Section 11

Soils

Section 11. Soils

11.1 State Standards

Pursuant to the State's Site Law, the Applicant is providing a soil survey for the Project.

11.2 Narrative

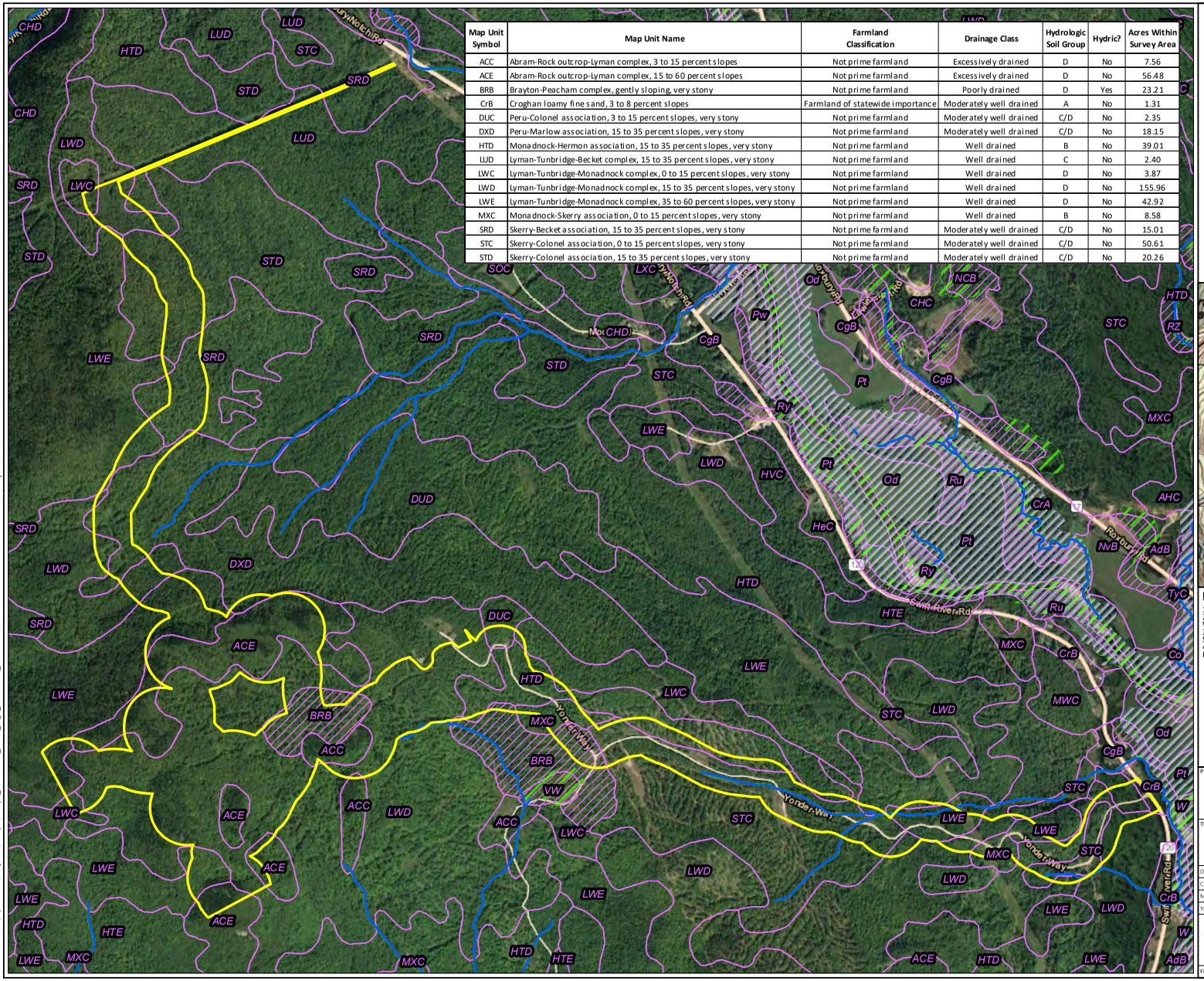
On behalf of the Applicant, Flycatcher conducted a Class L and Class D soil survey in September and October 2021. The soil survey was led by Rodney Kelshaw, a Maine Licensed Soil Scientist. The soil survey covered approximately 458 acres in Roxbury and Rumford. The complete soil survey is Exhibit 11-1. In addition, an NRCS Soil Survey is included in Exhibit 11-1.

The soil survey concludes:

Results of this soil survey indicate that in some areas this site could require engineered designs to address the limiting factors for the proposed Project. However, with proper planning, engineering, and construction techniques, the soils are adequate for the proposed Project and are not dissimilar from limitations for other successfully constructed commercial scale wind energy generation projects in this area. (Section 6 of the soil survey.)

Prior to constructing the turbine foundations, the Applicant will collect geotechnical information at each location to inform the final foundation design. The foundation design will be provided by a licensed engineer.

Exhibit 11-1
Soil Survey
NRCS Soil Map



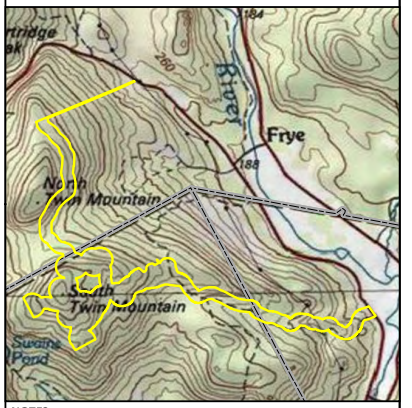
Map Unit Symbol	Map Unit Name	Farmland Classification	Drainage Class	Hydrologic Soil Group	Hydric?	Acres Within Survey Area
ACC	Abram-Rock outcrop-Lyman complex, 3 to 15 percent slopes	Not prime farmland	Excessively drained	D	No	7.56
ACE	Abram-Rock outcrop-Lyman complex, 15 to 60 percent slopes	Not prime farmland	Excessively drained	D	No	56.48
BRB	Brayton-Peacham complex, gently sloping, very stony	Not prime farmland	Poorly drained	D	Yes	23.21
CrB	Croghan loamy fine sand, 3 to 8 percent slopes	Farmland of statewide importance	Moderately well drained	A	No	1.31
DUC	Peru-Colonel association, 3 to 15 percent slopes, very stony	Not prime farmland	Moderately well drained	C/D	No	2.35
DXD	Peru-Marlow association, 15 to 35 percent slopes, very stony	Not prime farmland	Moderately well drained	C/D	No	18.15
HTD	Monadnock-Hermon association, 15 to 35 percent slopes, very stony	Not prime farmland	Well drained	B	No	39.01
LUD	Lyman-Tunbridge-Becket complex, 15 to 35 percent slopes, very stony	Not prime farmland	Well drained	C	No	2.40
LWC	Lyman-Tunbridge-Monadnock complex, 0 to 15 percent slopes, very stony	Not prime farmland	Well drained	D	No	3.87
LWD	Lyman-Tunbridge-Monadnock complex, 15 to 35 percent slopes, very stony	Not prime farmland	Well drained	D	No	155.96
LWE	Lyman-Tunbridge-Monadnock complex, 35 to 60 percent slopes, very stony	Not prime farmland	Well drained	D	No	42.92
MXC	Monadnock-Skerry association, 0 to 15 percent slopes, very stony	Not prime farmland	Well drained	B	No	8.58
SRD	Skerry-Becket association, 15 to 35 percent slopes, very stony	Not prime farmland	Moderately well drained	C/D	No	15.01
STC	Skerry-Colonel association, 0 to 15 percent slopes, very stony	Not prime farmland	Moderately well drained	C/D	No	50.61
STD	Skerry-Colonel association, 15 to 35 percent slopes, very stony	Not prime farmland	Moderately well drained	C/D	No	20.26

LEGEND

- PROJECT SURVEY AREA
- NHD STREAM/RIVER
- NWI WETLAND
- FEMA FLOODPLAIN

NRCS SOILS BY DRAINAGE GROUPS

- EXCESSIVELY DRAINED; MODERATELY WELL DRAINED; SOMEWHAT EXCESSIVELY DRAINED; WELL DRAINED
- POORLY DRAINED; SOMEWHAT POORLY DRAINED; VERY POORLY DRAINED



NOTES:

1. BASEMAP IMAGERY FROM ESRI/NAIP "WORLD IMAGERY" SERVICE LAYER.
2. NATIONAL WETLANDS INVENTORY DATA ACQUIRED FROM U.S FISH AND WILDLIFE WETLANDS MAPPER.
3. FLOODPLAIN INFORMATION FROM FEMA NATIONAL FLOOD HAZARD SERVICE LAYER.
4. NRCS SOIL DATA ACQUIRED FROM ESRI SSURGO DOWNLOADER, ACCESSED DECEMBER 2021.

N

0 1,250 2,500
Feet

1 " = 1,250 '
1:15,000

PROJECT:
TWIN WIND LLC
TWIN WIND PROJECT
OXFORD COUNTY, MAINE

TITLE:
NATIONAL WETLANDS INVENTORY AND NRCS SOIL SURVEY MAP

DRAWN BY:	D. KENWORTHY	PROJ NO.:	212P
CHECKED BY:	K. NICKERSON		
MONTH:	DECEMBER		**FIGURE 3**
YEAR:	2022		

Flycatcher LAND + SCIENCE + PEOPLE

PALMER

FILE NO.: Solaya_TwinWind_Delin_Fig3_NRCSNWI_11x17Lmxd

Coordinate System: NAD 1983 StatePlane Maine West FIPS 1802 Feet (Foot US)
Map Rotation: 0

Plot Date: 1/10/2022, 14:39:59 PM by JAKEN -- LAYOUT: ANSI B(11"x17")
Path: D:\Flycatcher\Projects\Solaya\Solaya_TwinWind_Delin_Fig3_NRCSNWI_11x17L.mxd

Class L & Class D Medium Intensity Soil Survey Report

Twin Energy Project
Oxford County, Maine

Prepared for:
Palmer/ Twin Energy LLC
13 Elm Street, Suite 200
Cohasset, MA 02025

Prepared by:
Flycatcher LLC
106 Lafayette Street, Suite 1C
Yarmouth, ME 04096
http://www.flycatcherllc.com

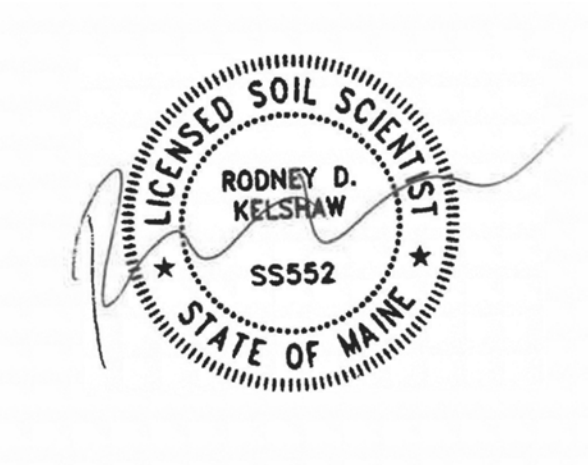
February 4, 2022

Contents

Appendices

1.0 SIGN-OFF SHEET

This soil narrative report entitled "*Class L & Class D Medium Intensity Soil Survey Report*", accompanying soil profile descriptions and soil survey maps, dated February 4, 2022, were completed in accordance with the standards adopted by the Maine Association of Professional Soil Scientists, February 1995, as amended, and was prepared by Rodney D. Kelshaw LSS #552 of Flycatcher LLC.



