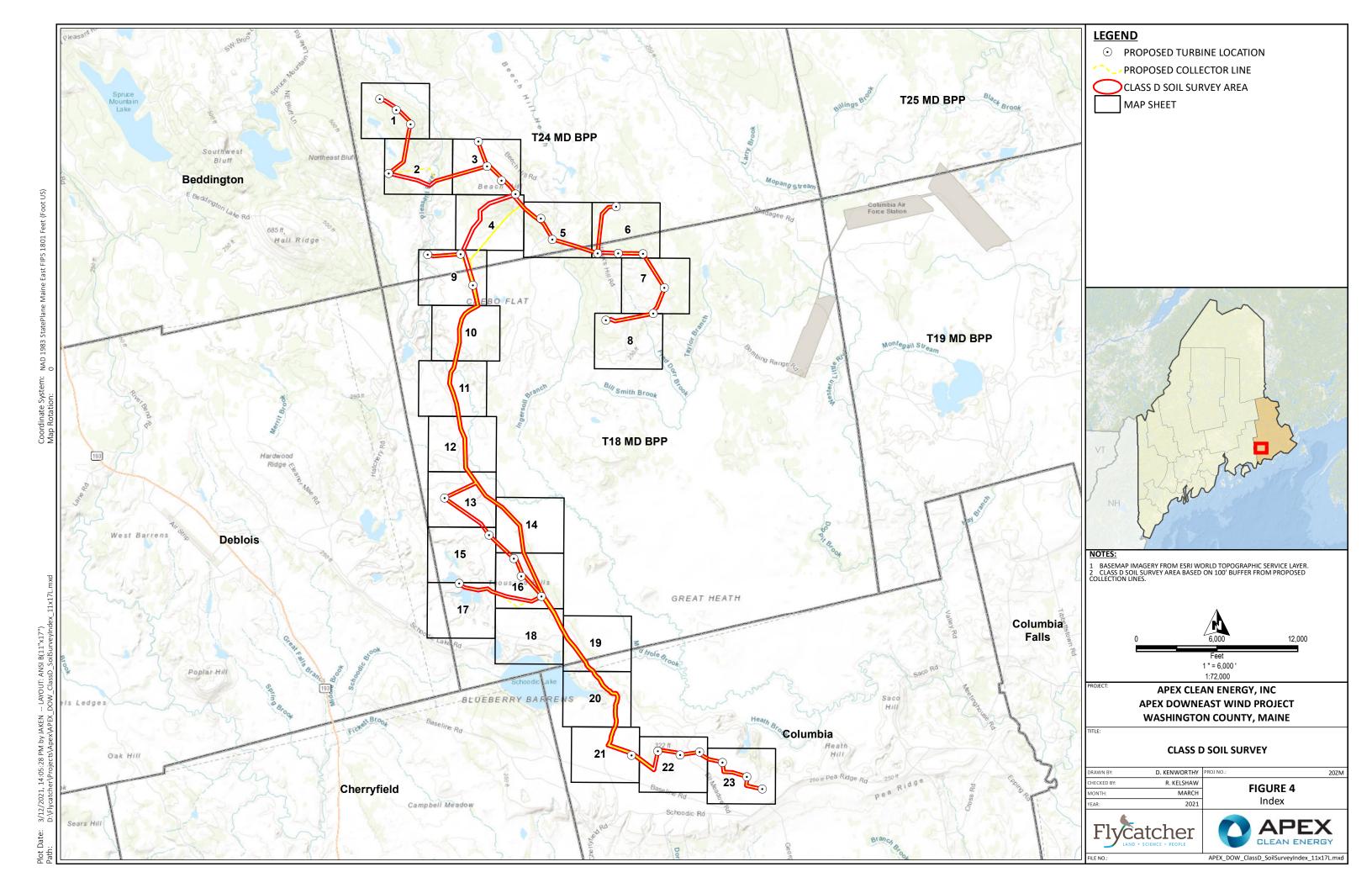


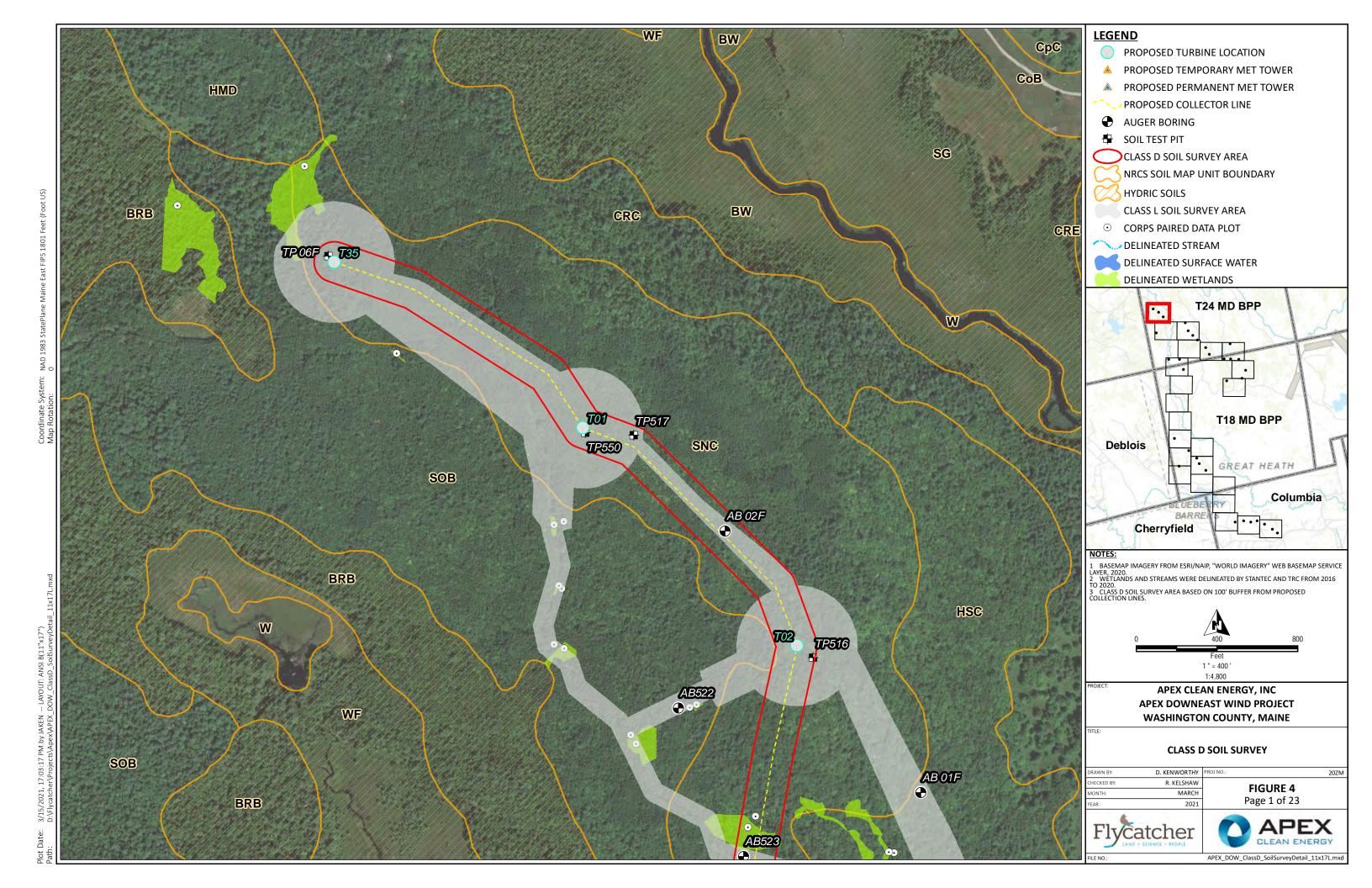


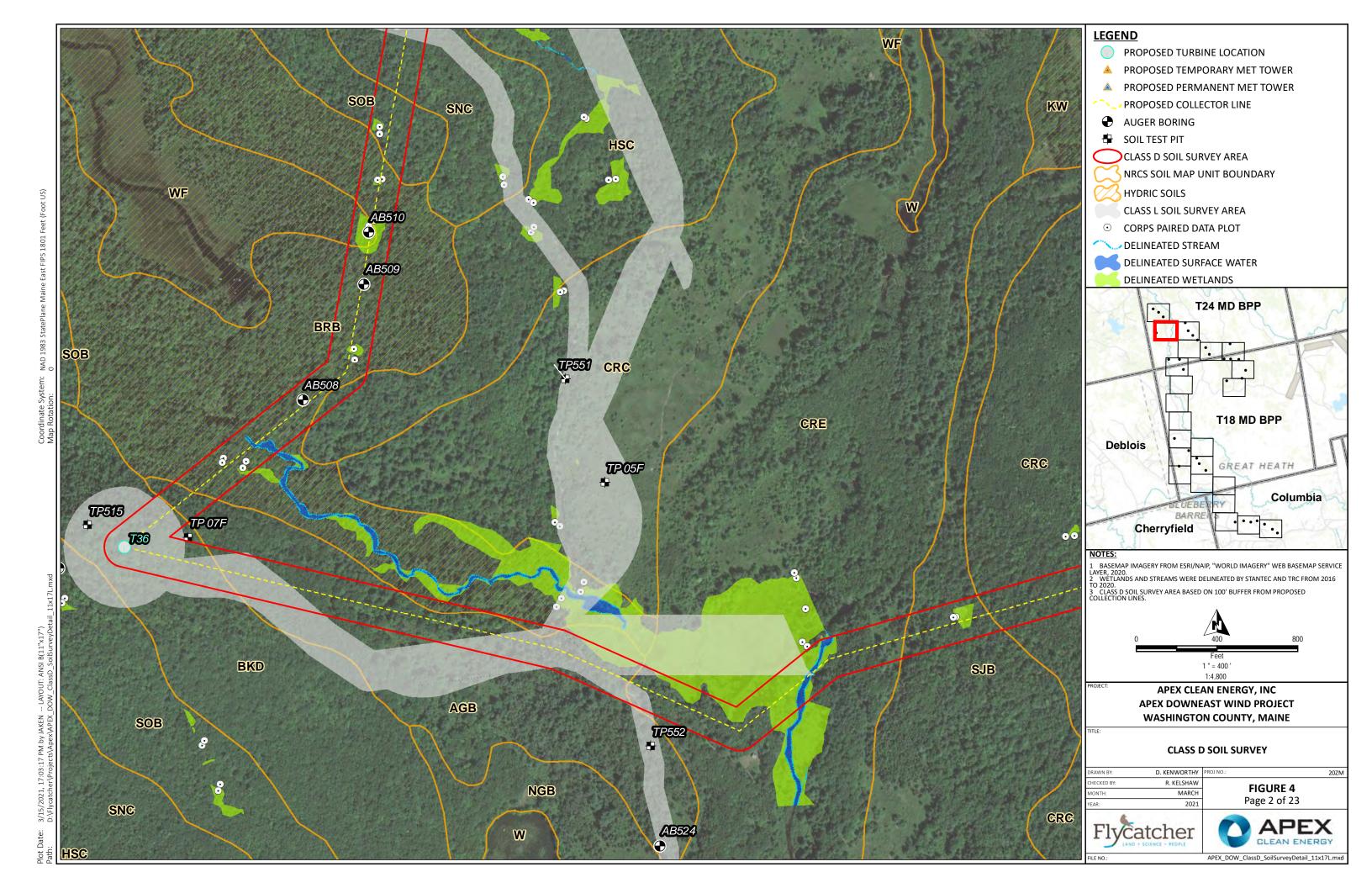


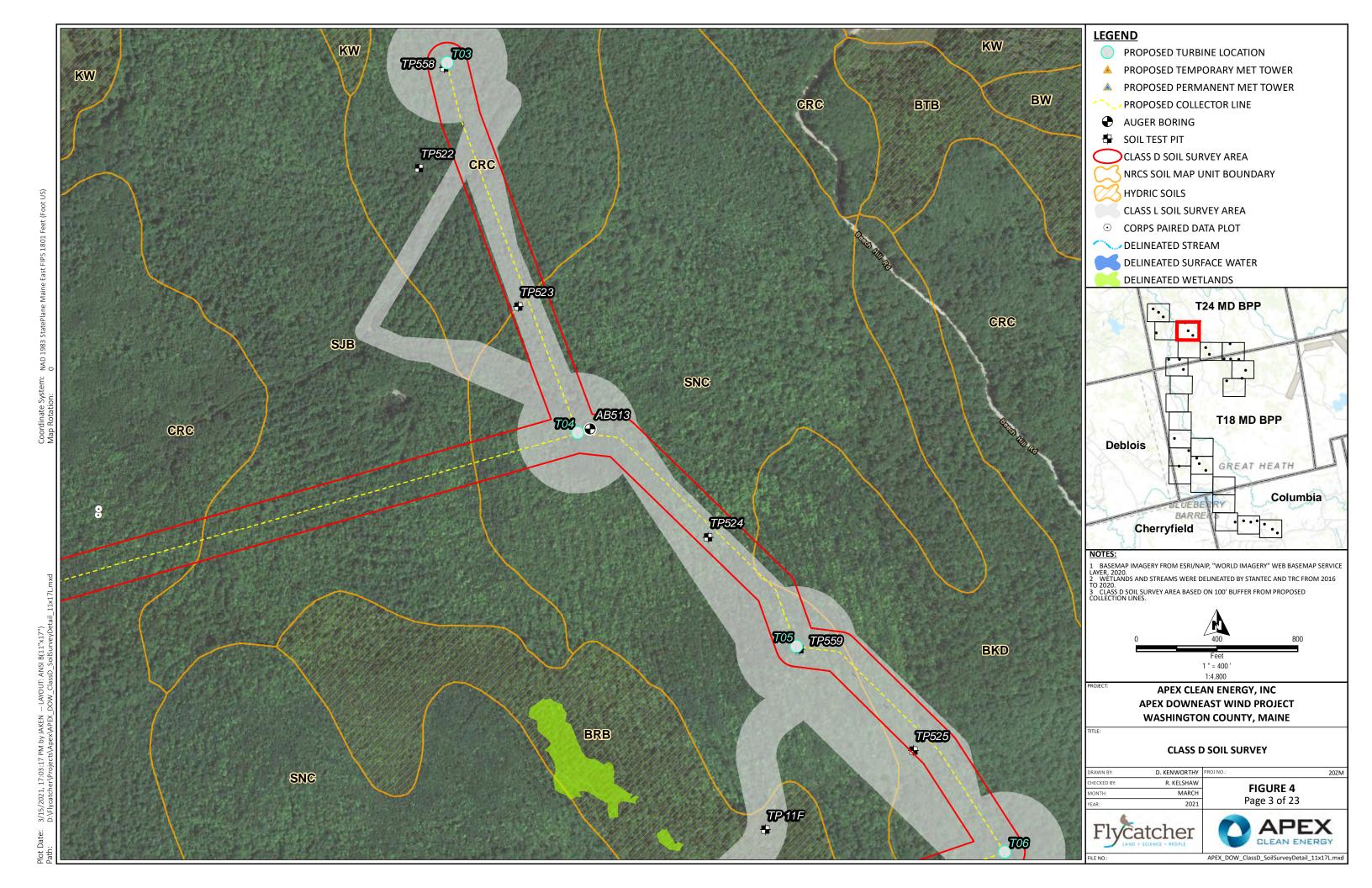


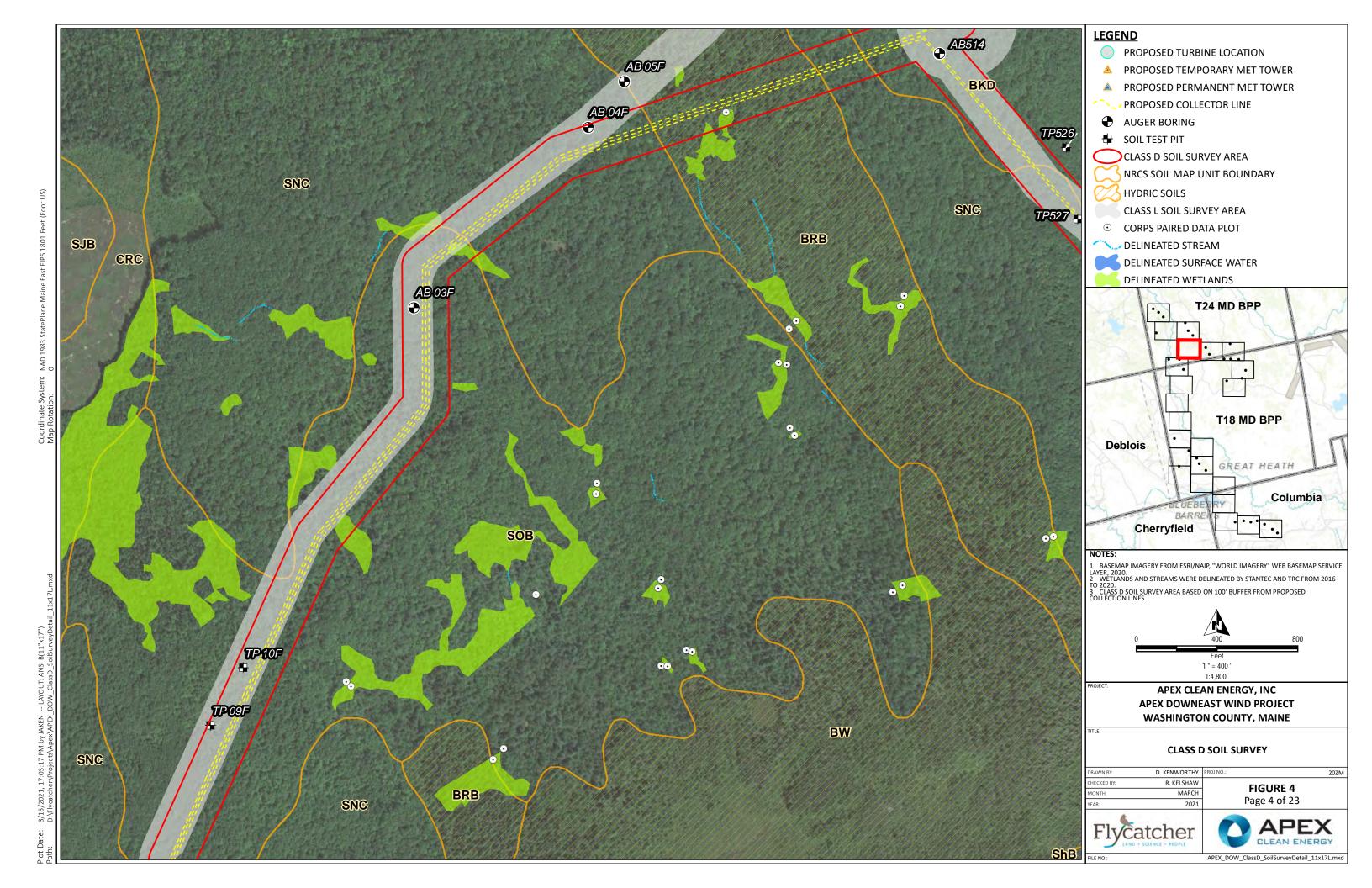
Map Unit		Hydrologic Soil
Symbol	Map Unit Name	Group (HSG)
AGB	Adams-Croghan association, 0 to 8 percent slopes	А
BKD	Becket-Skerry association, 8 to 35 percent slopes, very stony	С
BRB	Brayton-Colonel association, 0 to 8 percent slopes, very stony	D
BW	Bucksport and Wonsqueak mucks, 0 to 2 percent slopes	B/D
CoA	Colton gravelly sandy loam, 0 to 3 percent slopes	А
СоВ	Colton gravelly sandy loam, 3 to 8 percent slopes	А
CoC	Colton gravelly sandy loam, 8 to 15 percent slopes	А
CoE	Colton gravelly sandy loam, 15 to 70 percent slopes	А
СрВ	Colton gravelly sandy loam, 0 to 8 percent slopes, very bouldery	А
СрС	Colton gravelly sandy loam, 8 to 15 percent slopes, very bouldery	А
CRC	Colton-Adams complex, 3 to 15 percent slopes	А
CRE	Colton-Adams complex, 15 to 70 percent slopes	А
HkB	Hermon and Monadnock soils, 0 to 8 percent slopes, very bouldery	Α
HMD	Monadnock-Hermon complex, 15 to 30 percent slopes, very bouldery	В
HSC	Hermon-Monadnock-Skerry complex, 0 to 15 percent slopes, very bouldery	А
HVC	Hermon-Monadnock-Skerry complex, 0 to 15 percent slopes, extremely bouldery	А
KW	Kinsman-Wonsqueak association, 0 to 3 percent slopes	A/D
LCB	Lamoine-Buxton-Scantic complex, 0 to 15 percent slopes	C/D
LHB	Lamoine-Nicholville complex, 0 to 8 percent slopes	C/D
MmA	Masardis fine sandy loam, 0 to 3 percent slopes	А
MmB	Masardis fine sandy loam, 3 to 8 percent slopes	А
MmC	Masardis fine sandy loam, 8 to 15 percent slopes	А
MmE	Masardis fine sandy loam, 15 to 45 percent slopes	А
MSC	Masardis-Sheepscot complex, 0 to 15 percent slopes	А
MT	Medomak and Wonsqueak soils, frequently flooded	B/D
NGC	Nicholville-Croghan complex, 5 to 15 percent slopes	B/D
ShB	Sheepscot fine sandy loam, 0 to 8 percent slopes	В
SJB	Sheepscot-Croghan-Kinsman complex, 0 to 8 percent slopes	В
SNC	Skerry-Becket association, 0 to 15 percent slopes, very stony	C/D
SOB	Skerry-Colonel association, 0 to 8 percent slopes, very stony	C/D
WF	Wonsqueak and Bucksport mucks, 0 to 2 percent slopes, frequently flooded	B/D