2.0 INTRODUCTION AND PURPOSE

As requested by Twin Energy LLC, Flycatcher LLC (Flycatcher) conducted a soil survey of approximately 458 acres off Roxbury Notch and Swift River Road (Route 120) in Oxford County, Maine. The extent of the soil survey is outlined in yellow (Survey Area) depicted on Figures 1 and 2. The soil survey goal is to assist the client with planning and design of a proposed wind energy generation facility. A Maine Licensed Soil Scientist (R. Kelshaw, LSS #552) oversaw the soil survey field effort in September and October of 2021. This report provides a description of the methods and findings of the soil survey, and a discussion of potential limitations for project design based on soil type.

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 and to aid in project design. This report may also be used as part of the regulatory permit application process. 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 project may not be suitable for different project type.

3.0 SURVEY AREA DESCRIPTION

3.1 General Survey Area Description & Land Use

3.1.1 General Description:

As shown on Figure 1 (Appendix A), the Survey Area is approximately 458 acres, located west of the Swift River, and north of Scotty Stream in Oxford County, Maine. The Survey Area extends northwest from Route 120 in Mexico, follows an existing road paralleling Goff Brook for approximately 7,000 feet, then continues to the top of South Twin Mountain, in Rumford for a total of 12,000 feet. The Survey Area encompasses the peak of South Twin Mountain, and then extends another 7,000 feet north, flanking the peak of North Twin Mountain to the west. From there, a thirty-foot wide, 4,400 foot long, section turns east, adjacent to an existing overhead transmission line, and connects back to Route 120 in Roxbury.

The Survey Area is largely forested and is accessible via logging roads and recreational vehicle trails. The forest is a mix of hard and softwood trees and shrubs, with evidence of past logging such as skidder trails, landing areas, haul roads, and early to late successional growth. There are a couple of small cabins located just outside of the Survey Area southeast of South Twin Mountain. A rough gravel road starts at Swift River Road (State Route 120) and provides access to the cabins and other trails in the area. It is referenced on base map aerial imagery from ESRI/NAIP as “Yonder Way”.

3.1.2 Topography/drainage:

South Twin Mountain is the highest point within the Survey Area, with a summit elevation of approximately 2,150 feet. There is a dip in topography with a perennial stream flowing to the east between South and North Twin Mountains. Terrain generally slopes easterly to where the Survey Area intersects with Route 120. Field evidence suggests groundwater discharges in several areas throughout the site. Steep eroded swales form several drainages that eventually develop into streams downslope. Goff Brook forms approximately midway up the southern ridge of South Twin Mountain, flows east, and joins the Swift River offsite.

3.1.3 Vegetation:

Upland areas are a mixture of early and mid-successional forest, dominated by American beech (*Fagus grandifolia*), eastern hemlock (*Tsuga canadensis*), balsam fir (*Abies balsamea*), northern red oak (*Quercus rubra*), sugar maple *(Acer saccharum*), and red maple (*Acer rubrum*). Upland forests have a dominance of hardwood species, but softwood species occur more often at higher elevations.

Forested wetland areas are dominated by balsam fir, red maple, yellow birch (*Betula alleghaniensis*), green ash (*Fraxinus pennsylvanica*), and gray birch (*Betula populifolia*). Shrub habitat within wetlands is dominated by speckled alder (*Alnus incana*), dwarf red raspberry (*Rubus idaeus*), steeplebush (Spiraea tomentosa), red maple, yellow birch, and gray birch. Emergent habitat within wetlands contains cinnamon fern (*Osmundastrum cinnamomeum*), sensitive fern (*Onoclea sensibilis*), evergreen wood fern (*Dryopteris intermedia*), cottongrass bulrush (*Scirpus cyperinus*), fringed sedge (*Carex crinita*), nodding sedge (*Carex gynandra*), spotted touch-me-not (*Impatiens capensis*), and melic manna grass (*Glyceria melicaria*).

4.0 METHODS

4.1 Standards

A combination of two soil survey classes were completed in different areas across the Survey Area 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 D (medium intensity) survey was conducted for the proposed electrical collector line corridor where it is not co-located with other Project infrastructure.

The soil survey methodology and deliverables are designed to meet the typical requirements of Section 11 of the Site Location of Development permit application.[1] This report and associated maps were completed in accordance with the standards adopted by the Maine Association of Professional Soil Scientists (MAPSS) "*Guidelines for Maine Certified Soil Scientists for Soils Identification and Mapping*" (revised 2009)[2] and follows the standards detailed in the USDA NRCS "*Soil Survey Manual*".[3] 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 Supplement*[4] and the *Field Indicators for Identifying Hydric Soils in New England, Version 4.*[5]

[1] 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

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

[3] 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.

[4] 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.

[5] 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.

4.2 Desktop Review

This soil survey was developed through a compilation of on-site soil investigation observations supported by publicly available data, including the USDA NRCS soil surveys for Sagadahoc County.[6] Prior to the on-site fieldwork, Flycatcher reviewed available data sources, including:

- Wetland delineation data;
- Project maps provided by Twin Energy LLC and Sewall Co. (project engineers);
- United States Geological Survey (USGS) topographic map;
- NRCS medium-intensity soil survey map; and
- Recent and historic aerial photography.

4.3 Soil Survey Area Boundary Establishment and Field Methods

The Survey Area depicted on the soil survey maps and used during the fieldwork as the Survey Area boundary was provided to Flycatcher as GIS Shapefiles by Sewall Co, the Project engineer. The wetland and watercourse delineations were performed Flycatcher prior to the soil survey fieldwork. The wetland delineation information was used to aid in determination of hydric soil boundaries. The soil survey fieldwork was performed in October and November 2021. There was no ground frost or snow cover during the field visit. Temperatures ranged from the mid-30 to 70-degree Fahrenheit range. The weather conditions were typical for the season.

4.4 Data Collection

Site orientation and data collection was accomplished using the ESRI "Field Maps" application. Field Maps provides online ArcGIS map integration that allows the field user to view various base layer maps (e.g., USGS topographic maps, aerial photographs, etc.) while tracking their location and collecting data. Geolocation of field data was accomplished using a mapping-grade GPS antenna (i.e., Juniper Systems Geode).

Hand dug test pits and hand auger borings 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 (48-inches). Other factors used to determine soil boundaries included changes in vegetation, slope, aspect, observations of surface stones, ditches, excavations, and other human influence. Test pit and hand auger boring locations were selected to collect representative soil data which could be used to determine the soil series or phase and the soil map unit boundary.

4.5 Soil Map Requirements

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.

[6] Source: NRCS Web Soil Survey URL: https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx; reviewed January 11, 2022.

4.6 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 map 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 (Appendix A, Figure Sets 3 & 4). 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.

5.0 FINDINGS

The following is a summary of the findings of the Class L and Class D soil surveys respectfully. The enclosed appendices provide specific details of the survey results. Appendix A contains the USGS Survey Area Location Map (Figures 1) Aerial Photograph Survey Area Location Map (Figure 2), Class L Soil Survey Maps (Figures 3-1 to 3-37), and Class D Soil Survey Maps (Figures 4-1 and 4-2). Appendix B provides 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 (Form F).

The Map Unit Descriptions in Appendix C describe the soil origin, textures, drainage classes, depth to bedrock, where they are located with the Survey Area, and typical physical and chemical properties of each soil series and how they may affect development of this site for this Project.

Appendix D includes the MAPSS Class L and Class D Soil Survey standards. Appendix E provides a Glossary of terms.

5.1 Class L Soil Survey

The Survey Area is approximately 445-acres and contains 58 map units. Generally, in higher elevations in the Survey Area the soil is dominantly very shallow to moderately deep to bedrock with sizeable bedrock outcrops. These are typically associated with steep slopes and at their margins quickly transition to very deep soil. Transitioning to lower elevations the slope generally tends toward being less steep and there is a higher percentage of deep and very deep soils. Some key factors to consider during Project planning are:

- The bedrock outcrops depicted on the HISS are not the only areas of exposed bedrock. These are points used to help map soil boundaries and define soil type. Some of the outcrops are much larger than the symbol on the map.

- Some map units contain phases with stony and very stony surfaces. These typically occur in the Tunbridge and Tunbridge/Lyman Complex soils mapped along the western and eastern Survey Area boundaries.

- In the low-lying areas the observed seasonal groundwater table is higher than what was expected based on the NRCS mapping. The Tunbridge/Lyman Complex contains discrete inclusions of moderately well and somewhat poorly drained soil that are too small to map at the scale of the mapping performed.

- In addition to wetlands and watercourses there are multiple non-wetland drainages that convey surface water after rain events and spring thaw. These are non-jurisdictional features however, their locations on the landscape can be important to incorporate into stormwater planning.

5.2 Class D Soil Survey

The Class D soil survey encompassed approximately 2.75-acres and was conducted for the proposed electrical collector line. The figures depict the Class D soil survey boundary overlaid onto an aerial photograph and the NRCS "Oxford County Area" published soil map data at a scale of 1-inch equals 200-feet (1:2,400). The NRCS data was originally mapped as an Order 3 Soil Survey, completed at a range of scales from 1:20,000 to 1:24,000. The most recent publication to the Web Soil Survey was August 2021. Five map units were mapped by the NRCS within the Class D Survey Area:

- LUD: Lyman/Tunbridge/Becket Complex, 15-35% slopes, very stony;
- LWD: Lyman/Tunbridge/Monadnock Complex, 15-35% slopes, very stony;
- LWE: Lyman/Tunbridge/Monadnock Complex, 35-60% slopes, very stony;
- SRD: Skerry/Becket Association, 15-35% slopes, very stony; and
- STD: Skerry/Colonel Association, 15-35% slopes, very stony

These The NRCS mapping is supplemented with on-site mapped wetlands and watercourses. The wetlands are poorly drained phases of the NRCS mapped soil. The Class D Medium Intensity Soil Survey maps and Map Unit Description Table are located in Appendix A.

6.0 Conclusions and Survey Limitations

Results of this soil survey indicate that in some areas this site could require engineered designs to address the limiting factors for the proposed Project. However, with proper planning, engineering, and construction techniques, the soils are adequate for the proposed Project and are not dissimilar from limitations for other successfully constructed commercial scale wind energy generation projects in this area. The most limiting soil factors at this site are shallow depth to bedrock, steep slopes associated with exposed bedrock, upland areas with high-water table (somewhat poorly drained), and wetlands.

Development in or disturbance of the wetlands should be avoided and minimized, if possible, because they are protected natural resources and impacts typically require 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 road construction and site stability.

The soils that are shallow to bedrock provide limitations if the project requires significant grade cuts, which would require blasting or bedrock removal. However, if bedrock is removed it can provide high

quality road base materials. Increasing the impervious area can increase stormwater surface flow quantity and velocity. The exposed bedrock should also be a consideration for design of roadside stormwater controls, such as vegetated buffers.

The scope of this investigation was conducted in accordance with the Class L and Class D Medium Intensity 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 Project planners for specific application of this proposed commercial scale wind energy generation project.

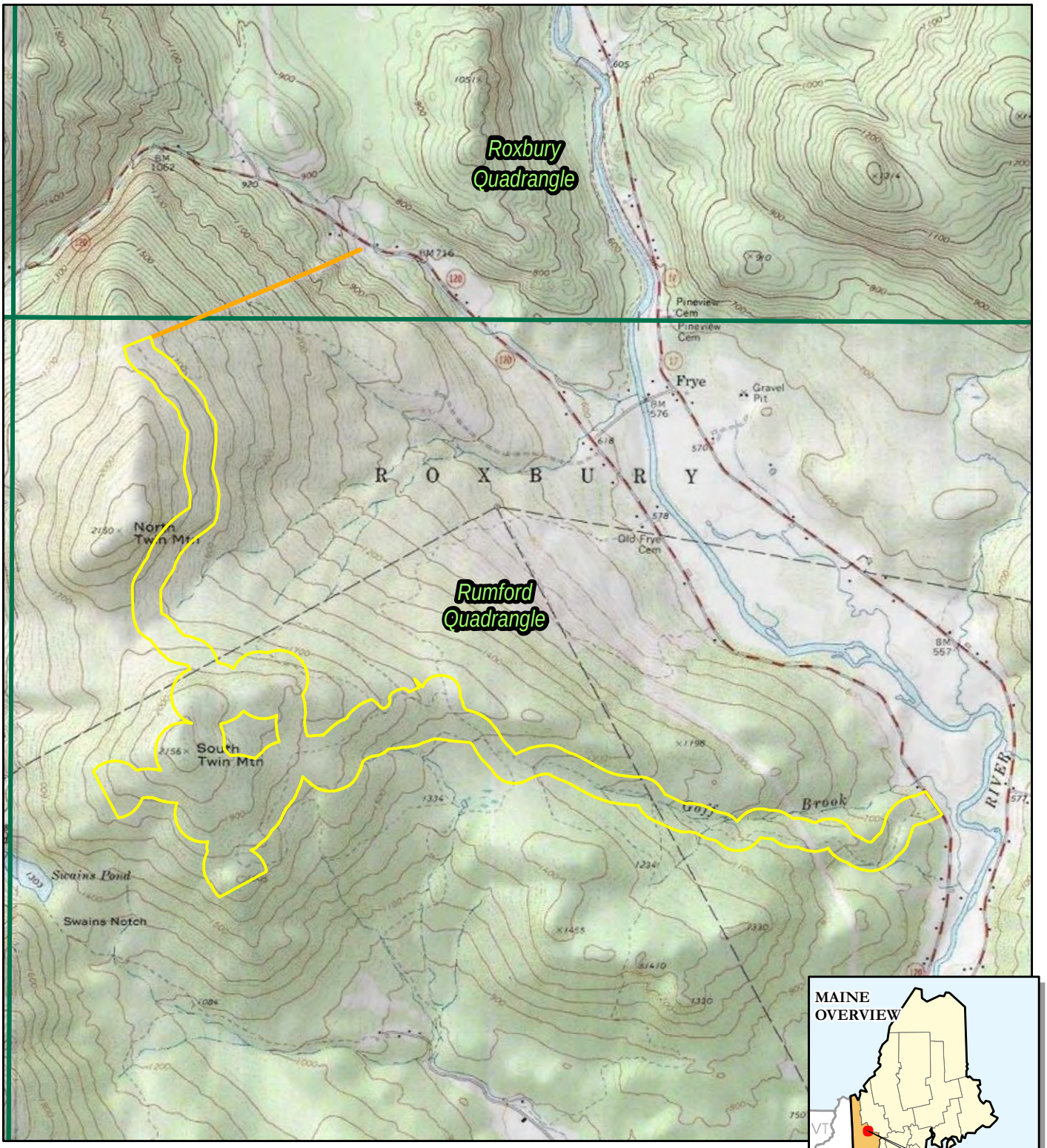
APPENDIX A: FIGURES

Figure 1. USGS Survey Area Location Map

Figure 2. Aerial Photo Survey Area Location Map

Figures 3-1 to 3-37. Class L Soil Survey Maps & Map Unit Legend

Figures 4-1 to 4-2. Class D Soil Survey Maps & Map Unit Legend



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES.

1 " = 2,500 '
1:30,000

0 2,000 4,000 FEET

PALMER
Flycatcher

PROJECT:

TWIN ENERGY LLC
TWIN ENERGY PROJECT
OXFORD COUNTY, MAINE

LEGEND:

- CLASS L SOIL SURVEY AREA
- CLASS D SOIL SURVEY AREA
- USGS 7.5-MINUTE QUADRANGLE BOUNDARY

DRAWN BY:	D. KENWORTHY
CHECKED BY:	R. KELSHAW
MONTH:	JANUARY
YEAR:	2022
PROJ. NO.:	21ZP
CLIENT:	PALMER

FIGURE 1

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Coordinate System: NAD 1983 StatePlane Maine West FIPS 1802 Feet (Foot US)
Map Rotation: 0

Plot Date: 1/27/2022, 16:18:08 PM by JAKEN -- LAYOUT: ANSI B(11"x17")
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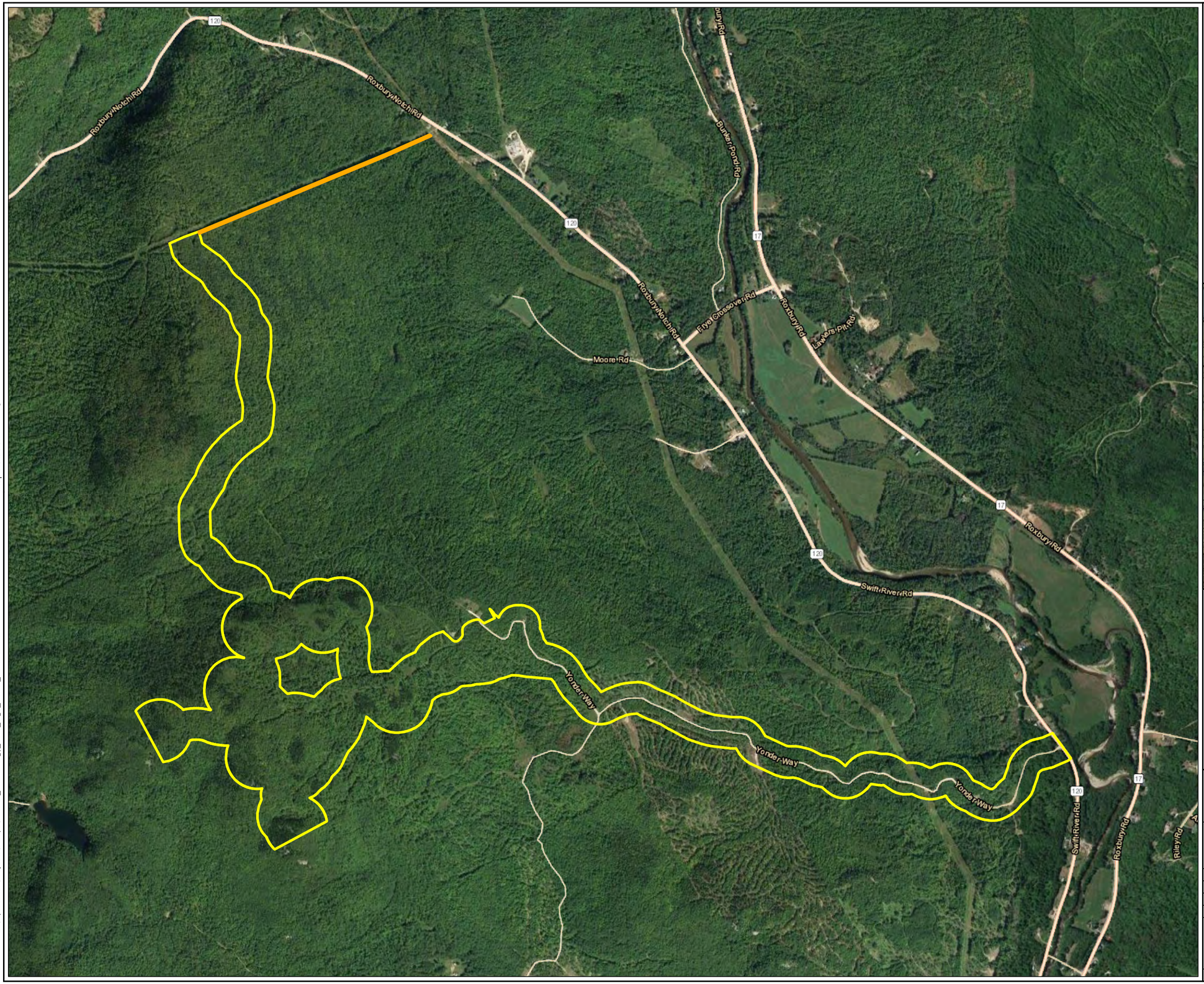
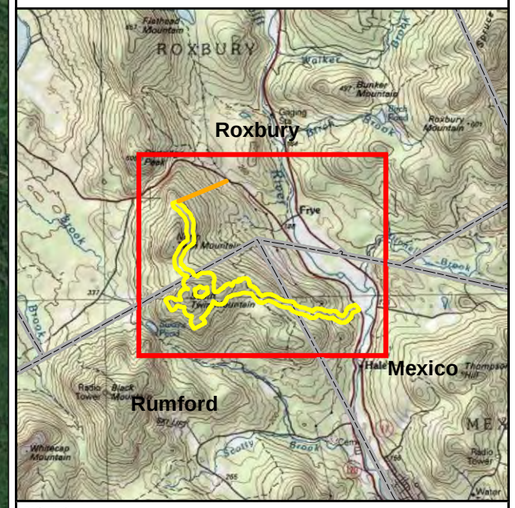


LEGEND

- CLASS L SOIL SURVEY AREA
- CLASS D SOIL SURVEY AREA



NOTES:

1 BASEMAP IMAGERY FROM ESRI/NAIP "WORLD IMAGERY" SERVICE LAYER.

N

0 1,500 3,000
Feet
1 " = 1,500 '
1:18,000

PROJECT:
TWIN ENERGY LLC
TWIN ENERGY PROJECT
OXFORD COUNTY, MAINE

TITLE:
AERIAL SOIL SURVEY LOCATION MAP

DRAWN BY:	D. KENWORTHY	PROJ NO.:	21ZP
CHECKED BY:	R. KELSHAW		
MONTH:	JANUARY		**FIGURE 2**
YEAR:	2022		

Flycatcher LAND + SCIENCE + PEOPLE

PALMER

FILE NO.: Palmer_TwinEnergy_Soils_Fig2_Aerial_11x17L.mxd

Map Unit Symbol	Map Unit Name	HSG
AlB	Abram/Lyman/Rock Outcrop Complex, 15-35% slopes	D
AlC	Abram/Lyman/Rock Outcrop Complex, 8-15% slopes	D
AlD	Abram/Lyman/Rock Outcrop Complex, 15-35% slopes	D
AlE	Abram/Lyman/Rock Outcrop Complex, >35% slopes	D
ApA	Abram sandy loam, poorly drained, 0-3% slopes	D
AtB	Abram/Tunbridge Complex, 3-8% slopes	C/D
AtD	Abram/Tunbridge Complex, 15-35% slopes	C/D
BrA	Brayton sandy loam, 0-3% slopes	D
BrB	Brayton sandy loam, 3-8% slopes	D
BrC	Brayton sandy loam, 8-15% slopes	D
BrD	Brayton sandy loam, 15-35% slopes	D
BtC	Becket/Tunbridge Complex, 8-15% slopes	C
BtD	Becket/Tunbridge Complex, 15-35% slopes	C
BtE	Becket/Tunbridge Complex, >35% slopes	C
BwC	Becket/Westbury Complex, 8-15% slopes	C/D
BwD	Becket/Westbury Complex, 15-35% slopes	C/D
BwE	Becket/Westbury Complex, >35% slopes	C/D
CsB	Colonel/Skerry Complex, 3-8% slopes	C/D
CsC	Colonel/Skerry Complex, 8-15% slopes	C/D
CsD	Colonel/Skerry Complex, 15-35% slopes	C/D
Ht	Human Transported Material	NR
LpA	Lyman sandy loam, poorly drained, 0-3% slopes	D
LpB	Lyman sandy loam, poorly drained, 3-8% slopes	D
LpC	Lyman sandy loam, poorly drained, 8-15% slopes	D
LrB	Lyman/Tunbridge/Rock Outcrop Complex, 3-8% slopes	C/D
LrC	Lyman/Tunbridge/Rock Outcrop Complex, 8-15% slopes	C/D
LrD	Lyman/Tunbridge/Rock Outcrop Complex, 15-35% slopes	C/D
LrE	Lyman/Tunbridge/Rock Outcrop Complex, >35% slopes	C/D
LuB	Lyman/Tunbridge/Becket Complex, 8-15% slopes	C/D
LuD	Lyman/Tunbridge/Becket Complex, 15-35% slopes	C/D
MoB	Monadnock fine sandy loam, 3-8% slopes	B
MoC	Monadnock fine sandy loam, 8-15% slopes	B
MoD	Monadnock fine sandy loam, 15-35% slopes	B
MoE	Monadnock fine sandy loam, >35% slopes	B
MtC	Monadnock/Tunbridge Complex, 8-15% slopes	B/C
MtD	Monadnock/Tunbridge Complex, 15-35% slopes	B/C
PbA	Peacham/Brayton Complex, 0-3% slopes	D
PbB	Peacham/Brayton Complex, 3-8% slopes	D
PmC	Peru/Marlow Complex, 8-15% slopes	C
PmD	Peru/Marlow Complex, 15-35% slopes	C
PmE	Peru/Marlow Complex, 35% slopes	C
ScC	Skerry/Colonel Complex, 8-15% slopes	C/D
ScD	Skerry/Colonel Complex, 15-35% slopes	C/D
TmC	Tunbridge/Monadnock Complex, 8-15% slopes	B/C
TmD	Tunbridge/Monadnock Complex, 15-35% slopes	B/C
TmE	Tunbridge/Monadnock Complex, >35% slopes	B/C
TpA	Tunbridge sandy loam, poorly drained, 0-3% slopes	D
TpB	Tunbridge sandy loam, poorly drained, 3-8% slopes	D
TpC	Tunbridge sandy loam, poorly drained, 8-15% slopes	D
TpD	Tunbridge sandy loam, poorly drained, 15-35% slopes	D
TrC	Tunbridge/Lyman/Rock Outcrop Complex, 8-15% slopes	C/D
TrD	Tunbridge/Lyman/Rock Outcrop Complex, 15-35% slopes	C/D
TrE	Tunbridge/Lyman/Rock Outcrop Complex, >35% slopes	C/D

Map Unit Symbol	Map Unit Name	HSG
AlB	Abram/Lyman/Rock Outcrop Complex, 15-35% slopes	D
AlC	Abram/Lyman/Rock Outcrop Complex, 8-15% slopes	D
AlD	Abram/Lyman/Rock Outcrop Complex, 15-35% slopes	D
AlE	Abram/Lyman/Rock Outcrop Complex, >35% slopes	D
ApA	Abram sandy loam, poorly drained, 0-3% slopes	D
AtB	Abram/Tunbridge Complex, 3-8% slopes	C/D
AtD	Abram/Tunbridge Complex, 15-35% slopes	C/D
BrA	Brayton sandy loam, 0-3% slopes	D
BrB	Brayton sandy loam, 3-8% slopes	D
BrC	Brayton sandy loam, 8-15% slopes	D
BrD	Brayton sandy loam, 15-35% slopes	D
BtC	Becket/Tunbridge Complex, 8-15% slopes	C
BtD	Becket/Tunbridge Complex, 15-35% slopes	C
BtE	Becket/Tunbridge Complex, >35% slopes	C
BwC	Becket/Westbury Complex, 8-15% slopes	C/D
BwD	Becket/Westbury Complex, 15-35% slopes	C/D
BwE	Becket/Westbury Complex, >35% slopes	C/D
CsB	Colonel/Skerry Complex, 3-8% slopes	C/D
CsC	Colonel/Skerry Complex, 8-15% slopes	C/D
CsD	Colonel/Skerry Complex, 15-35% slopes	C/D
Ht	Human Transported Material	NR
LpA	Lyman sandy loam, poorly drained, 0-3% slopes	D
LpB	Lyman sandy loam, poorly drained, 3-8% slopes	D
LpC	Lyman sandy loam, poorly drained, 8-15% slopes	D
LrB	Lyman/Tunbridge/Rock Outcrop Complex, 3-8% slopes	C/D
LrC	Lyman/Tunbridge/Rock Outcrop Complex, 8-15% slopes	C/D
LrD	Lyman/Tunbridge/Rock Outcrop Complex, 15-35% slopes	C/D
LrE	Lyman/Tunbridge/Rock Outcrop Complex, >35% slopes	C/D
LuB	Lyman/Tunbridge/Becket Complex, 8-15% slopes	C/D
LuD	Lyman/Tunbridge/Becket Complex, 15-35% slopes	C/D
MoB	Monadnock fine sandy loam, 3-8% slopes	B
MoC	Monadnock fine sandy loam, 8-15% slopes	B
MoD	Monadnock fine sandy loam, 15-35% slopes	B
MoE	Monadnock fine sandy loam, >35% slopes	B
MtC	Monadnock/Tunbridge Complex, 8-15% slopes	B/C
MtD	Monadnock/Tunbridge Complex, 15-35% slopes	B/C
PbA	Peacham/Brayton Complex, 0-3% slopes	D
PbB	Peacham/Brayton Complex, 3-8% slopes	D
PmC	Peru/Marlow Complex, 8-15% slopes	C
PmD	Peru/Marlow Complex, 15-35% slopes	C
PmE	Peru/Marlow Complex, 35% slopes	C
ScC	Skerry/Colonel Complex, 8-15% slopes	C/D
ScD	Skerry/Colonel Complex, 15-35% slopes	C/D
TmC	Tunbridge/Monadnock Complex, 8-15% slopes	B/C
TmD	Tunbridge/Monadnock Complex, 15-35% slopes	B/C
TmE	Tunbridge/Monadnock Complex, >35% slopes	B/C
TpA	Tunbridge sandy loam, poorly drained, 0-3% slopes	D
TpB	Tunbridge sandy loam, poorly drained, 3-8% slopes	D
TpC	Tunbridge sandy loam, poorly drained, 8-15% slopes	D
TpD	Tunbridge sandy loam, poorly drained, 15-35% slopes	D
TrC	Tunbridge/Lyman/Rock Outcrop Complex, 8-15% slopes	C/D
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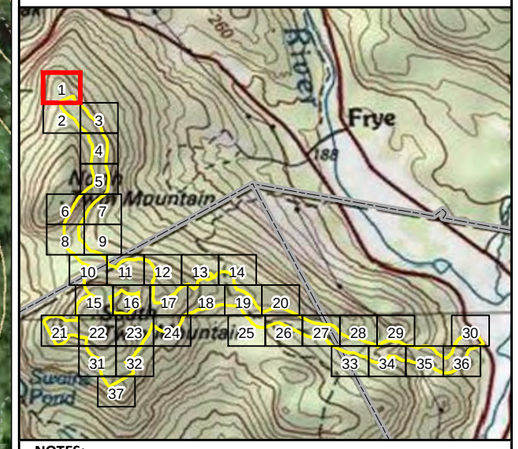
CERTIFIED SOIL SCIENTIST
Rodney D. Kelshaw
SS552
STATE OF MAINE



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Feet
1 " = 100 '
1:1,200

PROJECT:
TWIN ENERGY LLC
TWIN ENERGY PROJECT
OXFORD COUNTY, MAINE

TITLE:
CLASS L SOIL SURVEY

DRAWN BY:	D. KENWORTHY	PROJ NO.:	21ZP
CHECKED BY:	R. KELSHAW		
MONTH:	JANUARY		
YEAR:	2022		

FIGURE 3
Page 1 of 37

Flycatcher LAND + SCIENCE + PEOPLE
PALMER

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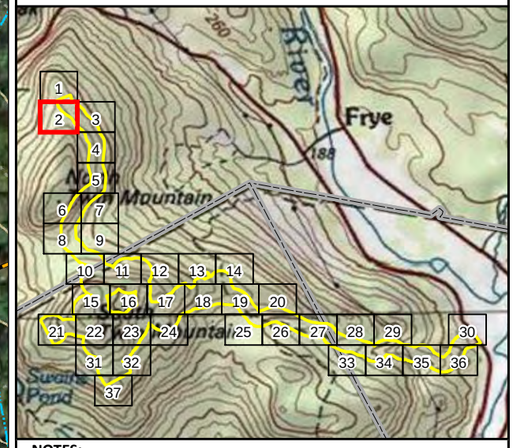

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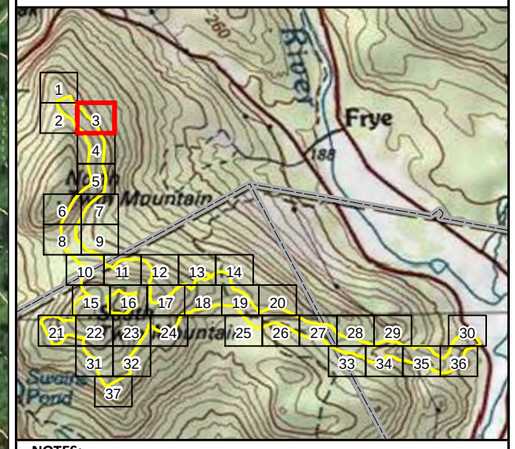

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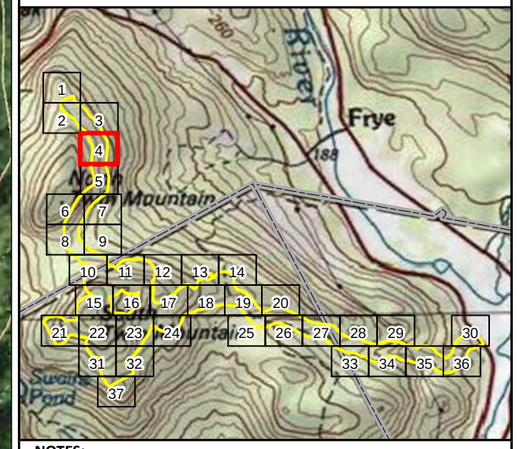