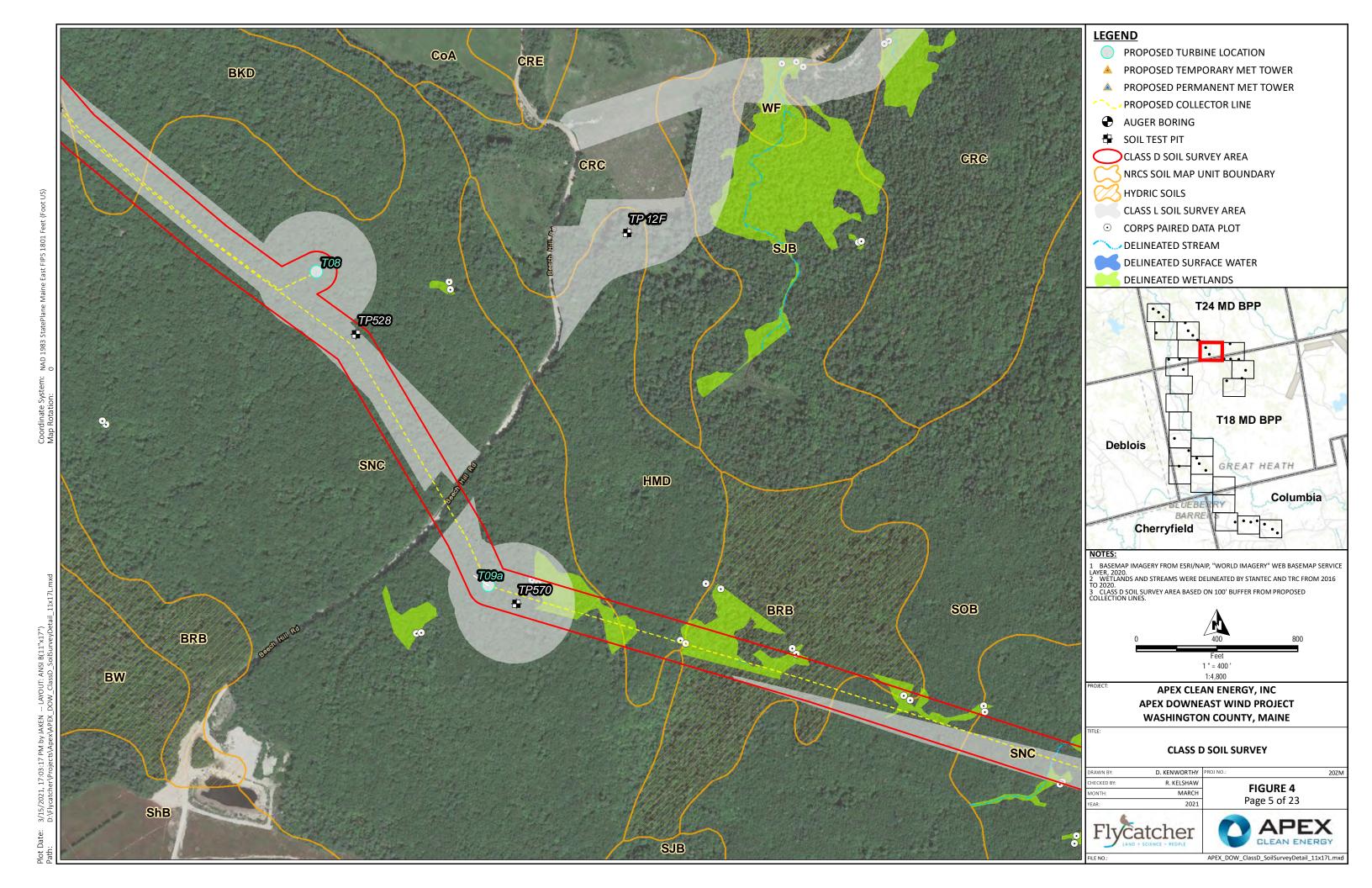


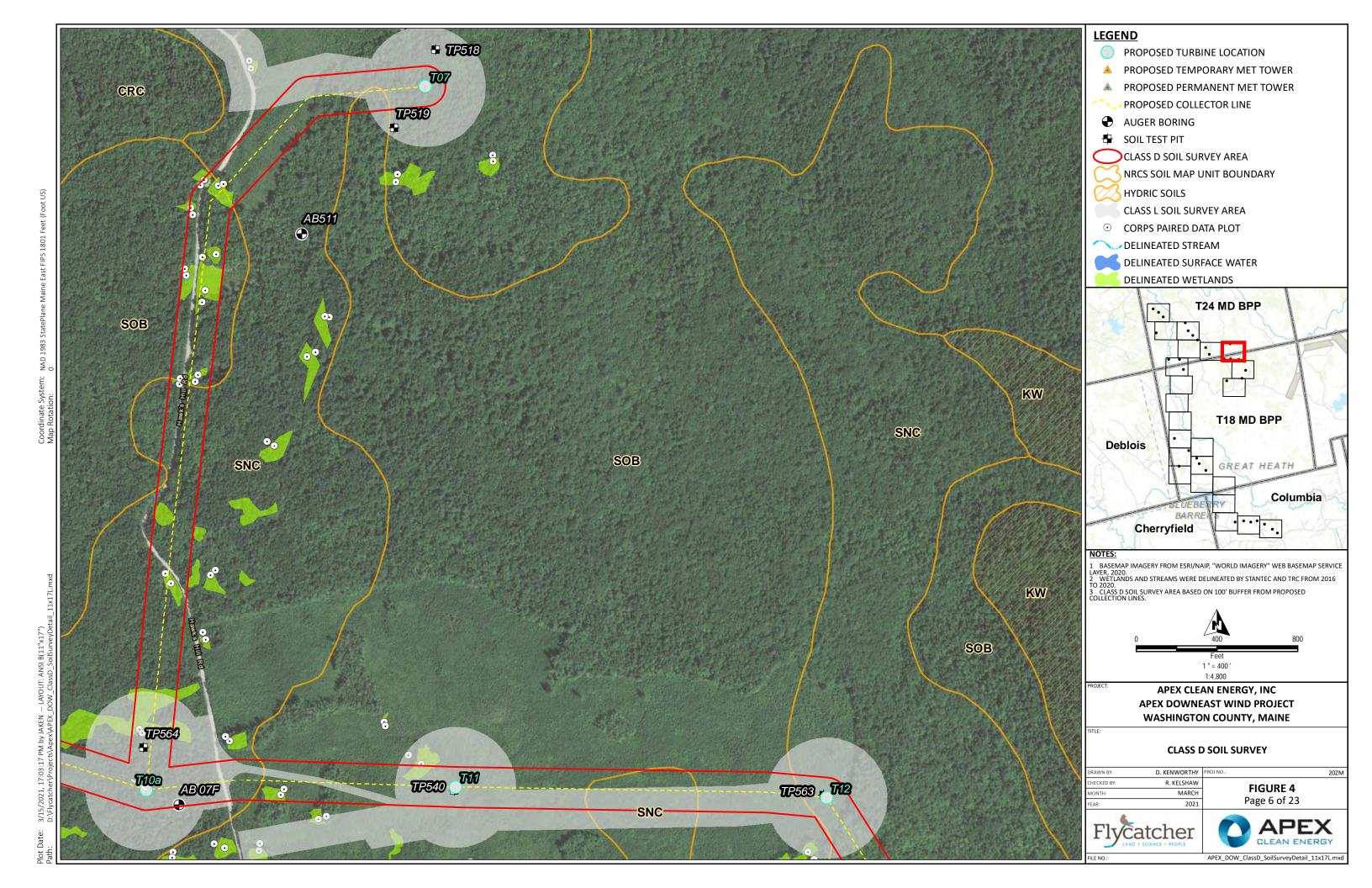


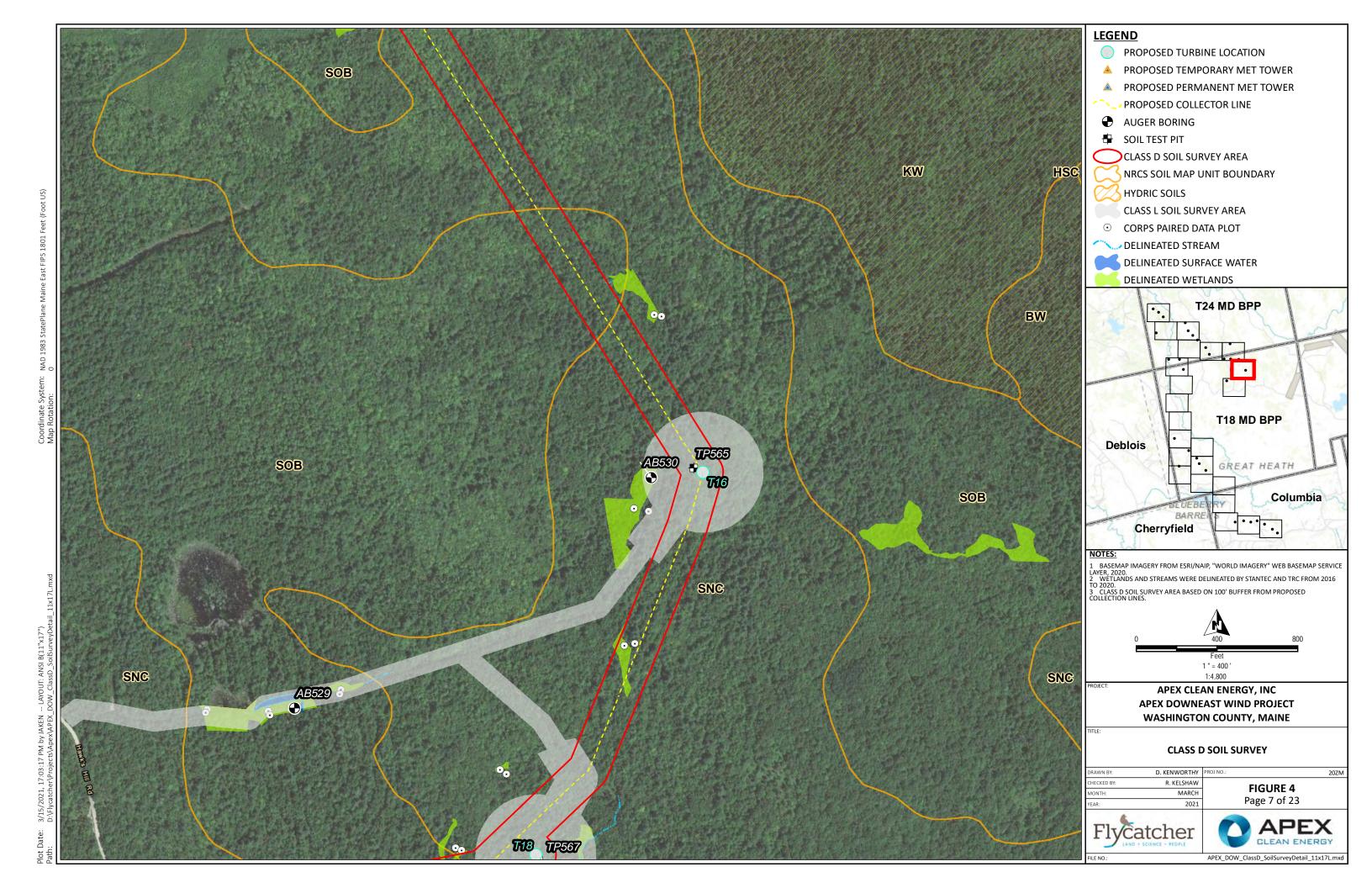


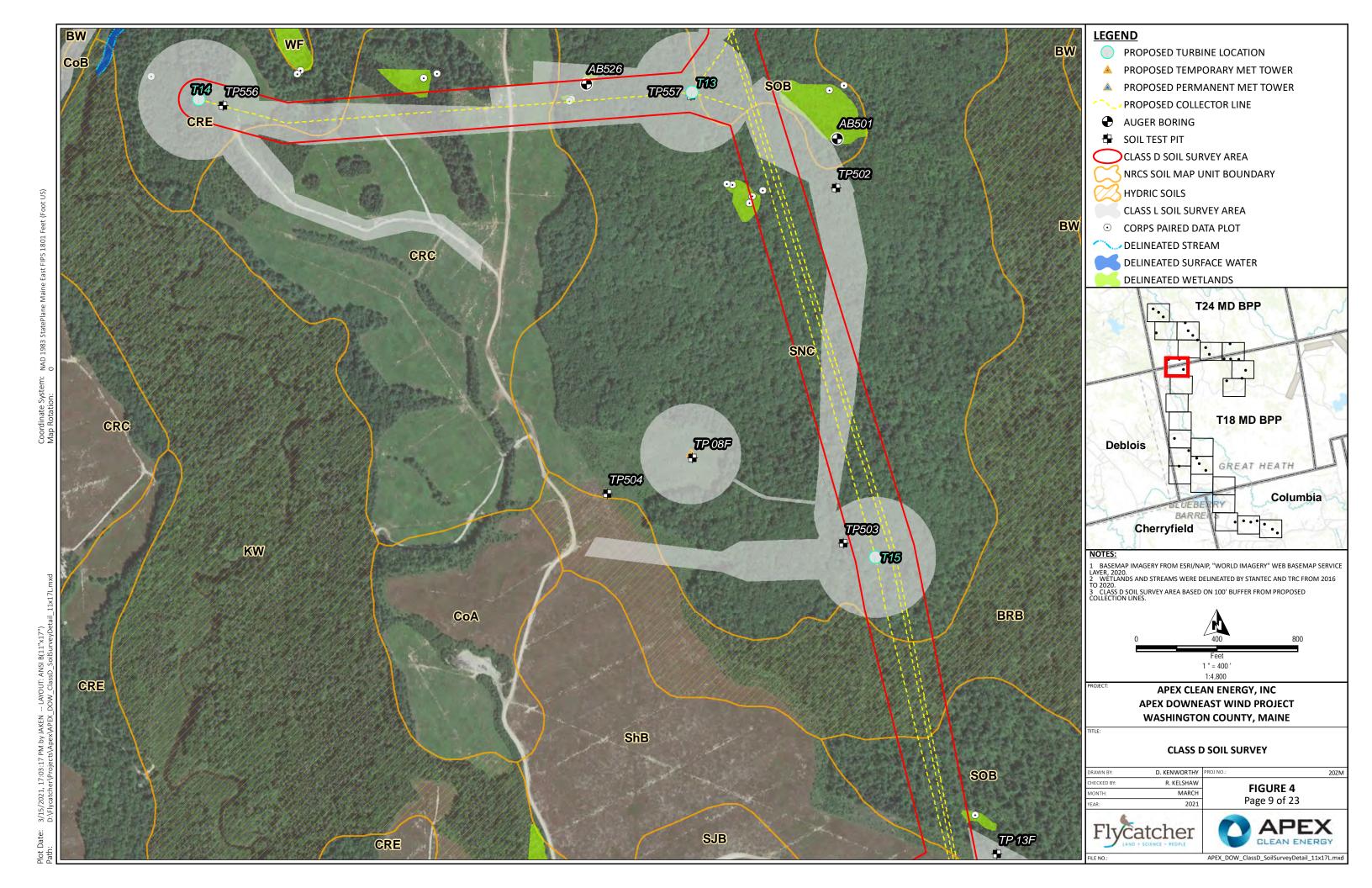


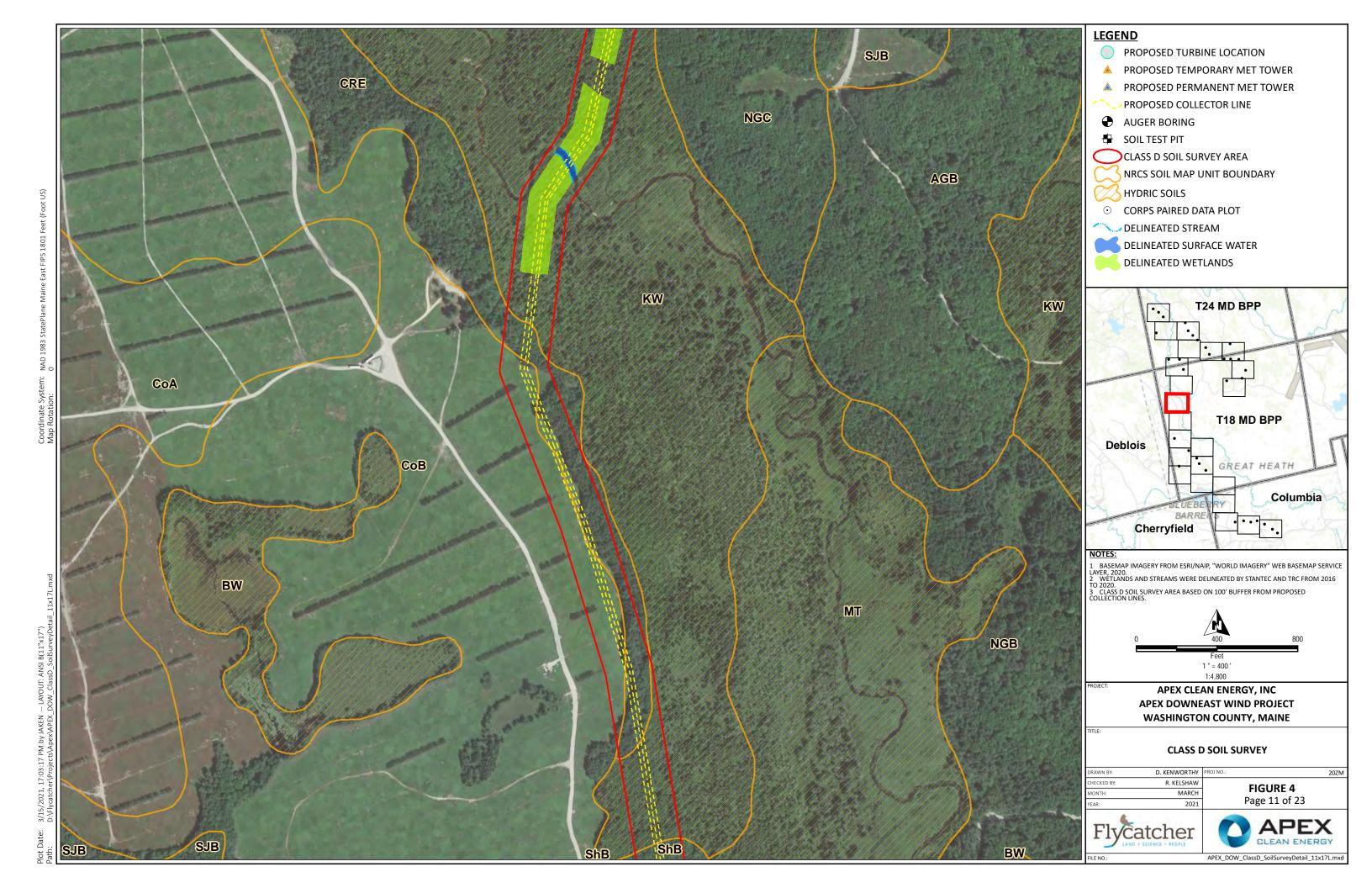


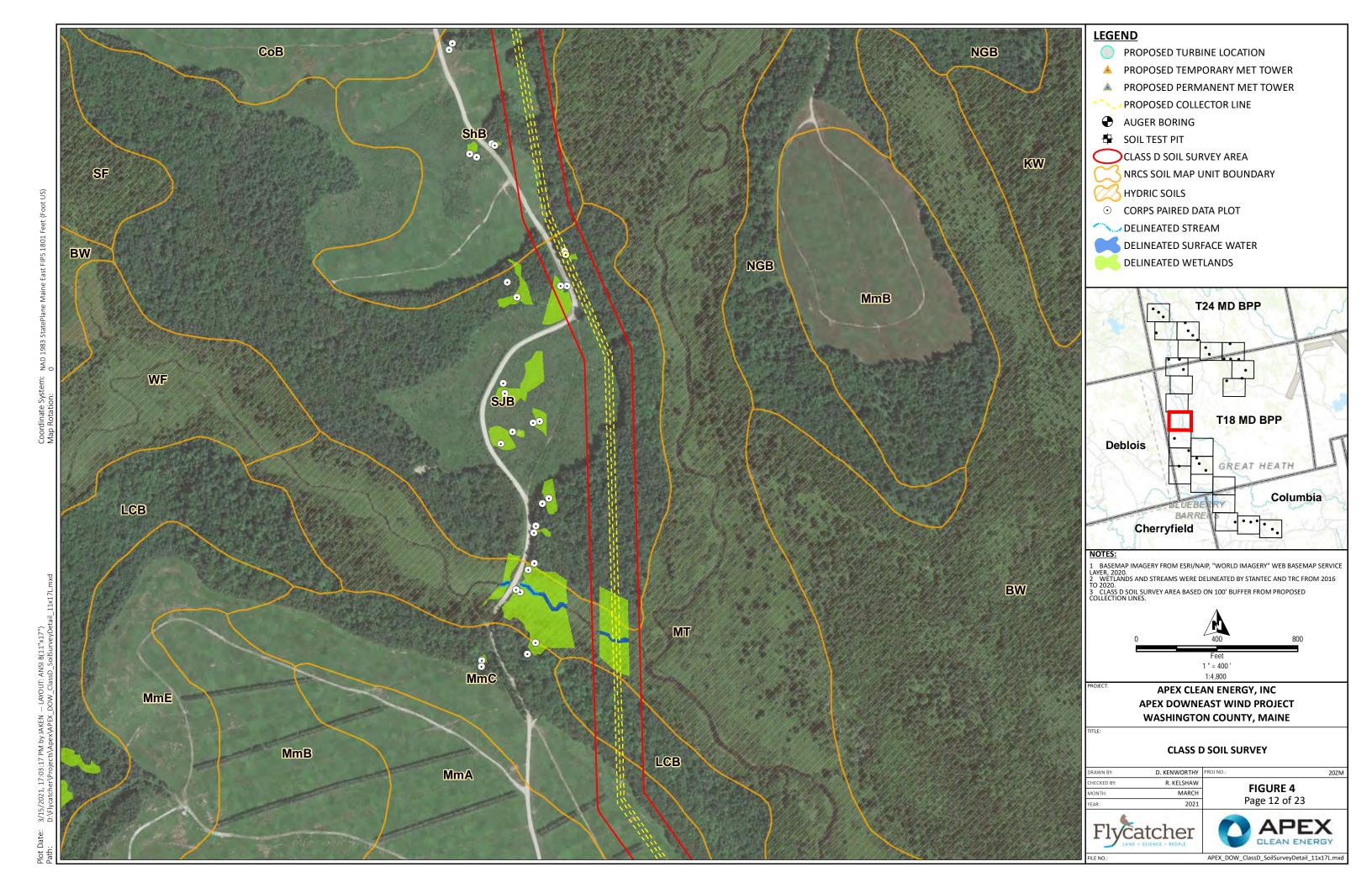


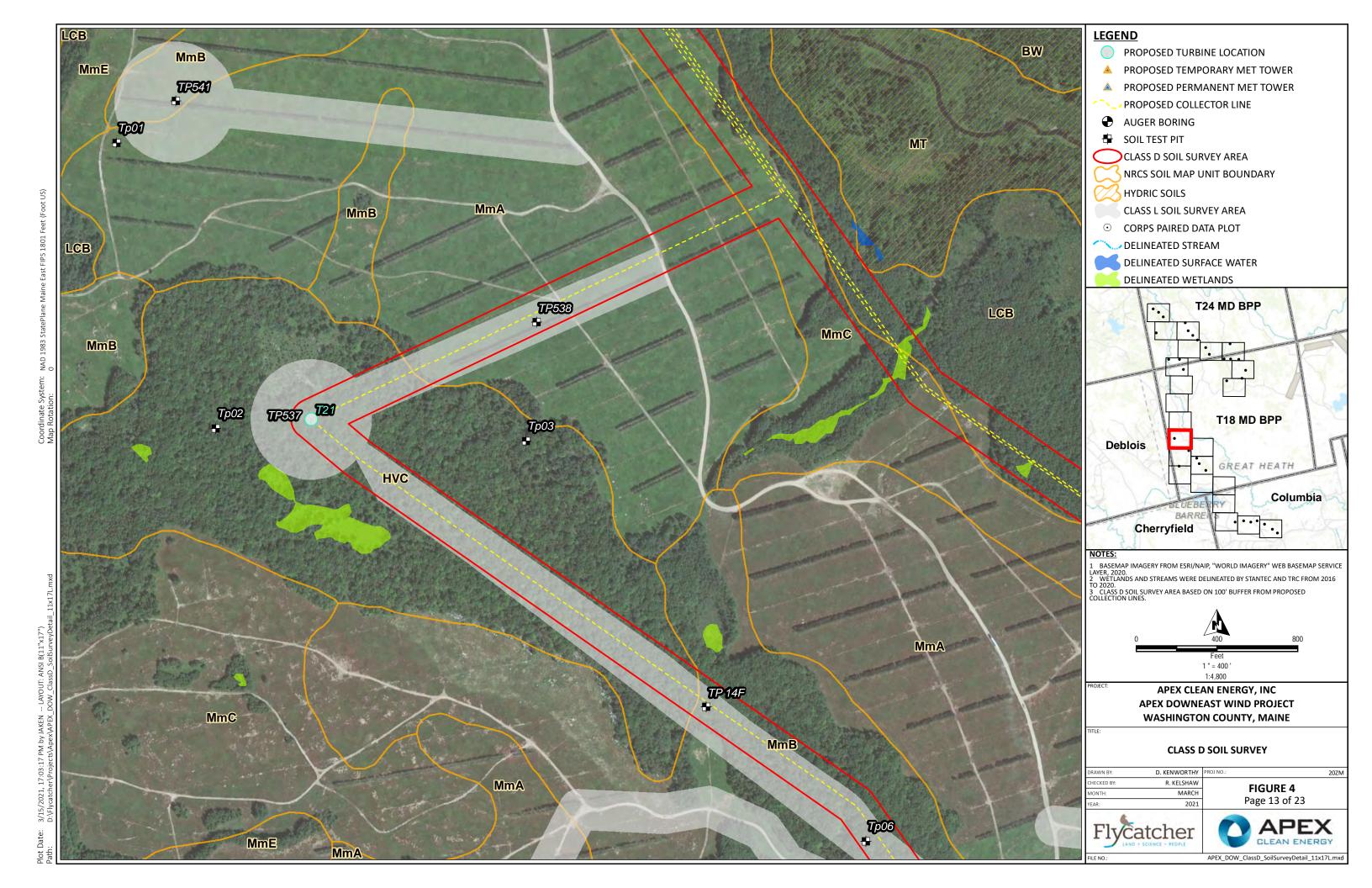


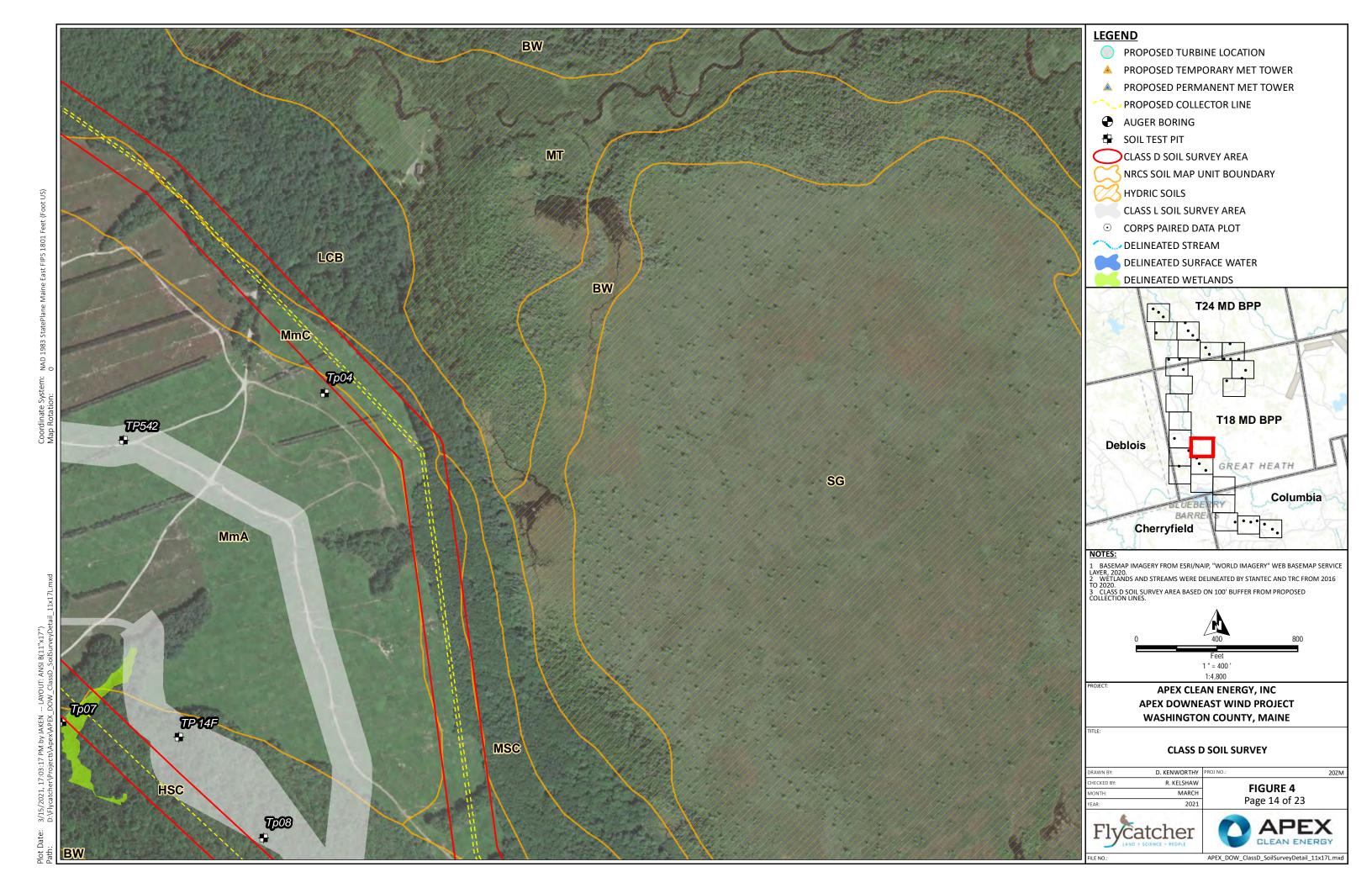


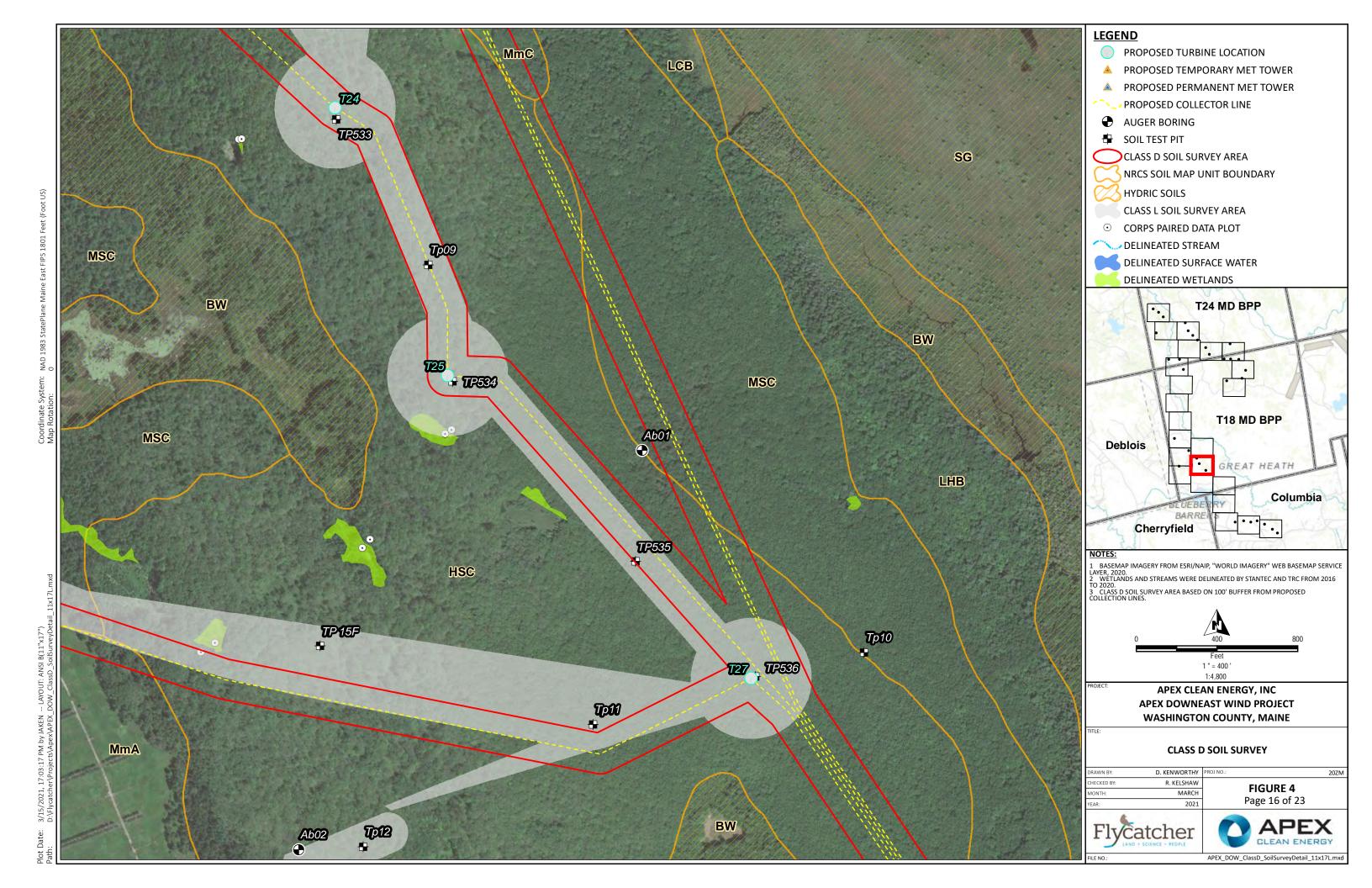


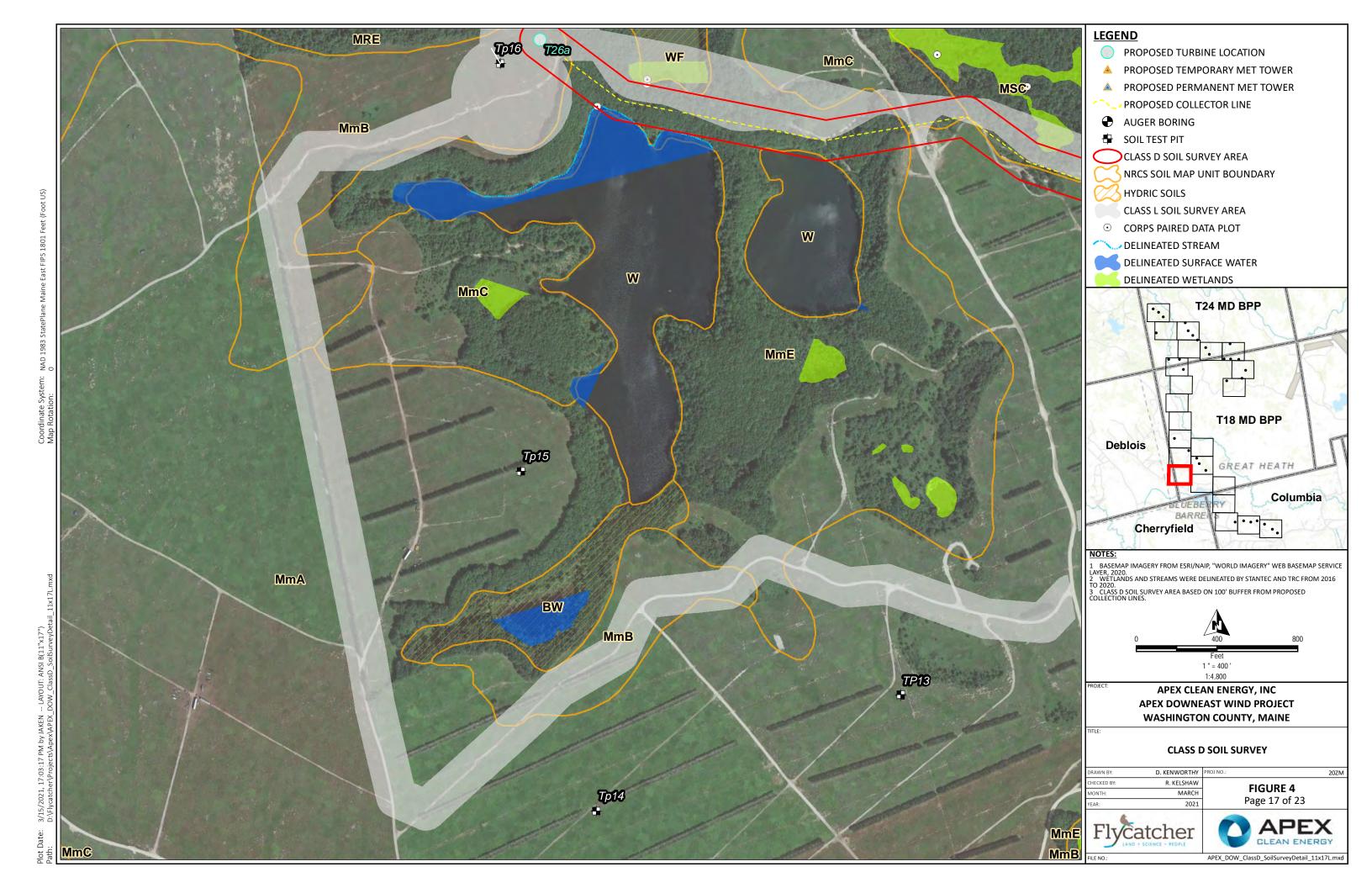


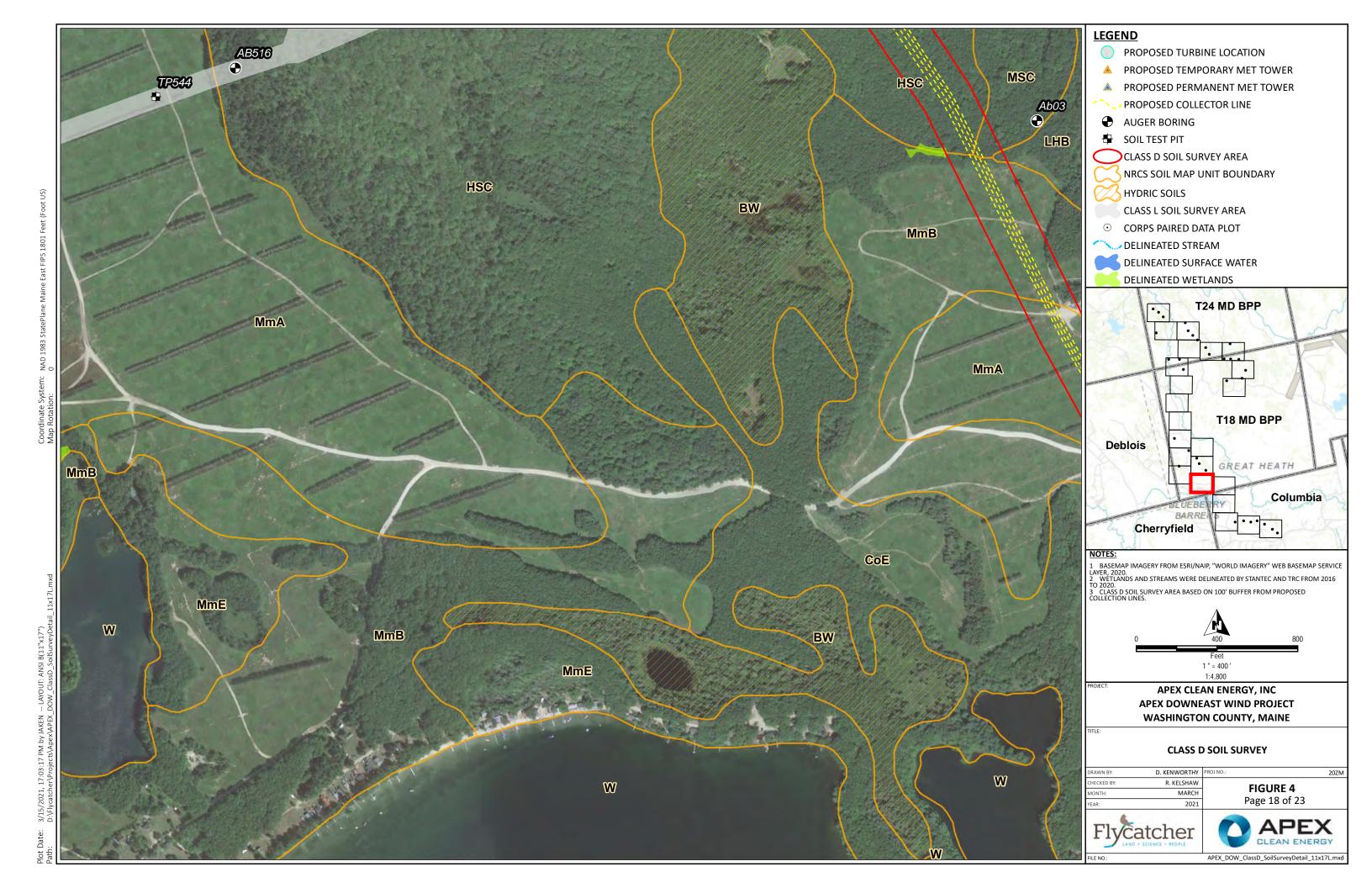


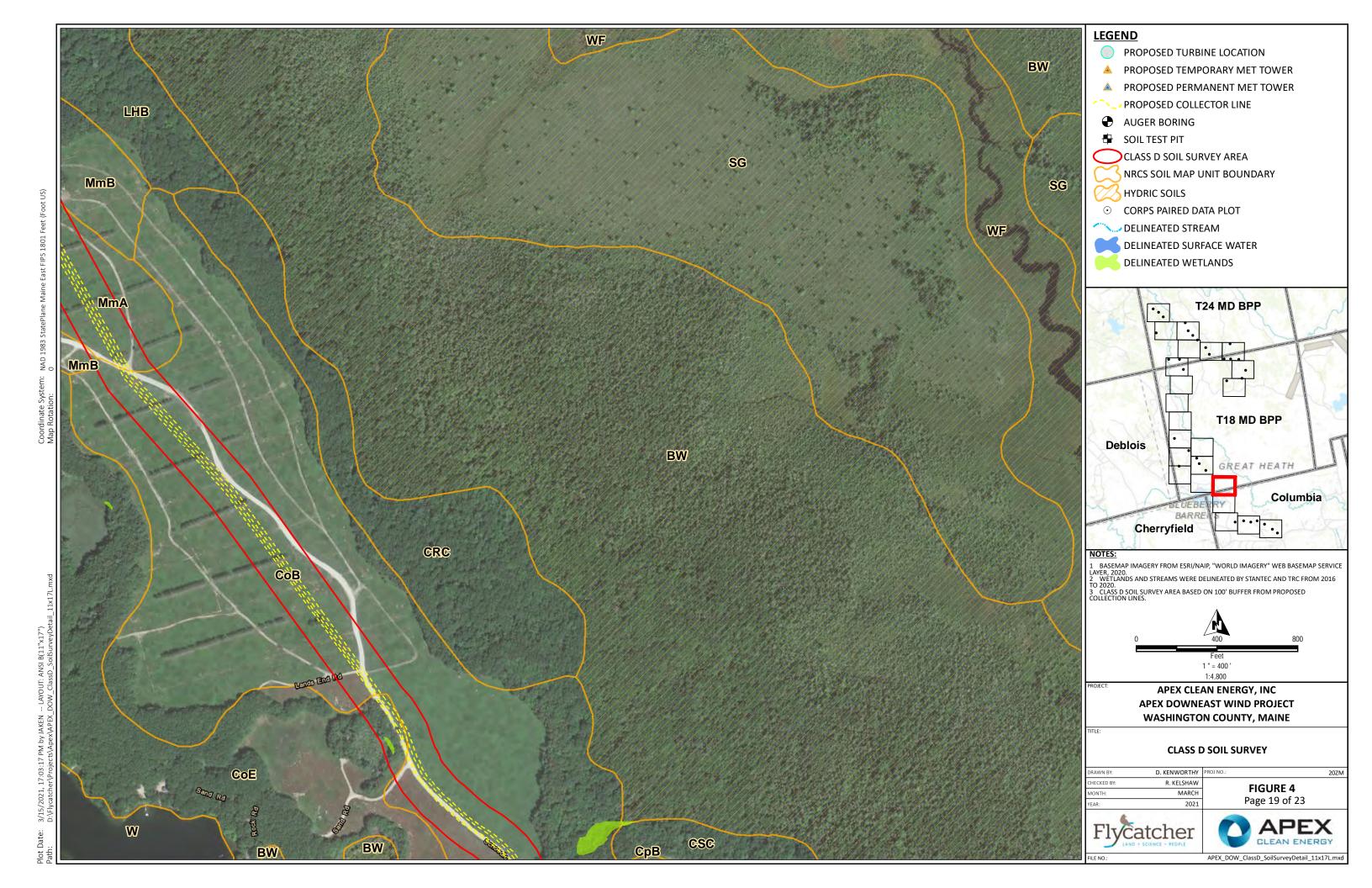


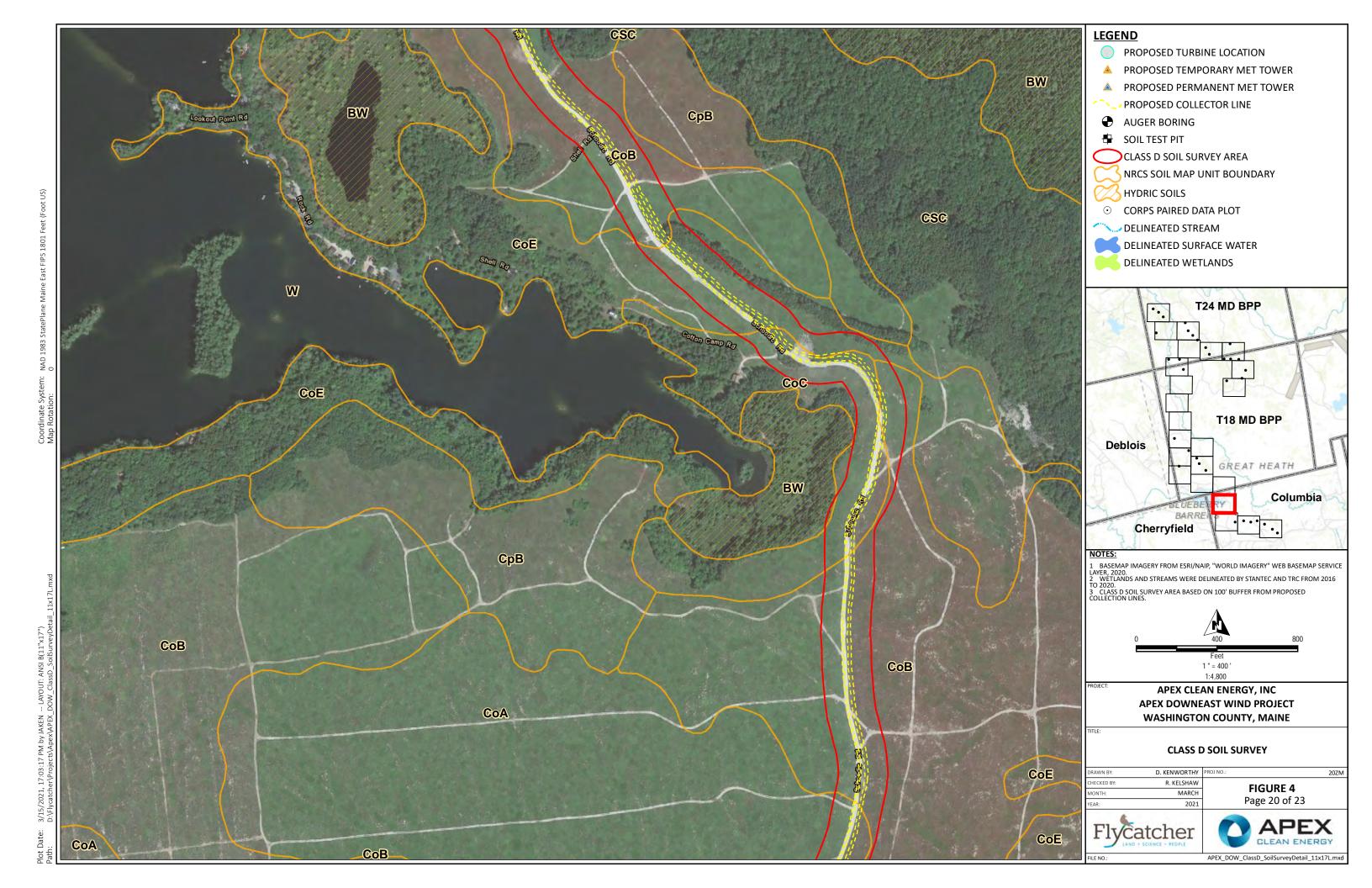


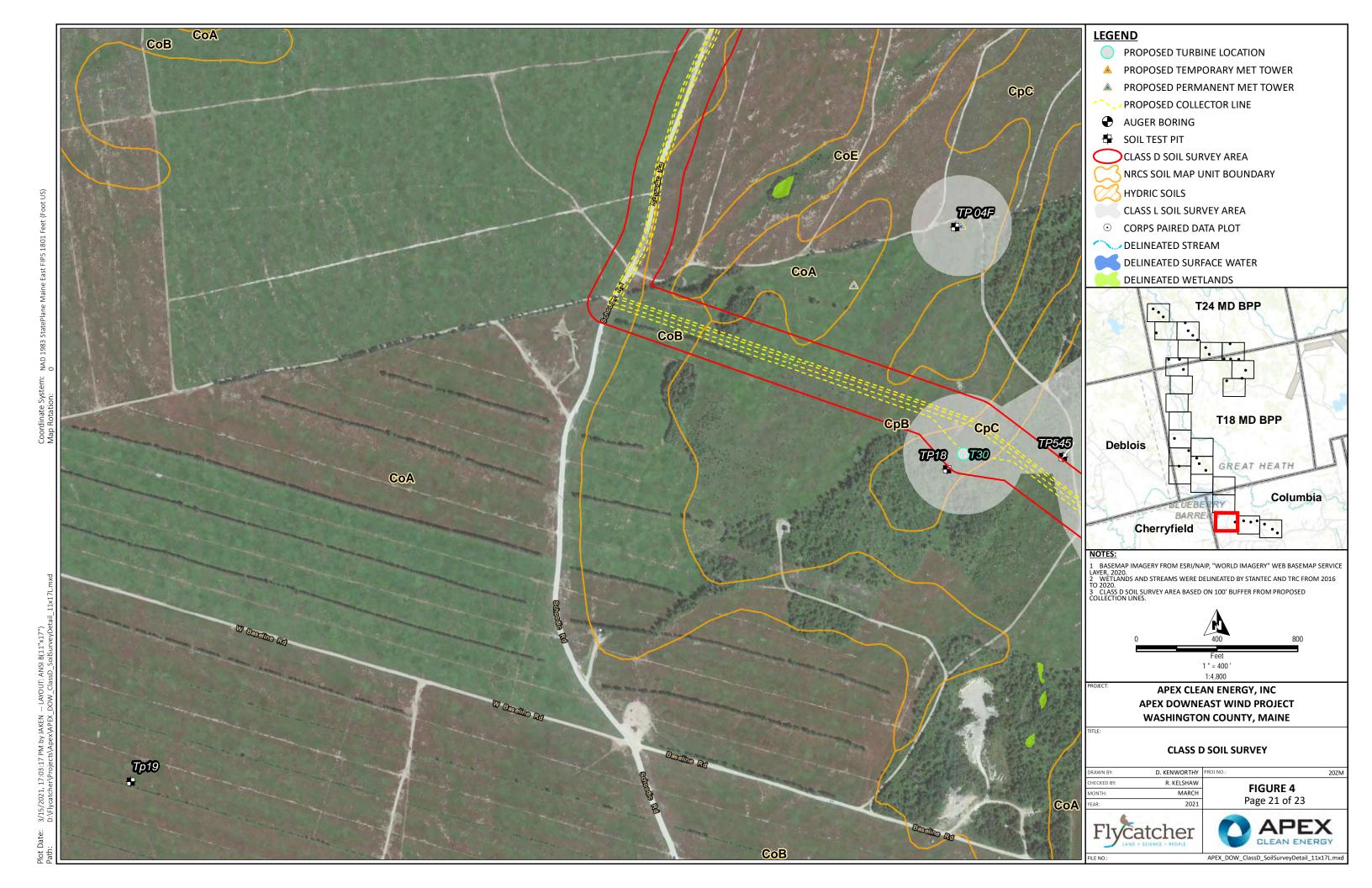


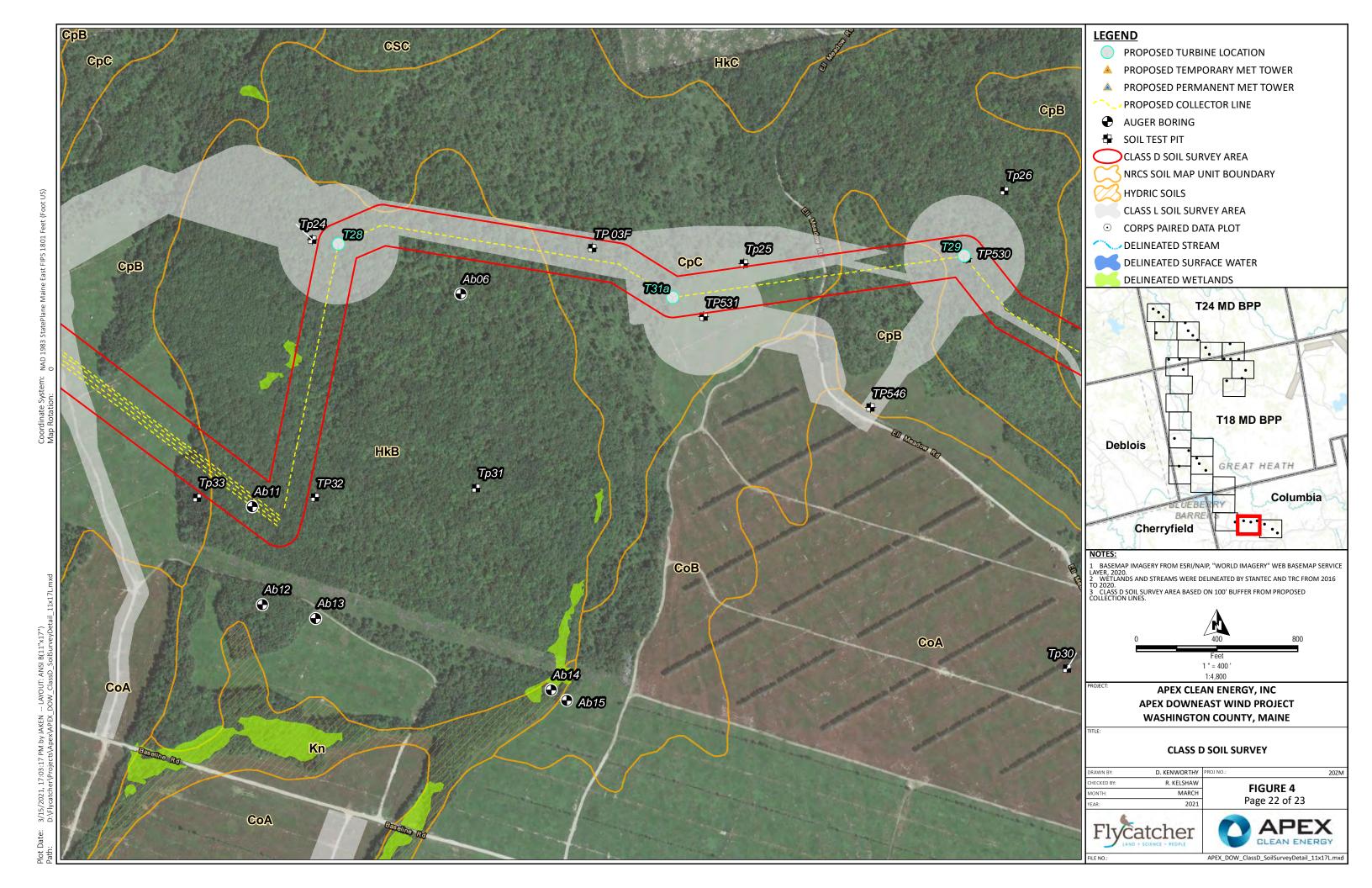


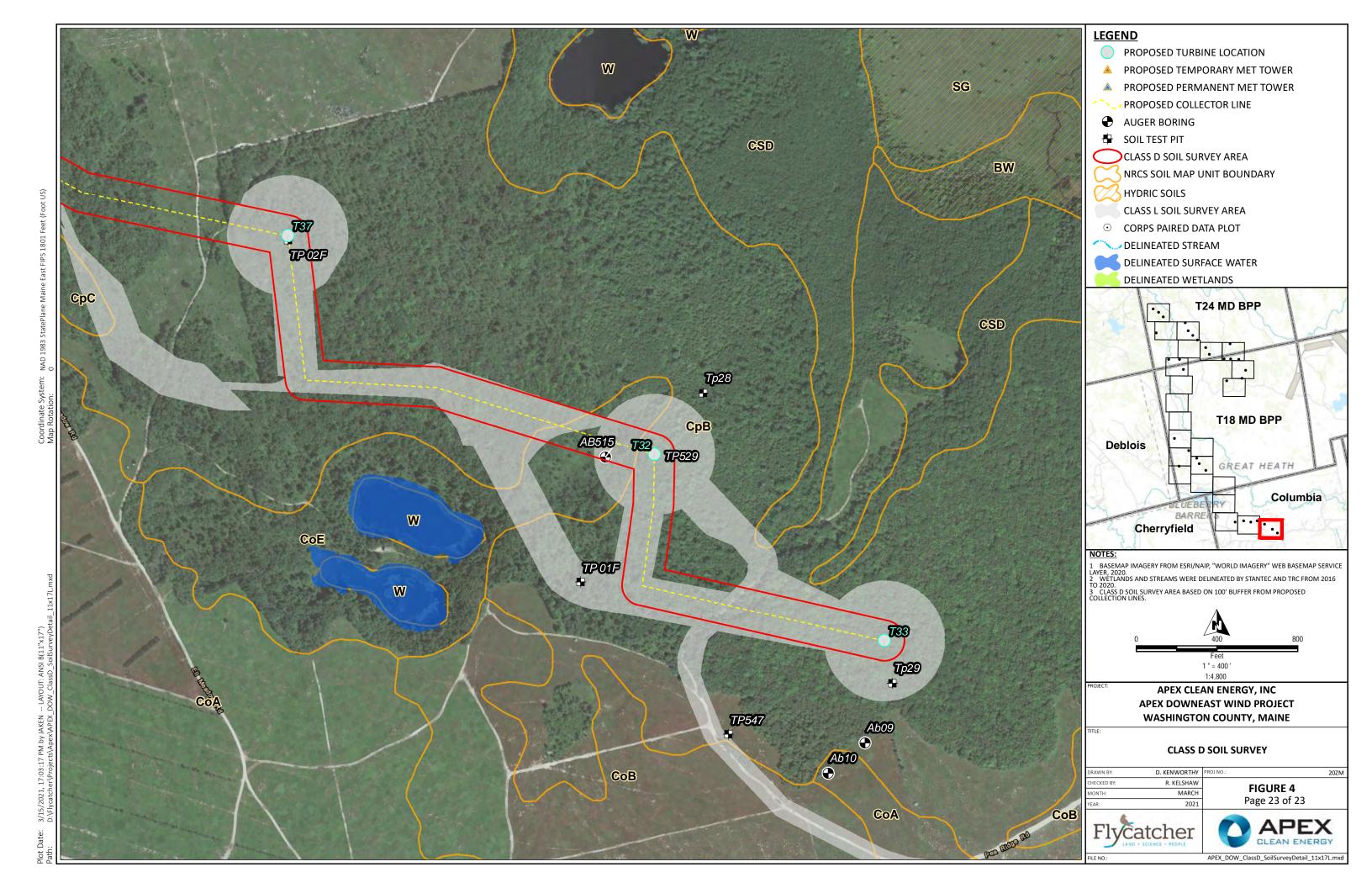












APPENDIX B. Forms

Soil Conditions Summary Table (Form E)

Soil Profile Classification/Information (Form F)



SUMMARY LOG OF SUBSURFACE **EXPLORATIONS AT PROJECT SITES**

Project Name:

Downeast Wind Project

Applicant Name: Apex Clean Energy

Project Location (municipality): T24MD BPP, T25MD BPP, T18MD BPP, T19MD BPP, and Columbia

	Exploration	■ or	Description of subsurface materials by:	Depths t	o (check one):	□ cm	Ground
Lot No.	Symbol (TP 1, B 2, etc.)	if at SSWD Field	 Soil profile/condition (if by S.E.), Soil series name (if by C.S.S.), or by Geologic unit (if by C.G.) 	Mottling (seasonal watertable)	Bedrock	Firm or Restrictive Layer	Limit of Exploration	Surface Slope (%)
	TP01		Masardis v. cob sandy loam	N.O.	N.O.	N.O.	48	8-0
	TP02		Mondanock sandy loam, ex. bl. surf.	N.O.	N.O.	N.O.	48	15-35
	TP03		Mondanock sandy loam, bl. surf.	N.O.	N.O.	N.O.	40	15-35
	TP04		Windsor coarse loamy sand	N.O.	N.O.	N.O.	48	0-8
	TP05		Masardis v. cob sandy loam	N.O.	N.O.	N.O.	48	0-8
	TP06		Mondanock sandy loam, bl. surf.	23	N.O.	N.O.	30	8-15
	TP07		Brayton v. gr. sandy loam	0	N.O.	20	20	0-8
10.27	TP08		Hermon v. st. sandy loam, v. st. surf.	N.O.	N.O.	25	25	8-35
	TP09		Hermon v. gr. loamy sand, v. st. surf.	N.O.	N.O.	21	21	8-35
	TP10		Hermon v. gr. loamy sand, ex. st. surf.	N.O.	N.O.	20	20	8-35
	TP11		Mondanock coarse gr. sandy loam, ex. bl. surf.	N.O.	N.O.	N.O.	48	0-15
	TP12		Mondanock coarse gr. sandy loam, ex. bl. surf.	30	N.O.	N.O.	48	0-15
	TP13		Masardis v. gr. coarse sand	N.O.	N.O.	N.O.	30	0-8
	TP14		Masardis v. gr. coarse sand	N.O.	N.O.	N.O.	21	0-8
	TP15		Masardis gr. coarse sand	N.O.	N.O.	N.O.	40	0-8
	TP16		Masardis gr. coarse sand	N.O.	N.O.	N.O.	37	0-8
	TP17		Hermon v. gr. loamy sand, v. st. surf.	N.O.	N.O.	15	30	8-15
	TP18		Mondanock cob. sandy loam, st. surface	N.O.	N.O.	N.O.	35	8-15
	TP19		Colton ex. gr. loamy sand	N.O.	N.O.	N.O.	25	0-8
	TP20		Colton ex. gr. loamy sand	N.O.	N.O.	N.O.	34	0-8
	TP21		Colton cob. coarse sand	N.O.	N.O.	N.O.	48	0-8
	TP22		Colton cob. coarse sand	N.O.	N.O.	N.O.	48	0-8
	TP23		Colton gr. coarse loamy sand	N.O.	N.O.	N.O.	44	0-8