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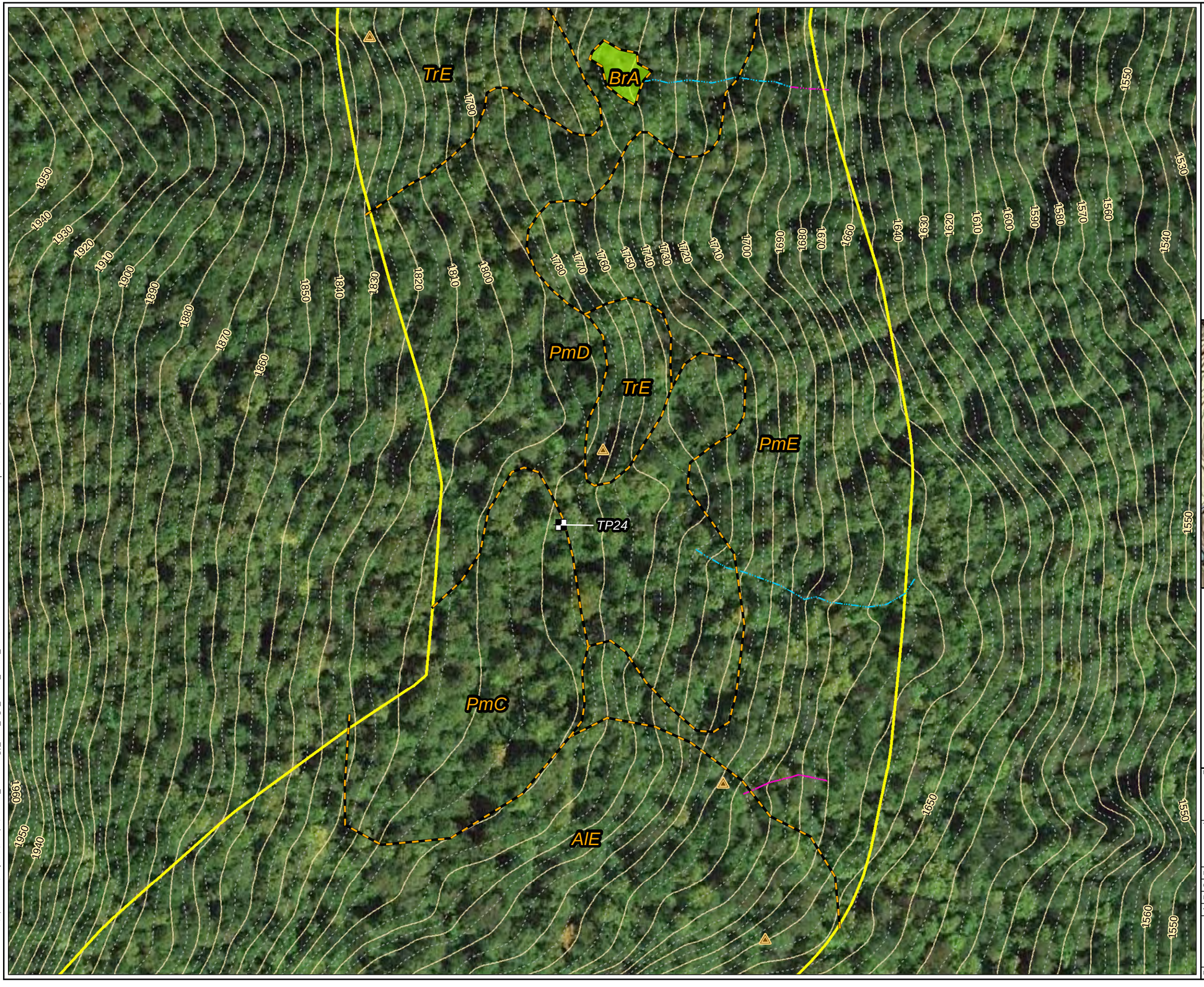

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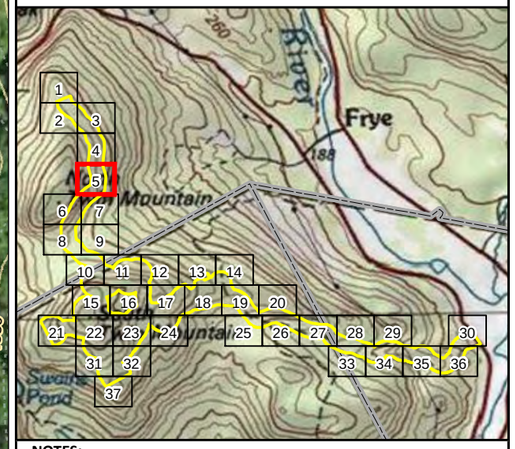

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FIGURE 3
Page 5 of 37

Flycatcher LAND + SCIENCE + PEOPLE

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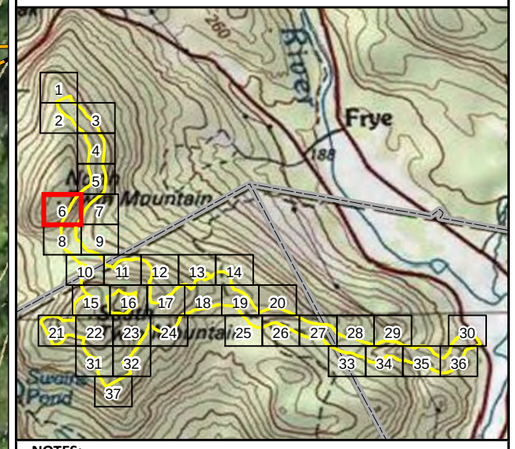

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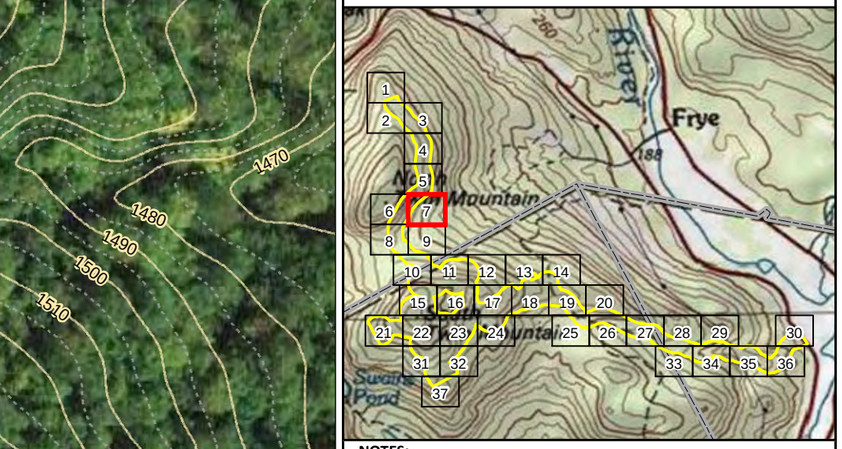

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FIGURE 3

Flycatcher LAND + SCIENCE + PEOPLE

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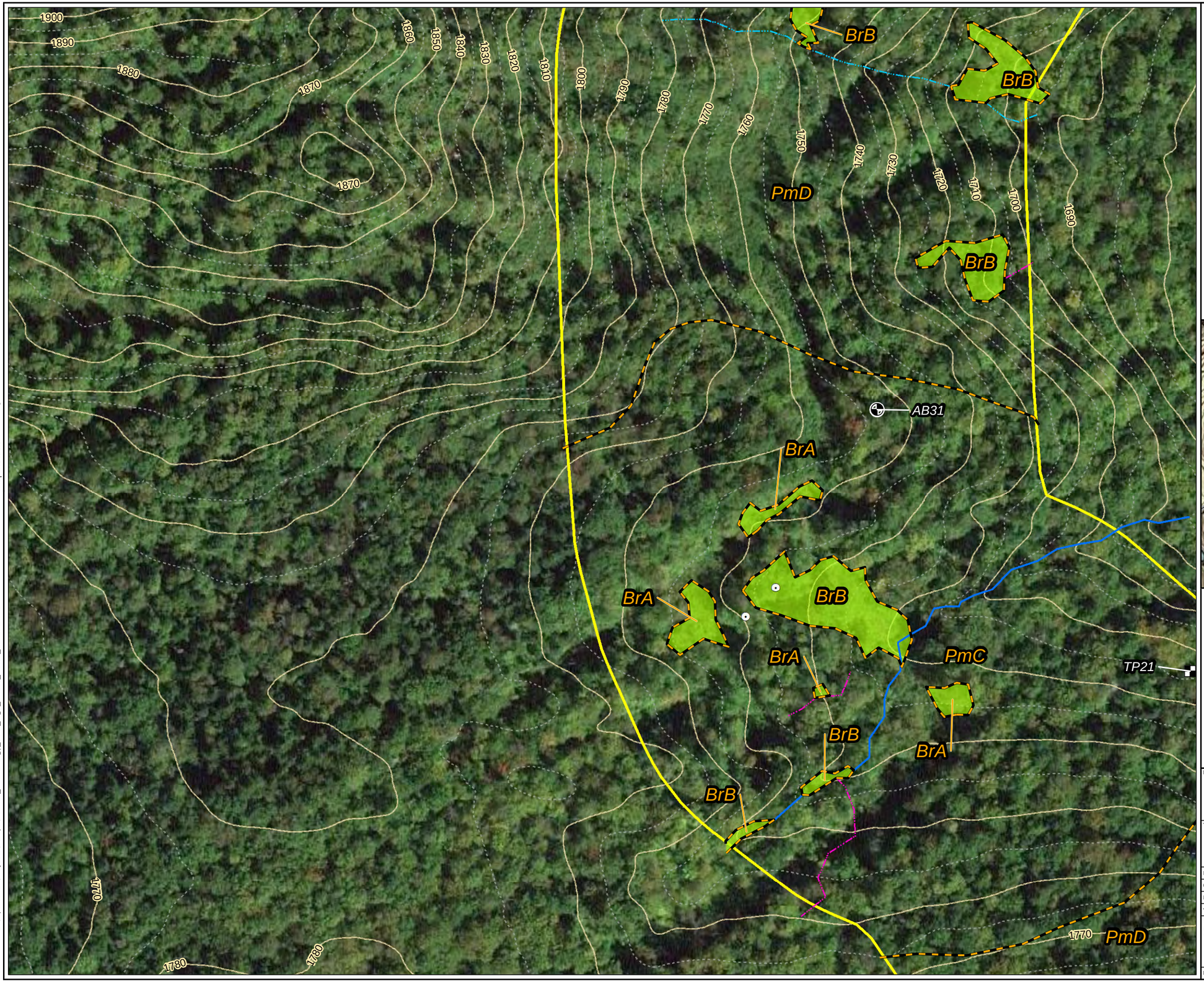

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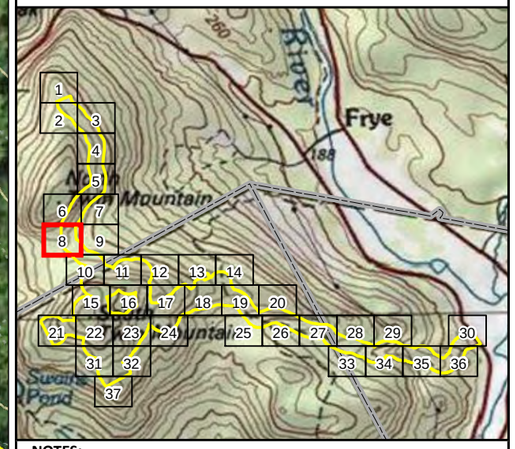

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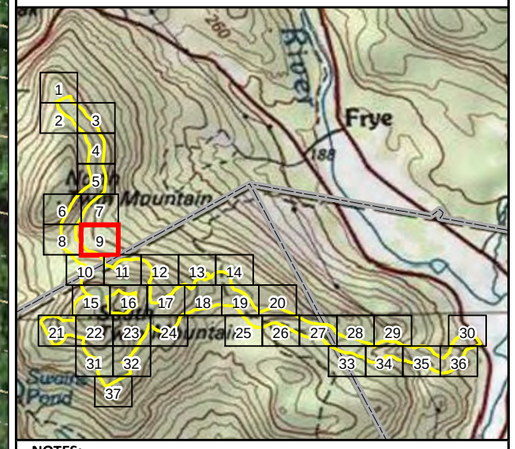