	TP24		Mondanock gr. sandy loam, st. surf., swp drained	12	N.O.	20	48	15-35
	TP25		Colton gr. loamy sand	N.O.	N.O.	N.O.	40	0-8
	TP26		Monadnock gr. loamy sand	N.O.	N.O.	N.O.	44	8-15
	TP27		Adams sand	N.O.	N.O.	N.O.	481111	1,5-35
	TP28		Monadnock gr. loamy sand	N.O.	N.O.	N.O.	FIED 8 OIL	St5-35

N.O. = Not Observed

Signature	. /	Date: 2021-02-02
Olgitatart	nu	Dato. 2021 02 02
Name Pr	inted/typed: Rodney Kelshaw	Cert/Lic/Reg. # 552
		Certificates. # 302
Title:	□ Licensed Site Evaluator	X Certified Soil Scientist
	□ Certified Geologist	☐ Other:

Rodney D Kelshaw

affix professional seal DEP Form E Rev. 9/01

SUMMARY LOG OF SUBSURFACE EXPLORATIONS AT PROJECT SITES

Project Name:

Downeast Wind Project

Applicant Name: Apex Clean Energy Project Location (municipality): T24MD BPP, T25MD BPP, T18MD BPP, T19MD BPP, and Columbia

. 127	Exploration	■ or	Description of subsurface materials by: Soil profile/condition (if by S.E.),		to (check one,):	i □ cm Limit	Ground Surface
Lot No.	Symbol (TP 1, B 2, etc.)	if at SSWD Field	 Soil series name (if by C.S.S.), or by Geologic unit (if by C.G.) 	Mottling (seasonal watertable)	Bedrock	Restrictive Layer	of Exploration	Slope (%)
	TP29		Monadnock fine sandy loam, v. st. surf.	N.O.	N.O.	N.O.	38	15-35
	TP30		Colton v. gr. loamy sand	N.O.	N.O.	N.O.	32	0-8
	TP31		Skerry v. cob. sandy loam	24	N.O.	35	48	0-8
	TP32		Waumbek loamy sand	19	N.O.	19	48	15-35
	TP33		Mondanock c. gr. loamy sand	N.O.	N.O.	N.O.	34	0-15
	TP34		Tunbridge fine sandy loam	N.O.	24	N.O.	24	0-8
	TP35		Tunbridge fine sandy loam	N.O.	39	N.O.	39	0-8
	TP36		Elliotsville fine sandy loam	15	49	18	49	8-0
	TP37		Nicholville fine sandy loam over silty clay loam	15	N.O.	23	36	0-8
	TP500		Colton gr. loamy sand	N.O.	N.O.	N.O.	40	0-8
	TP501		Colonel sandy loam, v. st. surf.	15	N.O.	25	25	0-8
	TP502		Skerry sandy loam	18	N.O.	30	30	0-8
	TP503		Becket gr. sandy loam	N.O.	N.O.	N.O.	34	8-15
	TP504		Colton ex. gr. loamy sand	N.O.	N.O.	N.O.	36	0-8
	TP505		Adams sandy loam	N.O.	N.O.	N.O.	42	0-8
	TP506		Colton gr. coarse sand	N.O.	N.O.	N.O.	40	8-15
	TP507		Colton v. gr. loamy coarse sand	N.O.	N.O.	N.O.	36	8-15
	TP508		Kinsman gr. sandy loam	0	N.O.	16	30	0-8
	TP509		Skerry cob. sandy loam	34	N.O.	34	40	0-15
	TP510		Scantic silty clay loam	0	N.O.	21	21	0-8
	TP511		Lamoine silt loam	11	N.O.	14	26	0-8
	TP512		Colonel v. cob. sandy loam, st. surf.	12	N.O.	16	30	0-8
	TP513		Skerry v. cob. Sandy loam	17	N.O.	22	32	0-15
	TP514		Colton v. gr. coarse sand	N.O.	N.O.	N.O.	33	0-8
	TP515		Becket v. gr. sandy loam	N.O.	N.O.	21	32	15-3
	TP516		Skerry st. sandy loam, st. surf.	19	N.O.	19	34	0-15
	TP517		Skerry st. sandy loam, st. surf.	28	N.O.	41	41	0-15
	TP518		Skerry st. sandy loam, st. surf.	21	N.O.	21	25	8-15
	TP519		Becket cob. sandy loam	N.O.	N.O.	N.O.	271111	18-15