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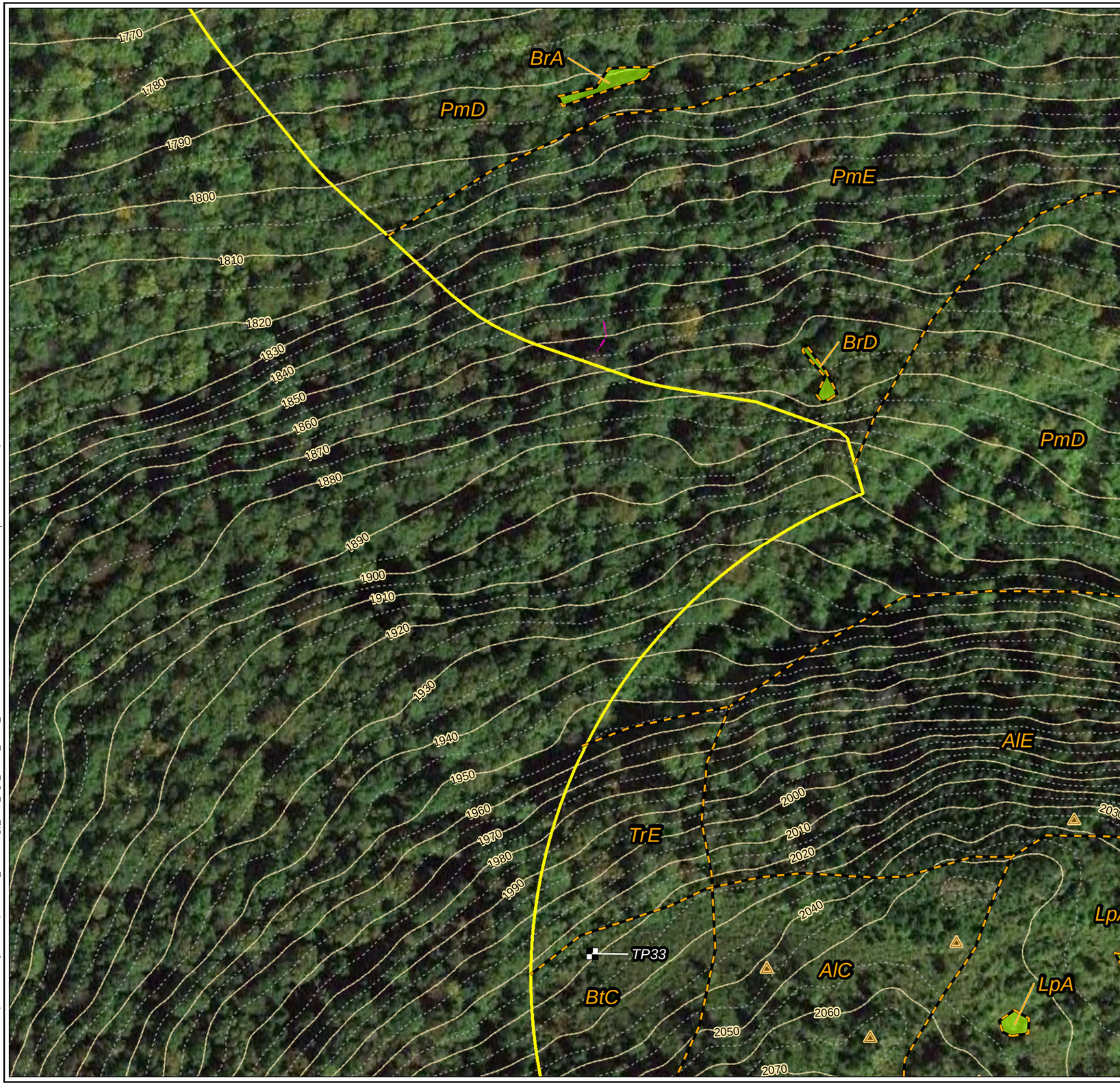

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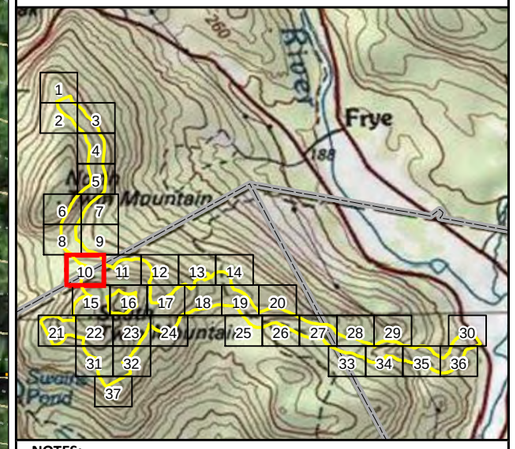
- DELINEATED INTERMITTENT STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED WETLAND
- CONTOUR LINE (10' INTERVAL)
- CONTOUR LINE (5' INTERVAL)

CERTIFIED SOIL SCIENTIST
Rodney D. Kelshaw
SS552
STATE OF MAINE



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N

0 100 200
Feet
1 " = 100 '
1:1,200

PROJECT:
TWIN ENERGY LLC
TWIN ENERGY PROJECT
OXFORD COUNTY, MAINE

TITLE:
CLASS L SOIL SURVEY

DRAWN BY:	D. KENWORTHY	PROJ NO.:	21ZP
CHECKED BY:	R. KELSHAW		
MONTH:	JANUARY		
YEAR:	2022		

FIGURE 3

Flycatcher LAND + SCIENCE + PEOPLE
PALMER

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Coordinate System: NAD 1983 StatePlane Maine West FIPS 1802 Feet (Foot US)
Map Rotation: 0

Plot Date: 1/28/2022, 11:34:36 AM by JAKEN -- LAYOUT: ANSI B(11"x17")
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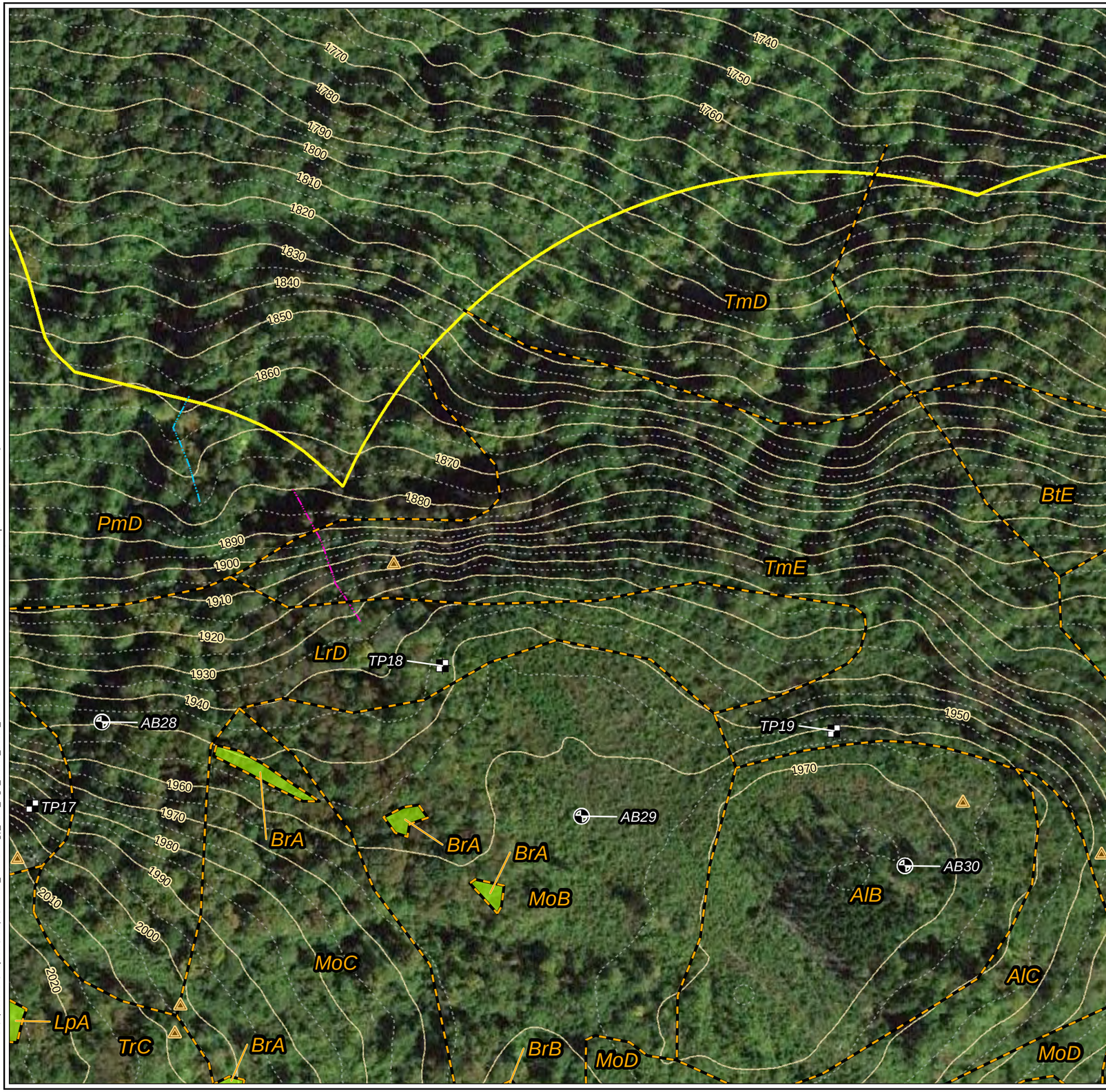

LEGEND

- CLASS L SOIL SURVEY AREA
- BEDROCK OUTCROP
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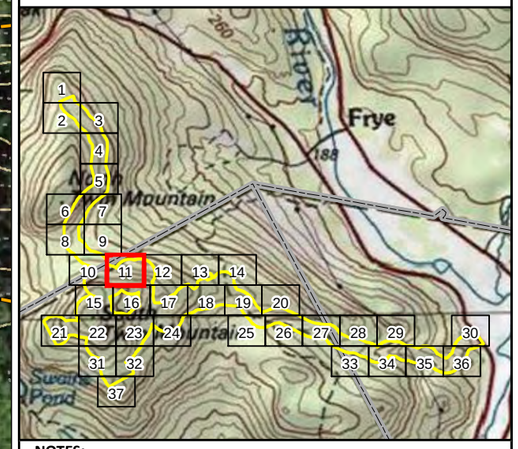

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FIGURE 3
Page 11 of 37

Flycatcher LAND + SCIENCE + PEOPLE

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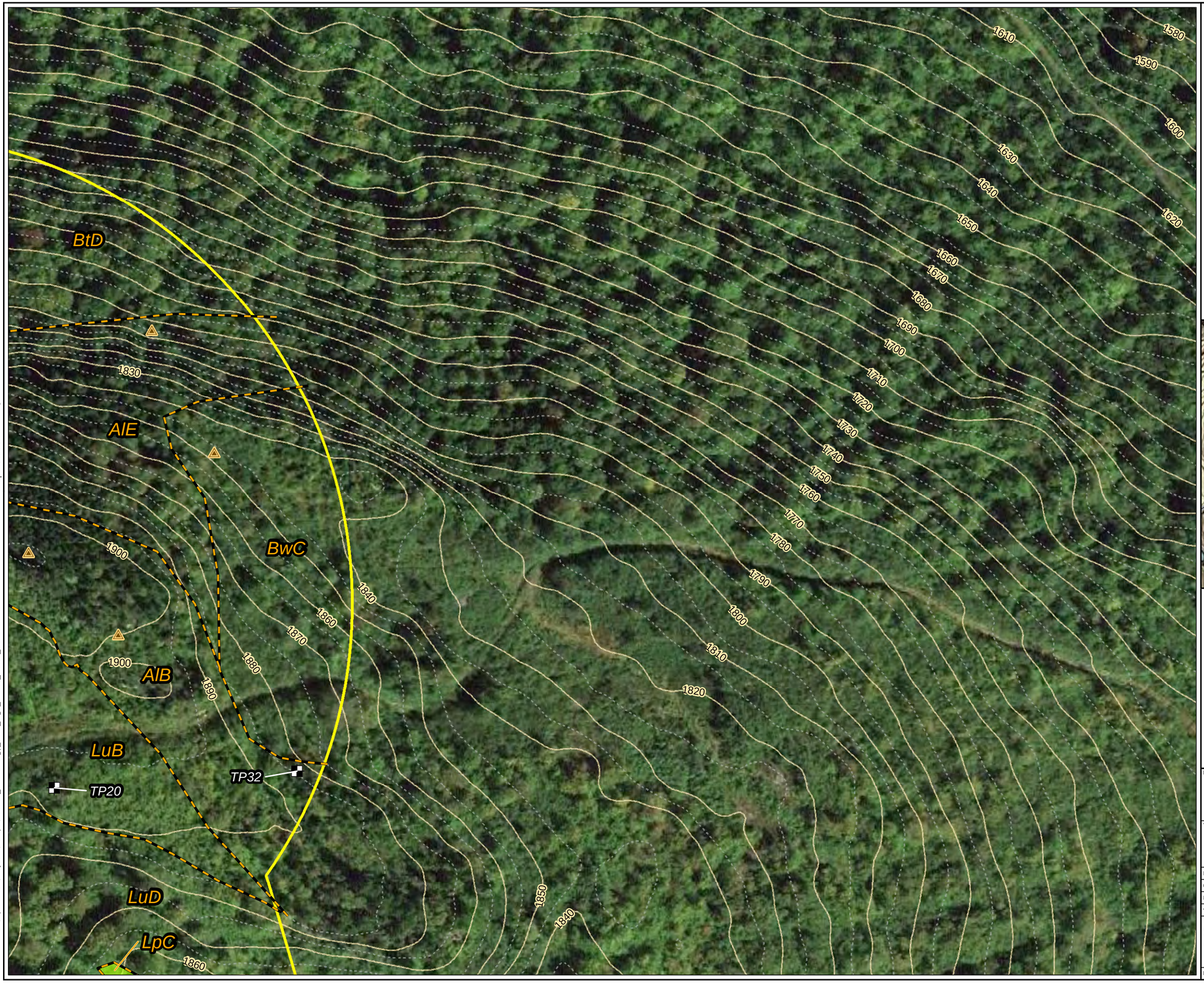