	TP520		Becket st. sandy loam, st. surf.	N.O.	N.O.	N.O.	K K32SOIL	84

N.O. = Not Observed

Name Printed/typed: Rodney Kelshaw

Title:

Cert/Lic/Reg. # 552

Title:

Certified Geologist

Cert/Lic/Reg. # 552

SS552

Rodney D Kelshaw

affix professional seal

SUMMARY LOG OF SUBSURFACE EXPLORATIONS AT PROJECT SITES

Project Name:

Downeast Wind Project

Applicant Name: Apex Clean Energy Project Location (municipality): T24MD BPP, T25MD BPP, T18MD BPP, T19MD BPP, and Columbia

	Exploration	■ or	Description of subsurface materials by:	Depths	to (check one): # inches	□ cm	Ground
Lot No.	Symbol (TP 1, B 2, etc.)	if at SSWD Field	 Soil profile/condition (if by S.E.), Soil series name (if by C.S.S.), or by Geologic unit (if by C.G.) 	Mottling (seasonal watertable)	Bedrock	Firm or Restrictive Layer	Limit of Exploration	Surface Slope (%)
	TP521		Becket cob. sandy loam	N.O.	N.O.	19	32	0-8
	TP522		Skerry gr. sandy loam, v. st. surf.	22	N.O.	20	35	0-8
	TP523		Colonel v. st. sandy loam	14	N.O.	14	24	0-8
	TP524		Skerry sandy loam, bl. surf.	20	N.O.	20	35	0-8
	TP525		Skerry st. sandy loam	18	N.O.	30	32	0-8
	TP526	I FOURT DE	Becket v. st. fine sandy loam, v. bl. surf.	N.O.	N.O.	20	22	0-15
	TP527		Becket v. st. fine sandy loam, v. bl. surf.	N.O.	N.O.	16	16	0-15
	TP528		Skerry st. fine sandy loam, v. bl. surf.	24	N.O.	32	32	0-15
	TP529		Monadnock cob. sandy loam, v. bl. surf.	N.O.	N.O.	N.O.	40	0-8
	TP530		Monadnock v. cob. sandy loam, bl. surf.	N.O.	N.O.	N.O.	20	0-8
	TP531		Colton v. cob. sandy loam	N.O.	N.O.	N.O.	32	0-8
	TP532		Colton v. cob. sandy loam	N.O.	N.O.	N.O.	32	0-8
	TP533		Monadnock fine sandy loam, bl. surf.	18	N.O.	18	24	0-8
	TP534		Monadnock fine sandy loam, ex. bl. surf.	18	N.O.	18	24	>15
	TP535		Monadnock fine sandy loam, v. bl surf.	N.O.	N.O.	N.O.	21	>15
	TP536		Hermon cob. fine sandy loam, v. st. surf.	N.O.	N.O.	N.O.	16	8-15
	TP537		Hermon cob. fine sandy loam, bl. surf.	N.O.	N.O.	14	24	8-15
	TP538		Masardis sandy loam	N.O.	N.O.	N.O.	21	0-8
	TP539		Monadnock fine sandy loam, st. surf.	N.O.	N.O.	21	21	0-15
	TP540	_	Skerry sandy loam	19	N.O.	26	38	8-15
	TP541		Masardis cob. sandy loam	N.O.	N.O.	N.O.	27	0-8
	TP542		Masardis cob. sandy loam	N.O.	N.O.	N.O.	36	0-8
	TP543		Masardis cob. sandy loam	N.O.	N.O.	N.O.	42	0-8
	TP544		Masardis cob. sandy loam	N.O.	N.O.	N.O.	32	0-8
	TP545		Monadnock v. cob. sandy loam, bl. surf.	N.O.	N.O.	N.O.	23	0-8
	TP546		Colton v. cob. loamy sand	N.O.	N.O.	N.O.	11120soi	0-8

N.O. = Not Observed

	INVESTIGATOR INFORMA	ATION AND SIGNATURE
Signature:		Date: 2021-02-02
Name Pi	rinted/typed: Rodney Kelshaw	Cert/Lic/Reg. # 552
Title:	☐ Licensed Site Evaluator	X Certified Soil Scientist
	☐ Certified Geologist	☐ Other:

Rodney D. Kelshaw

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DEP Form E Rev. 9/01

SUMMARY LOG OF SUBSURFACE **EXPLORATIONS AT PROJECT SITES**

Project Name:

Downeast Wind Project

Applicant Name:
Apex Clean Energy

Project Location (municipality): T24MD BPP, T25MD BPP, T18MD BPP, T19MD BPP, and Columbia

	Exploration	■ or	Description of subsurface materials by:	-	o (check one		r	Ground
Lot No.	Symbol (TP 1, B 2, etc.)	if at SSWD Field	 Soil profile/condition (if by S.E.), Soil series name (if by C.S.S.), or by Geologic unit (if by C.G.) 	Mottling (seasonal watertable)	Bedrock	Firm or Restrictive Layer	Limit of Exploration	Surface Slope (%)
	TP547		Colton coarse gr. loamy sand	N.O.	N.O.	N.O.	32	0-8
	TP548		Colonel sandy loam	12	N.O.	31	33	0-8
	TP549		Colonel sandy loam	10	N.O.	33	37	0-8
	TP550		Skerry sandy loam, stony surf.	22	N.O.	29	36	0-8
	TP551		Colton gr. loamy sand	N.O.	N.O.	N.O.	44	0-8
	TP552		Croghan fine sandy loam	N.O.	N.O.	N.O.	40	0-8
	TP553		Kinsman loamy fine sand	0	N.O.	11	20	0-8
	TP554		Adams fine sandy loam	N.O.	N.O.	N.O.	48	0-8
	TP555		Colton co. gr. sand	N.O.	N.O.	N.O.	36	8-35
	TP556		Colton v. cob. sandy loam	N.O.	N.O.	N.O.	30	8-35
	TP557		Becket st. sandy loam, st. surf.	N.O.	N.O.	N.O.	26	8-35
	TP558		Colonel st. sandy loam	14	N.O.	26	26	8-15
	TP559		Colonel st. sandy loam, ex. bl. surf.	11	N.O.	31	33	0-8
	TP560		Hermon gr. sandy loam, bl. surf.	20	N.O.	32	34	8-35
	TP561		Colton v. cob. coarse loamy sand	N.O.	N.O.	N.O.	24	0-8
	TP562		Colton v. cob. coarse loamy sand	N.O.	N.O.	N.O.	24	0-8
	TP563		Becket gr. sandy loam	N.O.	N.O.	24	32	0-15
	TP564		Skerry sandy loam	24	N.O.	28	39	8-15
	TP565		Becket sandy loam, v. st. surf.	N.O.	N.O.	N.O.	32	0-15
	TP566		Brayton v. cob sandy loam	0	N.O.	N.O.	26	0-8
	TP567		Colonel v. cob sandy loam	12	N.O.	N.O.	32	8-15
	TP568		Brayton v. cob sandy loam	0	N.O.	N.O.	16	0-8
	TP569		Skerry v. cob. sandy loam	18	N.O.	25	28	8-35
	TP570		Skerry v. cob. sandy loam	N.O.	N.O.	16	16	8-35
-31.2	TP 01F		Colton gr. coarse sand, bl surf.	N.O.	N.O.	N.O.	32	0-8
	TP 02F		Monadnock v.st. fine sandy loam, ex. bl. surf.	20	N.O.	20	28	8-15
	TP 03F		Colton v. cob. loamy sand	N.O.	N.O.	N.O.	24	3-8
	TP 04F		Colton v. gr. loamy sand	N.O.	N.O.	N.O.	26	8-15
	TP 05F		Colton gr. sandy loam	N.O.	N.O.	N.O.	29,,,,,	1,8-15
	TP 06F		Colonel st. fine sandy loam	9	N.O.	9	11320 SC	11L0-8

N.O. = Not Observed

	INVESTIGATOR INFORMA	ATION AND SIGNATURE
Signature	i: //	Date: 2021-02-02
Name Pr	inted/typed: Rodney Kelshaw	Cert/Lic/Reg. # 552
Title:	☐ Licensed Site Evaluator☐ Certified Geologist	X Certified Soil Scientist ☐ Other:

Rodney D Kelshaw

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SUMMARY LOG OF SUBSURFACE EXPLORATIONS AT PROJECT SITES

Project Name:

Downeast Wind Project

Applicant Name: Apex Clean Energy Project Location (municipality): T24MD BPP, T25MD BPP, T18MD BPP, T19MD BPP, and Columbia