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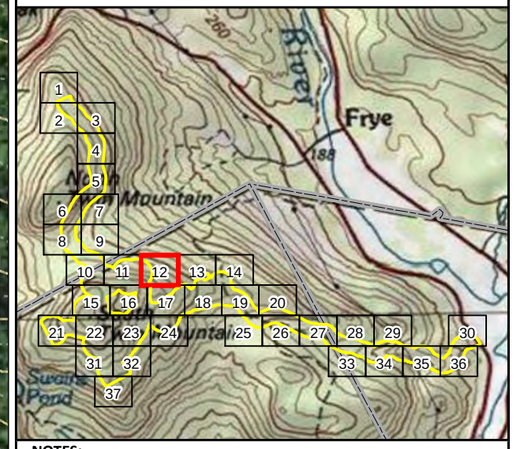

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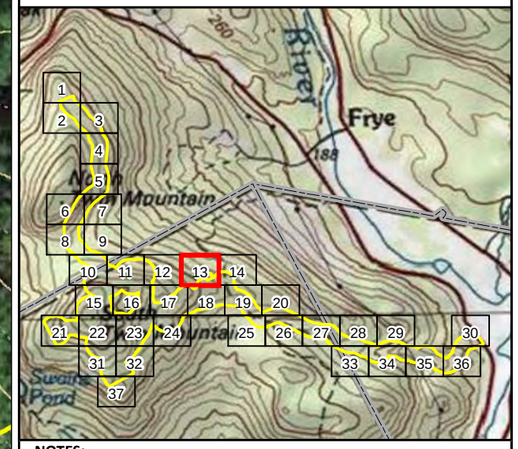

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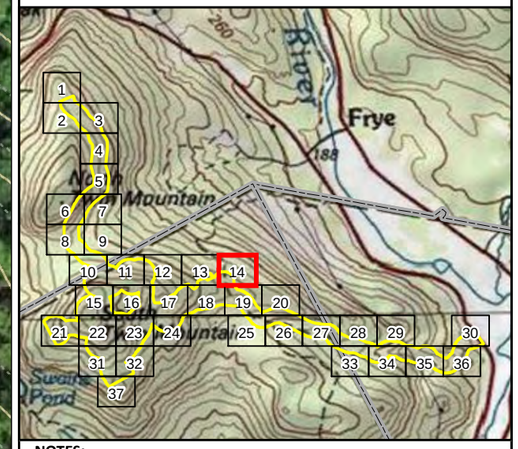

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FIGURE 3

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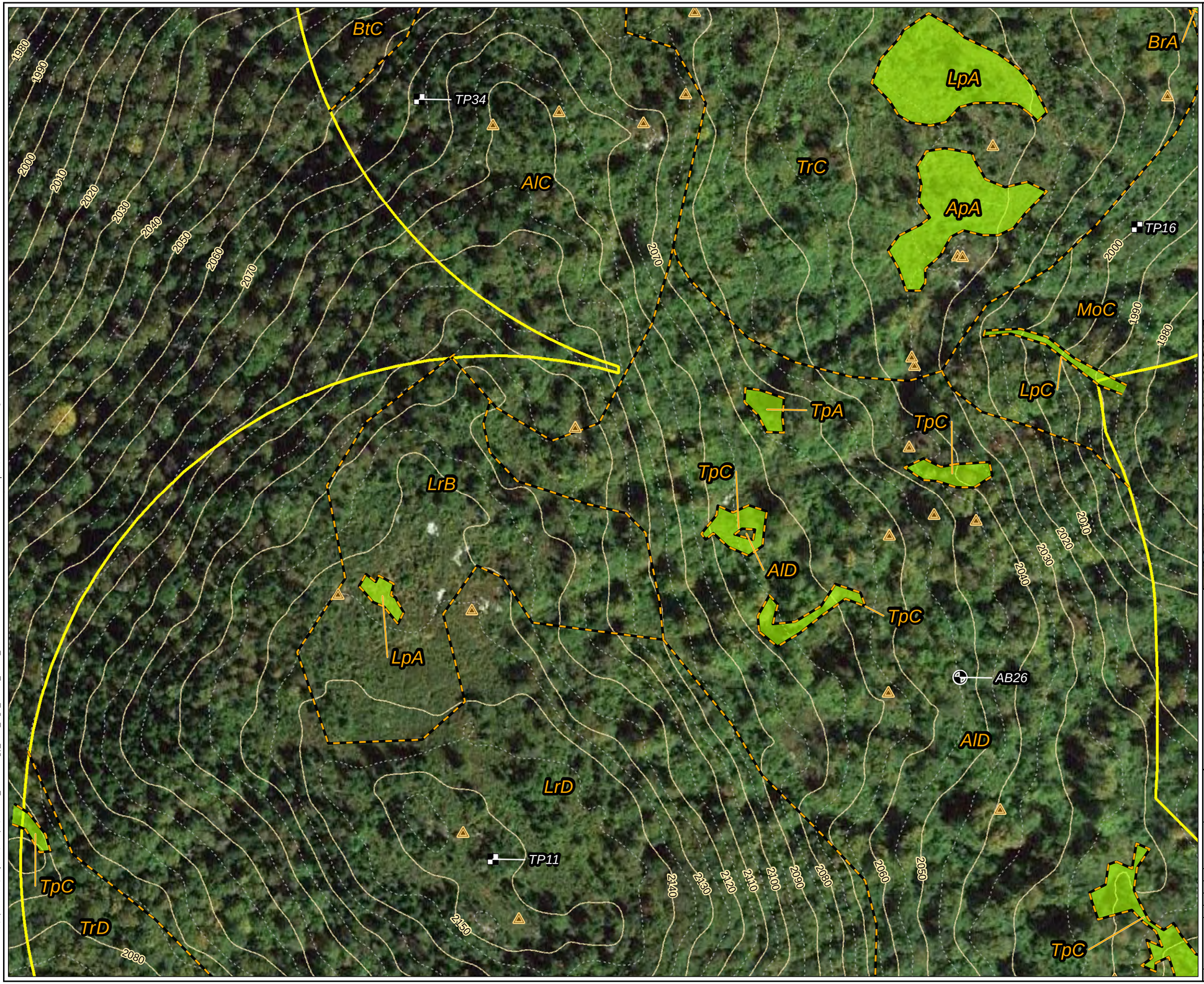

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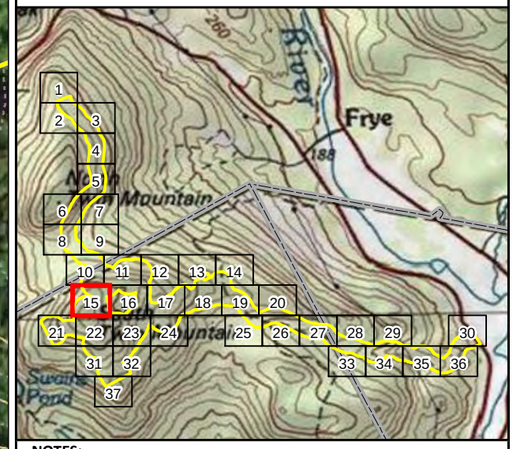

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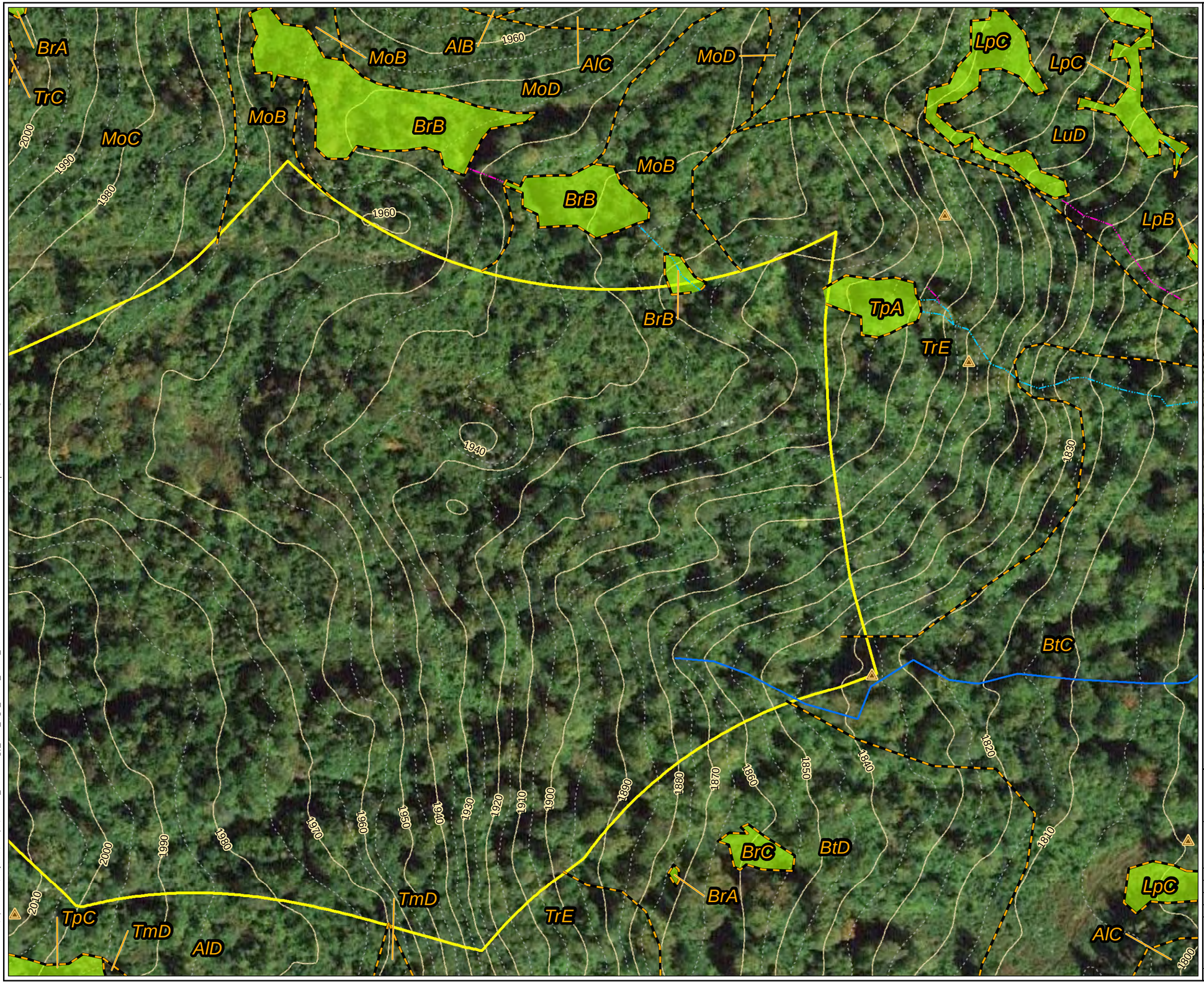