	Exploration	■ or	Description of subsurface materials by:	Depths t	o (check one,): ♣ inches	□ cm	Ground
Lot No.	Symbol (TP 1, B 2, etc.)	if at SSWD Field	 Soil profile/condition (if by S.E.), Soil series name (if by C.S.S.), or by Geologic unit (if by C.G.) 	Mottling (seasonal watertable)	Bedrock	Firm or Restrictive Layer	Limit of Exploration	Surface Slope (%)
	TP 07F		Becket st. sandy loam, ex. bl. surf.	N.O.	N.O.	N.O.	31	8-35
	TP 08F		Skerry st. sandy loam	N.O.	N.O.	N.O.	25	8-15
	TP 09F		Brayton v. st. sandy loam	0	N.O.	6	8	0-3
	TP 10F		Skerry v. cob. sandy loam	N.O.	N.O.	N.O.	34	3-8
	TP 11F		Skerry v. cob. sandy loam	N.O.	N.O.	20	30	8-15
	TP 12F		Sheepscot v. gr. coarse sand	N.O.	N.O.	N.O.	38	8-15
	TP 13F		Skerry cob. sandy loam, v. bl. surf.	N.O.	N.O.	19	29	3-8
	TP 14F		Hermon v. st. fine sandy loam, v. st. surf.	N.O.	N.O.	37	37	8-35
	TP 15F		Hermon loamy sand, st. surf.	N.O.	N.O.	N.O.	33	8-15
	TP 16F		Colonel v.st. fine sandy loam, v. st. surf.	15	N.O.	15	28	3-8
	TP 17F		Swanton sandy loam over silt loam	15	N.O.	23	42	3-8
	TP 18F		HAHT gr. loam over silt loam	1	N.O.	1	48	0-3
	RC 01F		Colton gr. coarse loamy sand	N.O.	N.O.	N.O.	96	0-3
	RC 02F		Colton gr. coarse loamy sand	N.O.	N.O.	N.O.	96	8-15
	RC 03F		Colton gr. coarse loamy sand	N.O.	N.O.	N.O.	96	0-3
							20111111	111111
						2	STELED SOL	SCIO

Signature:

Title:

INVESTIGATOR INFORMATION AND SIGNATURE

Date: 2021-02-02

Name Printed/typed: Rodney Kelshaw

Cert/Lic/Reg. # 552

□ Licensed Site Evaluator
 □ Certified Geologist

X Certified Soil Scientist

☐ Other:

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DEP Form E Rev. 9/01

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Downeast Wind Project

Project Name:

SOIL CONDITIONS SUMMARY TABLE

Applicant Name: Apex Clean Energy SUMMARY LOG OF SUBSURFACE EXPLORATIONS AT PROJECT SITES

Project Location (municipality): T24MD BPP, T25MD BPP, T18MD BPP, T19MD BPP, and Columbia

	Exploration	■ or	Description of subsurface materials by:		to (check one)	: # inches	□ cm	Ground
Lot No.	Symbol (TP 1, B 2, etc.)	if at SSWD Field	 Soil profile/condition (if by S.E.), Soil series name (if by C.S.S.), or by Geologic unit (if by C.G.) 	Mottling (seasonal watertable)	Bedrock	Firm or Restrictive Layer	Limit of Exploration	Surface Slope (%)
	AB01		Becket gr. loamy sand	N.O.	N.O.	N.O.	48	8-35
	AB02		Mondanock coarse gr. sandy loam, ex. bl. surf.	N.O.	N.O.	N.O.	40	0-15
	AB03		Kinsman loamy sand	9	N.O.	N.O.	48	8-15
	AB04		Kinsman loamy sand	13	N.O.	N.O.	30	0-8
	AB05		Kinsman loamy sand	12	N.O.	N.O.	30	0-8
	AB06		Mondanock gr. sandy loam, st. surf.	N.O.	N.O.	N.O.	40	15-35
	AB07		Kinsman loamy sand	0	N.O.	N.O.	30	8-15
	AB08		Kinsman loamy sand	13	N.O.	N.O.	30	8-15
	AB09		Colton v. cob loamy sand	N.O.	N.O.	N.O.	15	0-8
	AB10		Colton v. cob loamy sand	N.O.	N.O.	N.O.	10	0-8
	AB11		Monadnock st. fine sandy loam, st. surf., mod. well drained	N.O.	N.O.	N.O.	19	8-15
	AB12		Monadnock st. fine sandy loam, st. surf., mod. well drained	24	N.O.	N.O.	35	0-8
	AB13		Monadnock sandy loam	20	N.O.	N.O.	20	0-8
	AB14		Kinsman v. st. loamy sand; v. st. surf.	0	N.O.	N.O.	20	0-8
	AB15		Colton v. gr loamy sand	N.O.	N.O.	N.O.	20	0-8
	AB16		Swanton fine sandy loam, swp. dr.	14	N.O.	20	20	0-8
	AB17		Swanton fine sandy loam, p. dr.	0	N.O.	20	20	0-8
	AB18		Tunbridge fine sandy loam	N.O.	34	24	34	8-15
	AB19		Scantic silty clay loam	6	N.O.	12	12	0-8
	AB20		Buxton silty clay loam	16	N.O.	20	20	8-15
	AB21		Salmon v. fine sandy loam and silt loam varves	16	N.O.	N.O.	48	8-15
	AB22		Lamoine silt loam	13	N.O.	20	20	8-15
	AB23		Nicholville fine sandy loam over silt loam	17	N.O.	18	20	0-8
	AB24		Buxton silty clay loam	16	N.O.	12	20	8-15
	AB25		Scantic silt loam	5	N.O.	19	19	0-8
	AB26		Lamoine silt loam	15	N.O.	22	22	0-8
							SO SOIL	11/1/

N.O. = Not Observed

0:	///	D-4 0004 00 00
Signature		Date: 2021-02-02
Name Pr	inted/typed: Rodney Kelshaw	Cert/Lic/Reg. # 552
		Cerulioney. # 332
Title:	□ Licensed Site Evaluator	X Certified Soil Scientist
	□ Certified Geologist	☐ Other:

Rodney D. Kelshaw

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DEPIFORME Rev. 9/01

SUMMARY LOG OF SUBSURFACE **EXPLORATIONS AT PROJECT SITES**

Project Name:

Applicant Name: Apex Clean Energy **Downeast Wind Project**

Project Location (municipality): T24MD BPP, T25MD BPP, T18MD BPP, T19MD BPP, and Columbia

	Exploration	■ or	Description of subsurface materials by:	Depths 1	to (check one)	: # inches	cm cm	Ground
Lot No.	Symbol (TP 1, B 2, etc.)	if at SSWD Field	 Soil profile/condition (if by S.E.), Soil series name (if by C.S.S.), or by Geologic unit (if by C.G.) 	Mottling (seasonal watertable)	Bedrock	Firm or Restrictive Layer	Limit of Exploration	Surface Slope (%)
	AB500		Brayton sandy loam	8	N.O.	18	18	0-8
	AB501		Searsport mucky sand	0	N.O.	11	34	0-8
	AB502		Searsport mucky sand	0	N.O.	23	24	0-8
	AB503		Scantic silty clay	3	N.O.	3	20	0-8
	AB504		Lamoine silt loam	20	N.O.	20	26	0-8
	AB505		Kinsman v. gr. loamy sand	0	N.O.	14	17	0-8
	AB506		Kinsman v. fine sandy loam	0	N.O.	18	24	0-8
	AB507		Skerry gr. sandy loam, v. bl. surf.	19	N.O.	25	27	0-8
	AB508		Becket loamy sand	N.O.	N.O.	32	35	8-15
	AB509		Skerry sandy loam, st. surf.	18	N.O.	24	24	8-15
	AB510		Searsport muck	0	N.O.	32	34	0-8
	AB511		Becket v. st. sandy loam, v. st. surf.	N.O.	N.O.	22	22	8-15
	AB512		Skerry sandy loam	19	N.O.	19	30	8-15
	AB513		Skerry sandy loam, v. bl. surf.	19	N.O.	24	25	8-15
	AB514		Skerry sandy loam, v. st. surf.	19	N.O.	24	25	0-8
	AB515		Monadnock cob. sandy loam, v. bl. surf.	N.O.	N.O.	N.O.	40	>15
	AB516		Kinsman coarse sand, swpdr	15	N.O.	N.O.	32	0-8
	AB517		Brayton sandy loam	0	N.O.	N.O.	20	0-8
	AB518		Elmwood sandy loam over silty clay loam	0	N.O.	N.O.	20	0-8
	AB519		Colonel st. sandy loam	16	N.O.	16	20	0-8
	AB520		Searsport muck	0	N.O.	N.O.	27	0-8
	AB521		Lamoine silt loam	14	N.O.	16	20	0-8
	AB522		Skerry sandy loam, bl. surf.	22	N.O.	29	30	0-8
	AB523		Becket gr. sandy loam, v. bl. surf.	N.O.	N.O.	N.O.	16	0-8
	AB524		Adams v. fine sandy loam	N.O.	N.O.	N.O.	48	0-8
	AB525		Adams loamy fine sand	40	N.O.	N.O.	48	0-8
	AB526		Adams loamy fine sand	N.O.	N.O.	N.O.	48	0-8
							111111111111111111111111111111111111111	1111111

N.O. = Not Observed

Signature	e: MV	Date: 2021-02-02
Name Pr	inted/typed: Rodney Kelshaw	Cert/Lic/Reg. # 552
Title:	□ Licensed Site Evaluator	X Certified Soil Scientist
	□ Certified Geologist	☐ Other:

Rodney D. Kelshaw

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SUMMARY LOG OF SUBSURFACE EXPLORATIONS AT PROJECT SITES

Project Name:

Downeast Wind Project

Applicant Name:
Apex Clean Energy

Project Location (municipality): T24MD BPP, T25MD BPP, T18MD BPP, T19MD BPP, and Columbia

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.)	Mottling (seasonal watertable)	Bedrock): 丞 inches Firm or Restrictive Layer	Limit of Exploration	Ground Surface Slope (%)
	AB527		Searsport muck	0	N.O.	26	26	0-8
	AB528		Searsport muck	0	N.O.	32	32	0-8
	AB529		Brayton ex. st. sandy loam, ex. st. surf.	0	N.O.	12	14	0-8
	AB530		Searsport muck over v. st. sandy loam	0	N.O.	16	16	0-8
	AB531		Searsport muck over fine sandy loam	0	N.O.	N.O.	18	0-8
	AB532		Searsport muck over sandy loam	0	N.O.	N.O.	18	8-0
	AB 01F		Hermon gr. loamy sand, stony surf.	N.O.	N.O.	26	34	8-15
	AB 02F		Skerry st. fine sandy loam	22	N.O.	24	32	8-15
	AB 03F		Skerry v. cob sandy loam	N.O.	N.O.	26	34	3-8
	AB 04F		Skerry v. cob sandy loam	N.O.	N.O.	34	34	3-8
	AB 05F		Colonel v. st. sandy loam, v. bl. surface	14	N.O.	14	25	0-8
	AB 06F			N.O.	N.O.	26	26	
	AB 07F		Skerry ex. st. sandy loam	32	N.O.	32	34	0-8
	AB 08F		Scantic silty clay loam	0	N.O.	0	16	0-8
	AB 09F		Scantic silty clay loam	0	N.O.	0	16	0-8
							71/1/11/11/11/11/11/11/11/11/11/11/11/11	11/1/4
							Rodney	D. C.

Signature: Date: 2021-02-02

Name Printed/typed: Rodney Kelshaw Cert/Lic/Reg. # 552

Title: ☐ Licensed Site Evaluator ☐ Certified Geologist

N.O. = Not Observed

X Certified Soil Scientist

☐ Other:

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Kelshaw

SOIL PROFILE / CLASSIFIC	ATION INFORMATION	DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES
Project Name: DOWNEAST WIND PROJECT	Applicant Name: APEX CLEAN ENERGY	Project Location (municipality): T18,19,24 \$25 MD BPP \$ COLUMBIA
Exploration Symbol: TP27 🗵	est Pit □ Boring Explora	tion Symbol: TP 566 ☑ Test Pit ☐ Boring

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soil o	/	Soil series/phas	e name:	☐ Hydric Ma Non-hydric	Hydrologic C/D Soil Group

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soil d	lata		fication Slope	Limiting Factor Depth	☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Walls	INVESTIGATOR INFORMAT	ION AND SIGNATURE
Signatur	e: Frank	Date: 2020-04-09
Name Pr	inted/typed: Rodney Kelshaw	Cert/Lic/Reg. # 552
Title:	☐ Licensed Site-Evaluator ☐ Certified Geologist	☑ Certified Soil Scientist ☐ Other:

Rodney D. Kelshaw

SS552

PAGE 2 OF 5 **FORM F 2/02** DETAILED DESCRIPTION OF SOIL PROFILE / CLASSIFICATION INFORMATION SUBSURFACE CONDITIONS AT PROJECT SITES Project Name: Applicant Name: Project Location (municipality): APEX CLEAN ENERGY DOWNEAST WIND PROJECT TIB, 19, 24 \$ 25 MD BPP \$ COLUMBIA Exploration Symbol: TP 552 Test Pit Exploration Symbol: TP 555 Z Test Pit □ Boring Ground surface elev. 268 O__ " Organic horizon thickness Ground surface elev. 290 " Organic horizon thickness Mottling Color Consistency Consistency Color Mottling Texture 5412.5/1 Fibric NIA FR 54R2.5/1 sandy loon fine 7.54R 6/1 54R4/6 gr. sandy VER 7,54R4/6 Depth below mineral soil surface (inches) Depth below mineral soil surface (inches) Sandy 12 54R 5/8 NONE lanm sandy NONE FR 18 18 OBSELVED OBSERVED 104R516 V. fine 104R5 6 Co gr 24 24 Sandu Toolaa 2.54 5/4 2.545/6 30 30 2,5Y5/3 36 36" LOI 42 42 OI 48 Slope Limiting Factor ☐ Groundwater Classification Classification soil data soil data Slope Limiting Factor ☐ Groundwate ☐ Restrictive Layer by S.E.**≯** S.E. >> ☐ Restrictive Layer ☐ Bedrock Profile Condition Profile Condition Percent Depth Hydrologic Soil series/phase name: Hydrologic soil data soil data Soil series/phase name: □ Hydric □ Hydric FINE SANDY LOAM S.S. >> Ma Non-hydric COCTON GRAVELLY SAND Non-hydric S.S. » ROGHAN Exploration Symbol: TP553 ☐ Test Pit □ Boring Exploration Symbol: TP09 ☐ Boring

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	INVESTIGATOR INFORM	ATION AND SIGNATURE
Signature	: From	Date: 2020-04-09
Name Pr	inted/typed: Rodney Kelshaw	Cert/Lic/Reg. # 552
Title:	 □ Licensed Site Evaluator □ Certified Geologist 	□ Certified Soil Scientist □ Other:

affix professional seal

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APPENDIX C

Map Unit Descriptions



Map Unit: Adams sandy loam

Classification: Sandy, isotic, frigid Typic Haplorthods

Map Unit Symbol: AdA, AdC

SETTING

Parent Material: Glacial-fluvial or glacio-lacustrine sand

Landform: Outwash plains, deltas, lake plains, moraines, terraces, and eskers

Position in Landscape: Backslope, summit and base slope

Slope Gradient Range: (A) 0-8% (C) 15-35%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Excessively and somewhat excessively drained

Depth to Water Table: > 80"

Typical Profile Description:

Surface Layers:

0 – 3" Dark reddish brown, peat

3 – 5" Gray, sandy loam

5-12" Yellowish red, sandy loam

Subsurface Layers:

12 – 24" Yellowish brown, loamy sand

24 - 40" Light olive brown, sand

Substratum:

40 – 48" Light yellowish brown, sand

Hydrologic Group: A
Potential for Frost Action: Low
Available Water Storage: Low

Saturated Hydraulic Conductivity (Ksat): Moderately high to high

Depth to Bedrock: >80"
Hazard to Flooding: None
Erosion T Factor: 5

INCLUSIONS (within mapping unit)

Similar: Colton and Croghan

Dissimilar: Kinsman and Naumburg

USE AND MANAGEMENT

Mapped along an apparent historic beachfront at the boundary of a blueberry field and forestland along baseline road. It is also mapped in the northern portion of the site in a nearly level areas between a small ridge and a pond. Uses in the area are mainly wild blueberry production and forestland. Major management concerns are that cut banks and slopes are not stable, droughtiness, it is a poor filter, and it has a hazard of seepage.

The proposed uses for these soils are project access roads and a turbine pad. The rating for these soils as a haul road for logging is considered "slight", which indicates that there are no significant limitations that affect construction activities. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) ranges from "not limited" to "somewhat limited" for the steeper slopes. Not limited indicates the soil has features that are very favorable for this use. Somewhat limited indicates the soil has features that are moderately favorable for this use.



Map Unit: Becket-Skerry Complex

Classification: Becket: Coarse-loamy, isotic, frigid Oxyaquic Haplorthods

Skerry: Coarse-loamy, isotic, frigid Aquic Haplorthods

Map Unit Symbol: BsB, BsC

SETTING

Parent Material: Loamy mantle overlying dense, sandy till on drumlins and glaciated uplands

Landform: Hills

Position in Landscape: Summit, shoulder, backslope Slope Gradient Range: (B) 8-15% (C) 15-35%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Becket: Well drained

Skerry: Moderately well drained

Depth to Water Table: Becket: >80"

Skerry: 16 - 40"

Typical Profile Description:

Surface Layers:

0 – 2" Dark reddish brown, peat 2 – 3" Gray, gravelly sandy loam

3 – 7" Dark brown, gravelly sandy loam

Subsurface Layers:

7-13" Dark yellowish brown, gravelly sandy loam

13 – 24" Light olive brown, gravelly sandy loam

Substratum:

24 – 34" Olive, gravelly sandy loam

Hydrologic Group: C/D
Potential for Frost Action: Moderate
Available Water Storage: Low

Saturated Hydraulic Conductivity (Ksat): Moderately low to moderately high

Depth to Bedrock: >80" Hazard to Flooding: None Erosion T Factor: 3

INCLUSIONS (within mapping unit)

Similar: Monadnock

Dissimilar: Colonel and Brayton

USE AND MANAGEMENT

This map unit is mapped in forested areas within the northcentral portion of the site. Since these soils are well drained and moderately well drained typically seasonal water table is not a major concern for construction activities and ongoing project use. These soils are formed on a dense till so excavation can be difficult. The loamy mantle and underlying sandy till can typically be used on-site for road building and other site development.

The proposed uses for this soil are project access roads and turbine pads. The rating for this soil as a haul road for logging is considered "moderate", which indicates that there are one or more limitations that can cause some difficulty for construction. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) is "somewhat limited" for the steeper slopes. Somewhat limited indicates the soil has features that are moderately favorable for this use.



Map Unit: Brayton sandy loam

Classification: Loamy, mixed, active, nonacid, frigid, shallow Aeric Endoaquepts

Map Unit Symbol: BrA

SETTING

Parent Material: Lodgement till
Landform: Ground moraines
Position in Landscape: Base slope
Slope Gradient Range: (A) 0-8%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Poorly drained

Depth to Water Table: 0"

Typical Profile Description:

Surface Layers:

0 – 5" Black, muck; extremely stony

5 – 9" Gray, extremely stony sandy loam; redox. dark yellowish brown 5%

9 – 14" Olive gray, very cobbly sandy loam; redox. dark yellowish brown 5%

Subsurface Layers:

14 – 24" Light olive brown, very cobbly sandy loam; redox. dark yellowish brown 5%

24 – 26" Light olive brown, very cobbly sandy loam; redox. strong brown 30%

Substratum:

26" Lodgment till, dense

Hydrologic Group: D **Potential for Frost Action:** High **Available Water Storage:** Low

Saturated Hydraulic Conductivity (Ksat): Moderately low to moderately high

Depth to Bedrock: >80"
Hazard to Flooding: None
Erosion T Factor: 3

INCLUSIONS (within mapping unit)

Similar: Colonel

Dissimilar: Skerry and Becket

USE AND MANAGEMENT

This map unit is mapped in forested areas within the northcentral portion of the site. Major use and management concerns are that Brayton soils are hydric, so most areas mapped as Brayton are wetlands, and as such, impacts to these areas could require regulatory oversight. Brayton soils are very deep to bedrock yet shallow to dense till which typically creates a seasonal high water table at or close to the mineral soil surface, so activities impacted by a high-water table, such as foundations and roads could require additional engineering. These soils can be compacted if exposed to heavy equipment when wet so equipment limitations may be severe. Thick organic surface layers can lead to instability. Avoidance of these area is the preferred method of planning around these soils. Accepted construction techniques such as matting or bridging to minimize soil disturbance and compaction are recommended in these areas. Erosion and sediment controls should be installed prior to commencement of construction activities to avoid erosion and sedimentation of wetlands and other adjacent resources. The proposed uses for this map unit are project access roads and turbine pads. The rating for this map unit as a haul road for logging is considered "severe", which indicates that there are one or more limitations that can make construction very difficult or costly; in this case being wetness. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) is "very limited" due to the depth to the saturated zone. Very limited indicates the soil has one or more features that are unfavorable for this use.



Map Unit: Colonel stony sandy loam

Classification: Loamy, isotic, frigid, shallow Aquic Haplorthods

Map Unit Symbol: CcA, CcB

SETTING

Parent Material: Lodgement till Landform: Ground moraines

Position in Landscape: Foot slope and base slope

Slope Gradient Range: (A) 0-8%, (B) 8-15%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Somewhat poorly

Depth to Water Table: 7-16"

Typical Profile Description:

Surface Layers:

0 - 3" Black, muck; extremely stony
 3 - 9" Gray, extremely stony sandy loam
 9 - 14" Olive gray, very cobbly sandy loam

Subsurface Layers:

14 – 24" Light olive brown, very cobbly sandy loam; redox. dark yellowish brown 5%

24 – 26" Light olive brown, very cobbly sandy loam; redox. strong brown 30%

Substratum:

26" Lodgment till, dense

Hydrologic Group: D **Potential for Frost Action:** High **Available Water Storage:** Low

Saturated Hydraulic Conductivity (Ksat): Moderately high or in solum and low to moderately high in dense substratum

Depth to Bedrock: >80"
Hazard to Flooding: None
Erosion T Factor: 3

INCLUSIONS (within mapping unit)

Similar: Westbury
Dissimilar: Brayton

USE AND MANAGEMENT

This map unit is mapped in forested areas within the northcentral portion of the site. Major use and management concerns are that Colonel soils are very deep to bedrock yet shallow to dense till which typically creates a seasonal high water table at or close to the mineral soil surface, so activities impacted by a high-water table, such as foundations and roads could require additional engineering. These soils can be compacted if exposed to heavy equipment when wet so equipment limitations may be severe. Avoidance of these area is the preferred method of planning around these soils. Accepted construction techniques such as matting or bridging to minimize soil disturbance and compaction are recommended in these areas. Erosion and sediment controls should be installed prior to commencement of construction activities to avoid erosion and sedimentation of adjacent resources.

The proposed uses for this map unit are project access roads and turbine pads. The rating for this map unit as a haul road for logging is considered "severe", which indicates that there are one or more limitations that can make construction very difficult or costly; in this case being wetness. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) is "very limited" due to the depth to the saturated zone. Very limited indicates the soil has one or more features that are unfavorable for this use.



Map Unit: Colonel-Skerry Association

Classification: Colonel: Loamy, isotic, frigid, shallow Aquic Haplorthods

Skerry: Coarse-loamy, isotic, frigid Aquic Haplorthods

Map Unit Symbol: CsB, CsC

SETTING

Parent Material: Loamy mantle overlying dense and dense till, sandy till on drumlins and glaciated uplands

Landform: Hills and ground moraines

Position in Landscape: Summit, shoulder, backslope, foot slope and base slope

Slope Gradient Range: (B) 8 -15%, **(C)** 15-35%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Colonel: Somewhat poorly drained

Skerry: Moderately well drained

Depth to Water Table: Colonel: 7 – 16"

Skerry: 16 - 40"

Typical Profile Description:

Surface Layers:

0-4" Black, fine sandy loam

4 – 8" Brown, sandy loam

8 – 11" Brown, very cobbly sandy loam

11 – 17" Strong brown, very cobbly sandy loam

Subsurface Layers:

17 – 22" Light olive brown, gravelly sandy loam; redox. strong brown 10%, firm

Substratum:

22 – 26" Pale olive, very gravelly loamy sand, dense

26 - 32" Pale olive, loamy sand; loose in hand

Hydrologic Group: D

Potential for Frost Action: Moderate **Available Water Storage:** Very low to low

Saturated Hydraulic Conductivity (Ksat): Very low to moderately high

Depth to Bedrock: >80" Hazard to Flooding: None Erosion T Factor: 3

INCLUSIONS (within mapping unit)

Similar: Becket and Westbury
Dissimilar: Brayton and Searsport

USE AND MANAGEMENT

These map units are mapped in forested areas within the northcentral portion of the site. Since these soils are well moderately well drained to somewhat poorly drained, so seasonal water table may be a concern for construction activities and water management in some areas. These soils are formed on a dense till so excavation can be difficult. The loamy mantle and underlying sandy till can typically be used on-site for road building and other site development. The proposed uses for this soil are project access roads and turbine pads. The rating for this soil as a haul road for logging is considered "moderate", which indicates that there are one or more limitations that can cause some difficulty for construction, in this case due to the potential for wetness. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) is "very limited" due to the depth to the saturated zone. Very limited indicates the soil has one or more features that are unfavorable for this use.



Map Unit: Colton, gravelly loamy sand

Classification: Sandy-skeletal, isotic, frigid Typic Haplorthods

Map Unit Symbol: CoA, CoB, CoC, CoD

SETTING

Parent Material: Sandy skeletal glacio-fluvial deposits

Landform: Outwash terraces

Position in Landscape: Summit, backslope, side slope

Slope Gradient Range: (A) 0-8%, (B) 8-15%, (C) 15-35%, (D) >35%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Excessively drained

Depth to Water Table: > 80"

Typical Profile Description:

Surface Layers:

0 – 3" Reddish gray, fine sandy loam 3 – 4" Reddish gray, fine sandy loam

4-5" Dark reddish brown, very cobbly fine sandy loam 5-10" Strong brown, very cobbly course sandy loam

Subsurface Layers:

10 – 18" Dark yellowish brown, very coarse gravelly loamy coarse sand

18 – 23" Yellowish brown, cobbly coarse sand

Substratum:

22 – 48" Light olive brown, very coarse gravelly coarse sand

Hydrologic Group: A
Potential for Frost Action: Low
Available Water Storage: Very low

Saturated Hydraulic Conductivity (Ksat): Moderately high to high

Depth to Bedrock: Very Deep Hazard to Flooding: None Erosion T Factor: 3

INCLUSIONS (within mapping unit)

Similar: Monadnock and Hermon

Dissimilar: Kinsman poorly and somewhat poorly drained

USE AND MANAGEMENT

These soils are on glacial outwash terraces, plains, kames, and eskers with variable slopes across the site. The soils formed in water-sorted sand, gravel, cobbles, and stones typically derived from granite. Within the site these soils are mapped in the northern and southern areas and are typically associated with or mapped as improved blueberry land. Along their margins they extend into forested areas and may have a boulder surface. Because these soils are excessively drained and are very deep to bedrock and densic contact issues with seasonal water or obstructions to excavation should not be significant. Due to the coarse texture and loose structure they may not maintain excavated walls and be susceptible to caving without support. Revegetation of impacted soil may also be difficult if topsoil is not added. The proposed uses for this soil are project access roads and turbine pads. The rating for this map unit as a haul road for logging is considered "slight", which indicates that there are no significant limitations that affect construction activities. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) ranges from "not limited" to "somewhat limited" for the steeper slopes. Not limited indicates the soil has



features that are very favorable for this use. Somewhat limited indicates the soil has features that are moderately favorable for this use.



Map Unit: Croghan fine sandy loam

Classification: Sandy, mixed, frigid Aquic Haplorthods

Map Unit Symbol: CrA

SETTING

Parent Material: Sandy glacial-fluvial deposits

Landform: Eskers, outwash plains, and kame terraces

Position in Landscape: Backslope Slope Gradient Range: (A) 0-8%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Moderately well drained

Depth to Water Table: 16 to 30"

Typical Profile Description:

Surface Layers:

0-3" Black, peat

3 – 5" Black, fine sandy loam 5 – 6" Gray, fine sandy loam

6 – 9" Yellowish red, fine sandy loam 9 – 19" Yellowish red, fine sandy loam

Subsurface Layers:

19 – 24" Yellowish brown, very fine sandy loam

24 – 29" Light olive brown, very fine sandy loam

Substratum:

29 – 40" Light olive brown, gravelly coarse sand

Hydrologic Group: A

Potential for Frost Action: Moderate **Available Water Storage:** Low

Saturated Hydraulic Conductivity (Ksat): High to very high

Depth to Bedrock: >80" Hazard to Flooding: None Erosion T Factor: 5

INCLUSIONS (within mapping unit)

Similar: Colton and Adams
Dissimilar: Kinsman and Naumburg

USE AND MANAGEMENT

Mapped in the northern portion of the site in a nearly level areas between a small ridge and a pond. This is a transitional area that also encompasses an active stream floodplain. Typical use in the area is forestland. The proposed use for this map unit is a project access road. The rating for this map unit as a haul road for logging is considered "slight", which indicates that there are no significant limitations that affect construction activities.



Map Unit: Human Altered/Human Transported Materials

Classification: N/A: Variable Conditions

Map Unit Symbol: HAHT

SETTING

Parent Material: Lodgement till

Landform: Summits and sideslopes

Position in Landscape: Altered and improved areas of the developed facility

Slope Gradient Range: (A) 0-3%

COMPOSITION AND SOIL CHARACTERISTICS

Depth to Water Table: 4"
Typical Profile Description:

Surface Layers:

0-7" Brown, gravelly sandy loam, m, FR 7-14" Olive brown, gravelly silt loam, m, FI Redox Con. strong brown 15%

Subsurface Layers:

14 – 21" Dark olive brown, gravelly silt loam, m, FI

Substratum:

21 – 31" Greenish gray, very fine loamy sand, m, FI

Redox Con. strong brown 10%

31 - 48" Greenish gray, silty clay loam, m, VFI

Redox Con. strong brown 5%

Hydrologic Group: D **Potential for Frost Action:** High **Available Water Storage:** ---

Saturated Hydraulic Conductivity (Ksat): ---

Depth to Bedrock: >80"
Hazard to Flooding: --Erosion T Factor: ---

INCLUSIONS (within mapping unit)

Similar: Swanton
Dissimilar: Colton

USE AND MANAGEMENT

The proposed O&M building is located on Route 1 in Columbia on a parcel that was partially developed as a small restaurant. This map unit includes the building, paved driveway, gravel driveway and parking, maintained lawn, and subsurface wastewater disposal system. altered and improved lands surrounding the existing building. This map unit is adjacent to delineated wetland so erosion and sediment controls should be installed prior to commencement of construction activities to avoid erosion and sedimentation. The watertable is within 12-inches of the soil surface which could be limiting for shallow excavations, buildings with frost wall or basement, and frost action.



Map Unit: Hermon-Monadnock Complex, very bouldery
Classification: Hermon: Sandy-skeletal, isotic, frigid Typic Haplorthods

Monadnock: Coarse-loamy over sandy or sandy-skeletal, isotic over mixed, frigid Typic

Haplorthods

Map Unit Symbol: HmB, HmC, HmD

SETTING

Parent Material: Hermon: Glacial till

Monadnock: Loamy over sandy melt-out till on hills and mountains in glaciated uplands

Landform:Upland till plains, hills and ridgesPosition in Landscape:Side slope and nose slopeSlope Gradient Range:(B) 8-15%, (C) 15-35%, (D) >35%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Hermon: Somewhat excessively drained

Monadnock: Well drained

Depth to Water Table: Hermon: > 80"

Monadnock: > 80"

Typical Profile Description:

Surface Layers:

0 – 3" Reddish black, cobbly fine sandy loam

3 – 6" Black, cobbly fine sandy loam

6 – 14" Reddish brown, cobbly sandy loam

14 – 20" Strong brown, gravelly sandy loam

Subsurface Layers:

20 – 32" Dark yellowish brown, very gravelly coarse loamy sand

Substratum:

32 – 40" Olive brown, very gravelly coarse loamy sand

Hydrologic Group: A/B
Potential for Frost Action: Low
Available Water Storage: Low

Saturated Hydraulic Conductivity (Ksat): Moderately low to high

Depth to Bedrock: Very Deep Hazard to Flooding: None Erosion T Factor: 3

INCLUSIONS (within mapping unit)

Similar: Becket and Skerry

Dissimilar: Naskeag

USE AND MANAGEMENT

This map unit is mapped in forested areas across the site. Since these soils are well drained to somewhat excessively drained to seasonal water table so it typically is not a major concern for construction activities and ongoing project use. Portions of this map unit are formed on a dense till so excavation can be difficult. The loamy mantle and underlying sandy till can typically be used on-site for road building and other site development. The proposed uses for this map unit are project access roads and turbine pads. The rating for this map unit as a haul road for logging is considered "very limited" due to steep slope. Very limited indicates the soil has one or more features that are unfavorable for this use. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) is "somewhat limited", which indicates that the soil has features that are moderately favorable this use; with the limiting factor being steep slopes.



Map Unit: Kinsman sand, poorly drained Classification: Sandy, isotic, frigid Typic Endoaquods

Map Unit Symbol: KpA, KpB

SETTING

Parent Material: Glacial-fluvial or glacio-lacustrine sand

Landform: Outwash plains, deltas, lake plains, moraines, terraces, and eskers

Position in Landscape: Toeslope

Slope Gradient Range: (A) 0-8%, (B) 8-15%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Poorly drained

Depth to Water Table: 0"

Typical Profile Description:

Surface Layers:

0 – 6" Black, loamy fine sand, saturated 6 – 11" Gray, loamy fine sand, organic stripping

Subsurface Layers:

11 – 20" Yellowish red, loamy fine sand, concretions, firm, free water at 13"

Hydrologic Group: D

Potential for Frost Action: Moderate **Available Water Storage:** Low

Saturated Hydraulic Conductivity (Ksat): Moderately high to very high

Depth to Bedrock: >80"
Hazard to Flooding: None
Erosion T Factor: 5

INCLUSIONS (within mapping unit)

Similar: Naumburg

Dissimilar: Adams and Colton

USE AND MANAGEMENT

Mapped along outwash plains at the base of the slopes and depressions in outwash plains across the site; typically in forested areas. The proposed uses for these soils are project access roads and turbine pads. The rating for these soils as a haul road for logging is considered "severe", which indicates that there are one or more limitations that can make construction very difficult or costly; in this case being the depth to saturation. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) is "very limited", due to depth to saturation.



Map Unit: Kinsman sand, somewhat poorly drained

Classification: Sandy, isotic, frigid Typic Endoaquods

Map Unit Symbol: KsA, KsB

SETTING

Parent Material: Glacial-fluvial or glacio-lacustrine sand

Landform: Outwash plains, deltas, lake plains, moraines, terraces, and eskers

Position in Landscape: toeslope

Slope Gradient Range: (A) 0-8%, (B) 8-15%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Somewhat poorly drained

Depth to Water Table: 7-16"

Typical Profile Description:

Surface Layers:

0-3" Black, loamy sand

3 - 13" Reddish brown, loamy sand

Subsurface Layers:

13 – 30" Gray, loamy sand, redox. dark yellowish brown 5%, firm at 30"

Hydrologic Group: D

Potential for Frost Action: Moderate
Available Water Storage: Low

Saturated Hydraulic Conductivity (Ksat): Moderately high to very high

Depth to Bedrock: >80"
Hazard to Flooding: None
Erosion T Factor: 5

INCLUSIONS (within mapping unit)

Similar: Naumburg

Dissimilar: Adams and Colton

USE AND MANAGEMENT

Mapped along outwash plains at the base of the slopes and depressions in outwash plains across the site; typically in forested areas. The proposed uses for these soils are project access roads and turbine pads. The rating for these soils as a haul road for logging is considered "severe", which indicates that there are one or more limitations that can make construction very difficult or costly; in this case being the depth to saturation. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) is "very limited", due to depth to saturation.



Map Unit: Masardis sandy loam

Classification: Sandy-skeletal, isotic, frigid Typic Haplorthods

Map Unit Symbol: MaA, MaC, MaD

SETTING

Parent Material: Glacial-fluvial sand deposits

Landform: Outwash plains, deltas, lake plains, moraines, terraces, and eskers

Position in Landscape: Backslope

Slope Gradient Range: (A) 0-8%, (C) 15-35%, (D) >35%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Somewhat excessively drained

Depth to Water Table: >80"

Typical Profile Description:

Surface Layers:

0 – 4" Reddish black, fine sandy loam

4-7" Dark reddish brown, cobbly fine sandy loam

7 – 15" Strong brown, cobbly sandy loam

Subsurface Layers:

15 – 22" Dark yellowish brown, very cobbly coarse sand

22 – 29" Olive, coarse sand

Substratum:

29 - 36" Olive, very cobbly coarse sand

Hydrologic Group: A
Potential for Frost Action: Low
Available Water Storage: Low

Saturated Hydraulic Conductivity (Ksat): High

Depth to Bedrock: >80"
Hazard to Flooding: None
Erosion T Factor: 2

INCLUSIONS (within mapping unit)

Similar: Monadnock and Hermon

Dissimilar: Kinsman

USE AND MANAGEMENT

These soils are on glacial outwash terraces, plains, kames, and eskers in nearly level areas. The soils formed in water-sorted sand, gravel, cobbles, and stones typically derived from granite. Within the site these soils are primarily mapped in the southern portion and are typically associated with or mapped as improved blueberry land. Along their margins they extend into forested areas and may have a boulder surface. Because these soils are somewhat excessively drained and are very deep to bedrock and densic contact issues with seasonal water or obstructions to excavation should not be significant. Due to the coarse texture and loose structure they may not maintain excavated walls and be susceptible to caving without support. Revegetation of impacted soil may also be difficult if topsoil is not added.

The proposed uses for this soil are project access roads and turbine pads. The rating for this map unit as a haul road for logging is considered "not limited", which indicates that the soil has features that are very favorable for this use. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) is "not limited" Not limited indicates the soil has features that are very favorable for this use. Somewhat limited indicates the soil has features that are moderately favorable for this use.



Map Unit: Monadnock-Hermon Complex, Very Bouldery

Classification: Monadnock: Coarse-loamy over sandy or sandy-skeletal, isotic over mixed, frigid Typic

Haplorthods

Hermon: Sandy-skeletal, isotic, frigid Typic Haplorthods

Map Unit Symbol: MhA, MhB, MhC, MhD

SETTING

Parent Material: Hermon: Glacial till

Monadnock: Loamy over sandy melt-out till on hills and mountains in glaciated uplands

Landform: Upland till plains, hills and ridges

Position in Landscape: Side slope and nose slope

Slope Gradient Range: (A) 0-8%, (B) 8-15%, (C) 15-35%, (D) >35%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Monadnock: Well drained

Hermon: Somewhat excessively drained

Depth to Water Table: Monadnock: > 80"

Hermon: > 80"

Typical Profile Description:

Surface Layers:

0-3" Reddish black, cobbly fine sandy loam

3 – 6" Black, cobbly fine sandy loam

6 – 14" Reddish brown, cobbly sandy loam

14 – 20" Strong brown, gravelly sandy loam

Subsurface Layers:

20-32" Dark yellowish brown, very gravelly coarse loamy sand

Substratum:

32 – 40" Olive brown, very gravelly coarse loamy sand

Hydrologic Group: A/B
Potential for Frost Action: Low
Available Water Storage: Low

Saturated Hydraulic Conductivity (Ksat): Moderately low to high

Depth to Bedrock: Very Deep Hazard to Flooding: None Erosion T Factor: 3

INCLUSIONS (within mapping unit) Similar: Becket and Skerry

Dissimilar: Naskeag

USE AND MANAGEMENT

This map unit is mapped in forested areas across the site. Since these soils are well drained to somewhat excessively drained to seasonal water table so it typically is not a major concern for construction activities and ongoing project use. Portions of this map unit are formed on a dense till so excavation can be difficult. The loamy mantle and underlying sandy till can typically be used on-site for road building and other site development. The proposed uses for this map unit are an O&M building, substation, project access roads and turbine pads. The rating for this map unit as a haul road for logging is considered "very limited" due to steep slope. Very limited indicates the soil has one or more features that are unfavorable for this use. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) is "somewhat limited", which indicates that the soil has features that are moderately favorable this use; with the limiting factor being steep slopes.



Map Unit: Scantic silt loam

Classification: Fine, illitic, nonacid, frigid Typic Epiaquepts

Map Unit Symbol: ScA

SETTING

Parent Material: Glaciomarine or glaciolacustrine deposits
Landform: Coastal lowlands and river valleys

Position in Landscape: Base slope Slope Gradient Range: (A) 0-8%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Poorly drained

Depth to Water Table: 0"

Typical Profile Description:

Surface Layers:

0-6" Black, muck

Subsurface Layers:

6 – 14" Gray, silt loam, m, FI; redox. dark yellowish brown 15%

Substratum:

14 – 16" Olive silty clay loam, m, FI

Hydrologic Group: D **Potential for Frost Action:** High **Available Water Storage:** Low

Saturated Hydraulic Conductivity (Ksat): Surface and subsurface horizons is moderately high or high and low or moderately

slow in the subsoil and substratum.

Depth to Bedrock: >80"
Hazard to Flooding: None
Erosion T Factor: 3

INCLUSIONS (within mapping unit)

Similar: Brayton
Dissimilar: Swanton

USE AND MANAGEMENT

This map unit is mapped in forested areas in the center of the O&M parcel on Route 1 in Columbia. Major use and management concerns are that Scantic soils are hydric, so most areas mapped as Brayton are wetlands, and as such, impacts to these areas could require regulatory oversight. Major use and management concerns are that these soils are very deep to bedrock yet shallow to a dense layer which typically creates a seasonal high water table at or close to the mineral soil surface, so activities impacted by a high-water table, such as foundations and roads could require additional engineering. These soils can be compacted if exposed to heavy equipment when wet so equipment limitations may be severe. Avoidance of these area is the preferred method of planning around these soils. Accepted construction techniques such as matting or bridging to minimize soil disturbance and compaction are recommended in these areas. Erosion and sediment controls should be installed prior to commencement of construction activities to avoid erosion and sedimentation of adjacent resources.



Map Unit: Searsport mucky sand

Classification: Sandy, mixed, frigid Histic Humaquepts

Map Unit Symbol: SeA

SETTING

Parent Material: Thick peat/muck over glaciofluvial deposits

Landform: Sandy deposits in depressions on outwash plains, deltas, and terraces.

Position in Landscape: Nearly level, in depressions on outwash plains, deltas and terraces.

Slope Gradient Range: (A) 0 -8%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Very poorly drained

Depth to Water Table: 0"

Typical Profile Description:

Surface Layers:

0 - 29" Black, muck

Substratum:

29 - 32" Strong brown, coarse sand; firm in place and loose in hand

Hydrologic Group: D
Potential for Frost Action: High
Available Water Storage: Very high

Saturated Hydraulic Conductivity (Ksat): Moderately low to high

Depth to Bedrock: >80"
Hazard to Flooding: Frequent

Erosion T Factor: 1

INCLUSIONS (within mapping unit) Similar: Wonsqueak

Dissimilar: Hermon and Monadnock

USE AND MANAGEMENT

These map units are mapped in forested areas within the northcentral portion of the site in wetlands. Major use and management concerns are that Searsport soils are hydric, so most areas mapped as Searsport are wetlands, and as such, impacts to these areas could require regulatory oversight. These soils can be compacted if exposed to heavy equipment when wet so equipment limitations may be severe. Thick organic surface layers can lead to instability. Avoidance of these area is the preferred method of planning around these soils. Accepted construction techniques such as matting or bridging to minimize soil disturbance and compaction are recommended in these areas. Erosion and sediment controls should be installed prior to commencement of construction activities to avoid erosion and sedimentation of wetlands and other adjacent resources.

The proposed uses for this soil are project access roads and turbine pads. The rating for this soil as a haul road for logging is considered "severe", indicates that one or more limitations can make construction very difficult or very costly, in this case due to the potential for flooding, wetness and low strength. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) is "very limited" due to the depth to the saturated zone, ponding and flooding. Very limited indicates the soil has one or more features that are unfavorable for this use.



Map Unit: Skerry-Becket Complex

Classification: Skerry: Coarse-loamy, isotic, frigid Aquic Haplorthods

Becket: Coarse-loamy, isotic, frigid Oxyaquic Haplorthods

Map Unit Symbol: SbB, SbC

SETTING

Parent Material: Loamy mantle overlying dense, sandy till on drumlins and glaciated uplands

Landform: Hills

Position in Landscape: Summit, shoulder, backslope Slope Gradient Range: (B) 8 -15%, (C) 15 - 35%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Skerry: Moderately well drained

Becket: Well drained

Depth to Water Table: Skerry: 16 – 40"

Becket: > 80"

Typical Profile Description:

Surface Layers:

0 – 4" Black, fine sandy loam 4 – 8" Brown, sandy loam

8 – 11" Brown, very cobbly sandy loam

11 – 17" Strong brown, very cobbly sandy loam

Subsurface Layers:

17 – 22" Light olive brown, gravelly sandy loam; redox. strong brown 10%, firm

Substratum:

22 - 26" Pale olive, very gravelly loamy sand, dense

26 - 32" Pale olive, loamy sand; loose in hand

Hydrologic Group: C/D
Potential for Frost Action: Moderate
Available Water Storage: Low

Saturated Hydraulic Conductivity (Ksat): Moderately low to moderately high

Depth to Bedrock: >80"
Hazard to Flooding: None
Erosion T Factor: 3

INCLUSIONS (within mapping unit)

Similar: Monadnock

Dissimilar: Colonel and Brayton

USE AND MANAGEMENT

These map units are mapped in forested areas within the northcentral portion of the site. Since these soils are well drained and moderately well drained typically seasonal water table is not a major concern for construction activities and ongoing project use. These soils are formed on a dense till so excavation can be difficult. The loamy mantle and underlying sandy till can typically be used on-site for road building and other site development.

The proposed uses for this soil are project access roads and turbine pads. The rating for this soil as a haul road for logging is considered "moderate", which indicates that there are one or more limitations that can cause some difficulty for construction. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) is "very limited" due to the depth to the saturated zone. Very limited indicates the soil has one or more features that are unfavorable for this use.



Map Unit: Skerry-Colonel Association

Classification: Skerry: Coarse-loamy, isotic, frigid Aquic Haplorthods

Colonel: Loamy, isotic, frigid, shallow Aquic Haplorthods

Map Unit Symbol: ScA, ScB, ScC, ScD

SETTING

Parent Material: Loamy mantle overlying dense and dense till, sandy till on drumlins and glaciated uplands

Landform: Hills and ground moraines

Position in Landscape: Summit, shoulder, backslope, foot slope and base slope

Slope Gradient Range: (A) 0-8%, (B) 8 -15%, (B) 15-35%, (B) >35%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Skerry: Moderately well drained

Colonel: Somewhat poorly drained

Depth to Water Table: Skerry: 16 – 40"

Colonel: 7 - 16"

Typical Profile Description:

Surface Layers:

0 – 4" Black, fine sandy loam 4 – 8" Brown, sandy loam

8 – 11" Brown, very cobbly sandy loam

11 – 17" Strong brown, very cobbly sandy loam

Subsurface Layers:

17 – 22" Light olive brown, gravelly sandy loam; redox. strong brown 10%, firm

Substratum:

22-26" Pale olive, very gravelly loamy sand, dense

26 - 32" Pale olive, loamy sand; loose in hand

Hydrologic Group: D

Potential for Frost Action: Moderate **Available Water Storage:** Very low to low

Saturated Hydraulic Conductivity (Ksat): Very low to moderately high

Depth to Bedrock: >80" Hazard to Flooding: None Erosion T Factor: 3

INCLUSIONS (within mapping unit)

Similar: Becket and Westbury
Dissimilar: Brayton and Searsport

USE AND MANAGEMENT

These map units are mapped in forested areas within the northcentral portion of the site. Since these soils are well moderately well drained to somewhat poorly drained, so seasonal water table may be a concern for construction activities and water management in some areas. These soils are formed on a dense till so excavation can be difficult. The loamy mantle and underlying sandy till can typically be used on-site for road building and other site development.

The proposed uses for this soil are project access roads and turbine pads. The rating for this soil as a haul road for logging is considered "moderate", which indicates that there are one or more limitations that can cause some difficulty for construction, in this case due to the potential for wetness. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) is "very limited" due to the depth to the saturated zone and slope. Very limited indicates the soil has one or more features that are unfavorable for this use.



Map Unit: Skerry-Hermon-Monadnock Complex, Very Bouldery

Classification: Skerry: Coarse-loamy, isotic, frigid Aquic Haplorthods

Hermon: Sandy-skeletal, isotic, frigid Typic Haplorthods

Monadnock: Coarse-loamy over sandy or sandy-skeletal, isotic over mixed, frigid Typic

Haplorthods

Map Unit Symbol: ShC

SETTING

Parent Material: Glacial till and loamy mantle overlying dense, sandy till on drumlins and glaciated uplands

Landform: Upland till plains, hills and ridges

Position in Landscape: Side slope, nose slope summit, shoulder, and backslope

Slope Gradient Range: (C) 15 - 35%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Skerry: Moderately well drained

Hermon: Somewhat excessively drained

Monadnock: Well drained

Depth to Water Table: Skerry: 16 – 40"

Hermon: > 80" Monadnock: > 80"

Typical Profile Description:

Surface Layers:

0 – 4" Black, fine sandy loam 4 – 8" Brown, sandy loam

8 – 11" Brown, very cobbly sandy loam

11 – 17" Strong brown, very cobbly sandy loam

Subsurface Layers:

17 – 22" Light olive brown, gravelly sandy loam; redox. strong brown 10%, firm

Substratum:

22 – 26" Pale olive, very gravelly loamy sand, dense

26 – 32" Pale olive, loamy sand; loose in hand

Hydrologic Group: A/B to C/D **Potential for Frost Action:** Low to Moderate

Available Water Storage: Low

Saturated Hydraulic Conductivity (Ksat): Moderately low to high

Depth to Bedrock: Very Deep Hazard to Flooding: None Erosion T Factor: 3

INCLUSIONS (within mapping unit)

Similar: Becket

Dissimilar: Brayton and Seasrport

USE AND MANAGEMENT

This map unit is mapped in forested areas across the site. Since these soils are moderately well drained to somewhat excessively drained to seasonal water table so it typically is not a major concern for construction activities and ongoing project use. Portions of this map unit are formed on a dense till so excavation can be difficult. The loamy mantle and underlying sandy till can typically be used on-site for road building and other site development.

The proposed uses for this map unit are project access roads and turbine pads. The rating for this map unit as a haul road for logging ranges from "slight" to "moderate" due to stoniness and wetness. Slight indicates that no significant limitations affect construction activities and moderate indicates that one or more limitations can cause some difficulty in construction The rating



for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) ranges from "very limited" to "somewhat limited", which indicates that the soil has one or more features that are unfavorable for this use; with the limiting factor being the depth to the saturated zone.



Map Unit: Swanton sandy loam over silt loam

Classification: Coarse-loamy over clayey, mixed over illitic, superactive, nonacid, frigid Aeric Epiaquepts

Map Unit Symbol: SwA

SETTING

Parent Material: Thin mantle of loamy outwash materials over clayey marine or lacustrine deposits on

Landform: Lake and marine plains, and outwash plains and deltas

Position in Landscape: Depressional areas in plains or deltas

Slope Gradient Range: (A) 0-3%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Somewhat poorly

Depth to Water Table: 7-16"

Typical Profile Description:

Surface Layers:

0 – 3" Black, mucky peat

3 – 12" Brown, sandy loam, sbk, VFR

12 - 18" Yellowish brown, sandy loam, sbk, VFR

Subsurface Layers:

18 – 26" Light olive brown, sandy loam, sbk, FR, redox. dark yellowish brown 2%

Substratum:

26 – 54" Light olive brown, silty clay, FI

Hydrologic Group: D **Potential for Frost Action:** High **Available Water Storage:** Low

Saturated Hydraulic Conductivity (Ksat): Moderately high or in solum and low to moderately high in dense substratum

Depth to Bedrock: >80" Hazard to Flooding: None Erosion T Factor: 3

INCLUSIONS (within mapping unit)

Similar: Elmwood Dissimilar: Scantic

USE AND MANAGEMENT

This map unit is mapped in forested areas along the eastern side of the O&M parcel on Route 1 in Columbia. Major use and management concerns are that these soils are very deep to bedrock yet moderately deep to a dense layer which typically creates a seasonal high water table at or close to the mineral soil surface, so activities impacted by a high-water table, such as foundations and roads could require additional engineering. These soils can be compacted if exposed to heavy equipment when wet so equipment limitations may be severe. Avoidance of these area is the preferred method of planning around these soils. Accepted construction techniques such as matting or bridging to minimize soil disturbance and compaction are recommended in these areas. Erosion and sediment controls should be installed prior to commencement of construction activities to avoid erosion and sedimentation of adjacent resources.



Map Unit: Wonsqueak muck

Classification: Loamy, mixed, euic, frigid Terric Haplosaprists

Map Unit Symbol: WoA

SETTING

Parent Material: Mantle of well decomposed organic soil material over loamy mineral material

Landform: Depressions in glaciated lowlands and floodplains.

Position in Landscape: Nearly level, in depressions on outwash plains, deltas. Terraces, and floodplains.

Slope Gradient Range: (A) 0 -8%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class: Very poorly drained

Depth to Water Table: 0"

Typical Profile Description:

Surface Layers:

0 - 29" Black, muck

Substratum:

29 - 32" Gray, sandy loam

Hydrologic Group: D
Potential for Frost Action: High
Available Water Storage: Very high

Saturated Hydraulic Conductivity (Ksat): Moderately low to high

Depth to Bedrock: >80"
Hazard to Flooding: Frequent

Erosion T Factor: 1

INCLUSIONS (within mapping unit)

Similar: Searsport

Dissimilar: Hermon and Monadnock

USE AND MANAGEMENT

These map units are mapped in forested areas within the northcentral portion of the site in wetlands. Major use and management concerns are that Wonsqueak soils are hydric, so most areas mapped as Wonsqueak are wetlands, and as such, impacts to these areas could require regulatory oversight. These soils can be compacted if exposed to heavy equipment when wet so equipment limitations may be severe. Thick organic surface layers can lead to instability. Avoidance of these area is the preferred method of planning around these soils. Accepted construction techniques such as matting or bridging to minimize soil disturbance and compaction are recommended in these areas. Erosion and sediment controls should be installed prior to commencement of construction activities to avoid erosion and sedimentation of wetlands and other adjacent resources.

The proposed uses for this soil are project access roads and turbine pads. The rating for this soil as a haul road for logging is considered "severe", indicates that one or more limitations can make construction very difficult or very costly, in this case due to the potential for flooding, wetness and low strength. The rating for this soil for use with dwellings with basements (somewhat applicable because these are for foundations assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7-feet) is "very limited" due to the depth to the saturated zone, ponding and flooding. Very limited indicates the soil has one or more features that are unfavorable for this use.



APPENDIX D

MAPSS Soil Survey Standards



CLASS B (HIGH INTENSITY) SOIL SURVEY

- 1. Map units will not contain dissimilar limiting individual inclusions larger than one acre. Dissimilar limiting inclusions may total more than one acre per map unit delineation, in the aggregate, if not continuous.
- 2. Scale of 1 inch equals 200 feet or larger (e.g. 1" = 100').
- 3. Ground control—test pits for which detailed data is recorded are located by means of compass by chaining, pacing, or taping from known survey points or other methods of equal or greater accuracy.
- 4. Base map with 5-foot contour lines.

CLASS L SOIL SURVEY (FOR LINEAR PROJECTS)

This standard is designed to provide the minimum soil information necessary to allow for the design and construction of long but narrow projects with little or no adjacent development. Class L map units shall be made on the basis of parent material, slope, soil texture, soil depth to dense till or bedrock and soil drainage at the Class A High Intensity map unit size.

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

CLASS D (MEDIUM INTENSITY) SOIL SURVEY

- 1. Map units may contain dissimilar, limiting, individual inclusions larger than five-acres provided that each dissimilar, limiting inclusion is smaller than the minimum map unit size utilized. Dissimilar, limiting inclusions may total more than 1/8 acre per map unit delineation, in the aggregate, if not contiguous.
- 2. Scale of 1 inch equals 2,000 feet or larger (e.g. 1'' = 1,320')
- 3. Ground control as determined by the mapper.
- 4. Base map as determined by the mapper.



APPENDIX E

Glossary of Terms



Complex: Two or more dissimilar major components that occur in a regularly repeating pattern or in an unpredictable pattern.

Limiting Dissimilar Soil: Generally, map unit delineations contain soils other than those identified in the map unit name. These minor soil components reduce the purity of the soil map unit. Minor components that most detract from purity because they are the most dissimilar to the mapped name and are the most limiting for use.

Soil Drainage Class:

- Excessively Drained: Soil depth is less than 25 cm (10 inches) to bedrock; or has a sandy or sandy-skeletal particle-size class with a loamy cap less than 25 cm (10 inches) thick.
- Somewhat Excessively Drained: Soil depth is 25 to 50 cm (10 to 20 inches) to bedrock with a loamy or loamy-skeletal particle-size class; or soil depth is 50 cm (20 inches) or greater to bedrock with a sandy or sandy-skeletal particle-size class with a loamy cap 25 cm (10 inches) thick or greater.
- Well Drained: Soil depth is at least 50 cm (20 inches) to bedrock and has a texture of loamy very fine sand or finer and redoximorphic features, if present, are 100 cm (40 inches) or more below the mineral soil surface.
- Moderately Well Drained: Has redoximorphic features at a depth of 40 cm (16 inches) to less than 100 cm (40 inches) below the mineral soil surface.
- Somewhat Poorly Drained: Is not VERY POORLY or POORLY DRAINED and has redoximorphic features at a depth of less than 40 cm (16 inches) below the mineral soil surface.
- Poorly Drained: Has dominant textures in the upper 50 cm (20 inches) (below the A-horizon if present) of loamy fine sand or coarser and has redoximorphic features within 18 cm (7 inches) of the mineral soil surface; or has dominant textures in the upper 50 cm (20 inches) (below the A-horizon if present) of loamy fine sand or coarser and has a Bh- or Bhs-horizon with value/chroma of 3/3 or less that begins within 18 cm (7 inches) of the mineral soil surface and is directly underlain by a horizon that has redoximorphic features; or has an A-horizon that is 18 cm (7 inches) thick or greater with value/chroma of 3/2 or less and a textures in all sub-horizonswithin 50 cm (20 inches) of the mineral soil surface of loamy fine sand or coarser and has redoximorphic features directly below the A-horizon; or has a depleted or gleyed matrix within 50 cm (20 inches) of the mineral soil surface and redox depletions with value of 4 or more and chroma of 2 or less in ped interiors that are less than 18 cm (7 inches) below the mineral soil surface; or has an A-horizon that is 18 cm (7 inches) thick or greater with value/chroma of 3/2 or less and has a depleted or gleyed matrix within 50 cm (20 inches) of the mineral soils surface and has redox depletions with value of 4 or more and chroma of 2 or less in ped interiors or a depleted or gleyed matrix directly beneath the A-horizon.

Soil Depth:

- Very Shallow: < 10 inches of mineral soil above bedrock
- Shallow: 10 to < 20 inches of mineral soil above bedrock
- Moderately Deep: 20 to <40 inches of mineral soil above bedrock
- Deep: 40 to <60 inches of mineral soil above bedrock
- Very Deep: >60 inches of mineral soil above bedrock

Soil Map Unit: Designed to efficiently deliver soil information to meet user needs for management and land use decisions. They can appear on maps as individual areas (i.e. polygon), points, or lines. They are a collection of areas defined and named the same in terms of their major soil components, miscellaneous areas, or both.



Soil Phase: These terms are added to a map unit component name to covey important information about a map unit and differentiate it from other map units on the map unit legend.

Soil Series: Represents a three-dimensional soil body having a unique combination of properties that distinguish it from neighboring series.