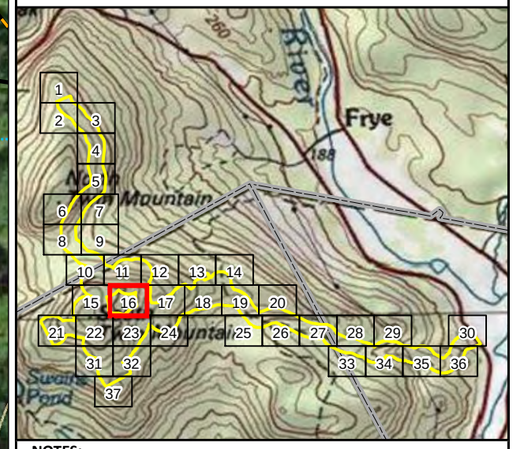

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FIGURE 3
Page 16 of 37

Flycatcher LAND + SCIENCE + PEOPLE
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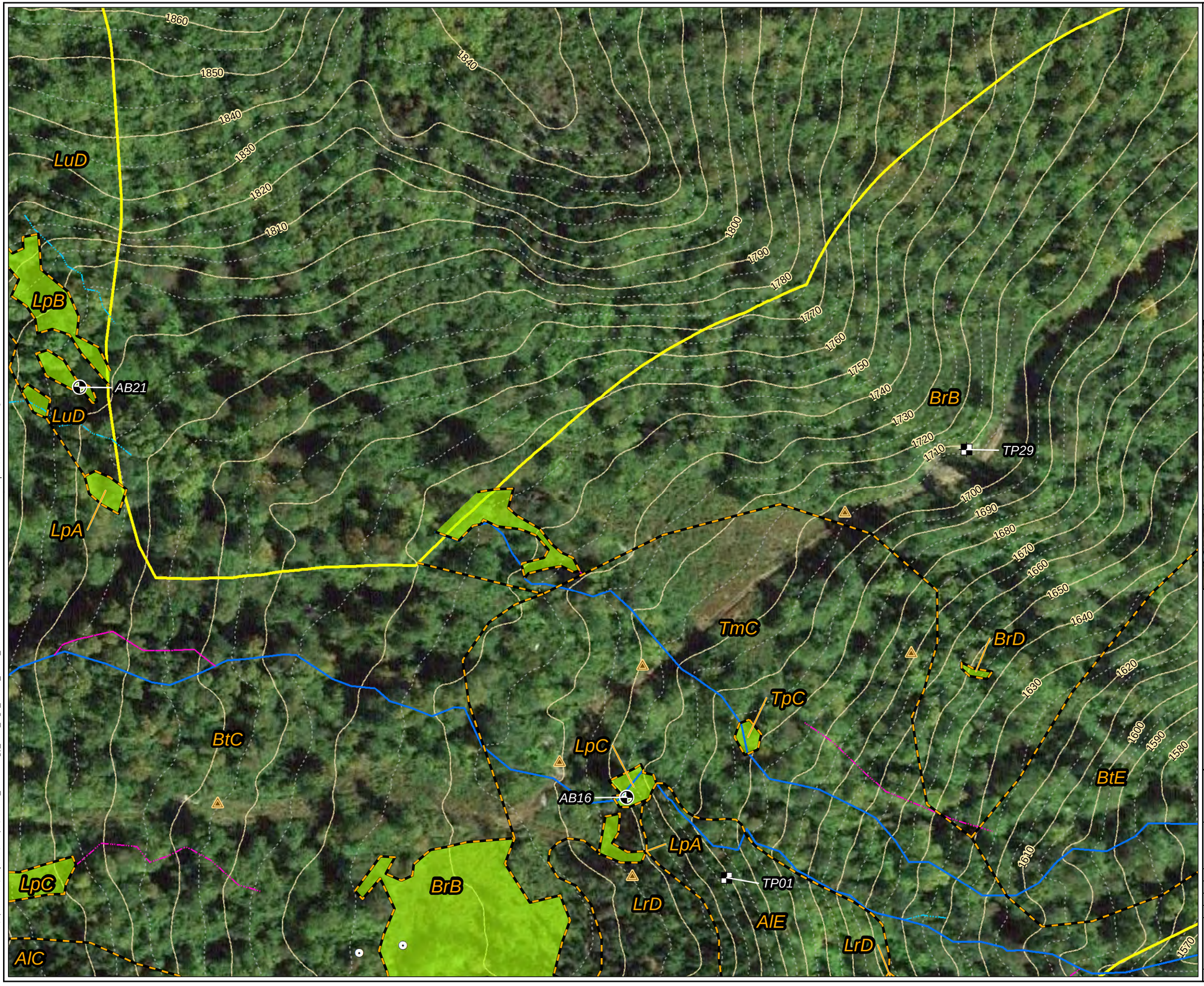

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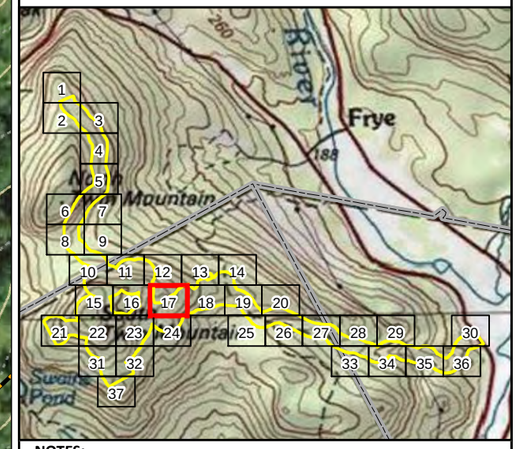

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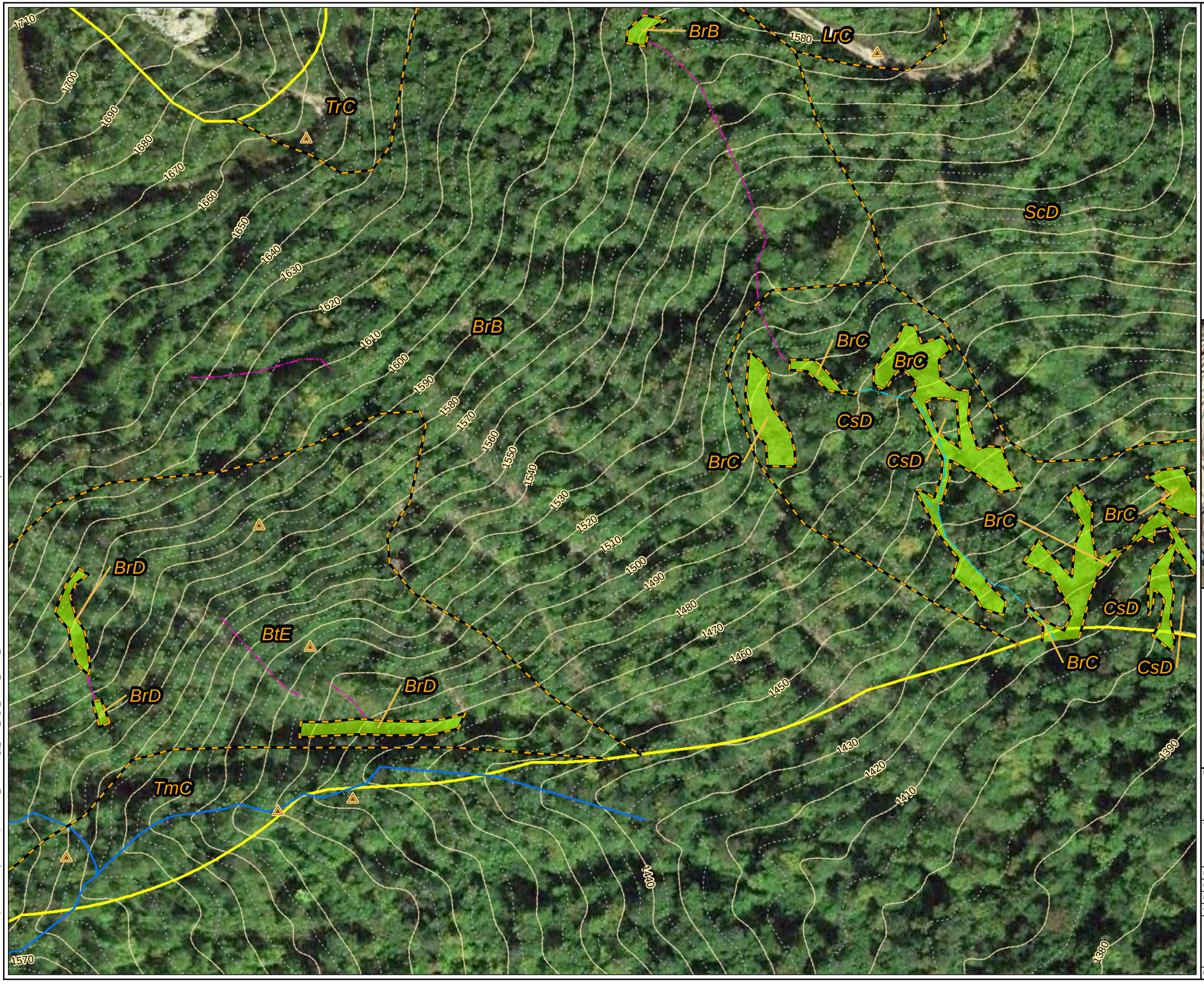

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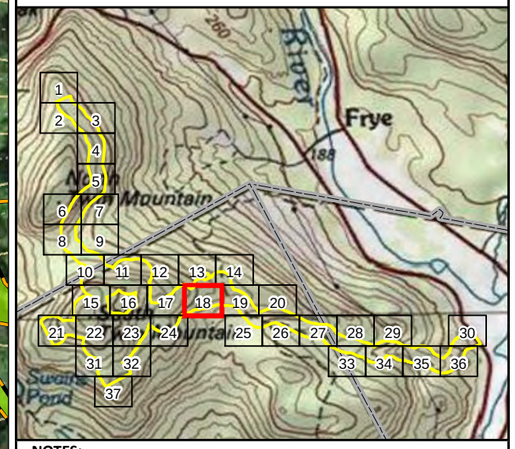

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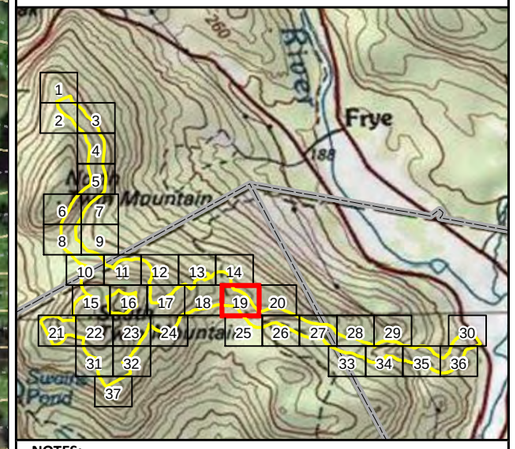

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FIGURE 3
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Flycatcher LAND + SCIENCE + PEOPLE
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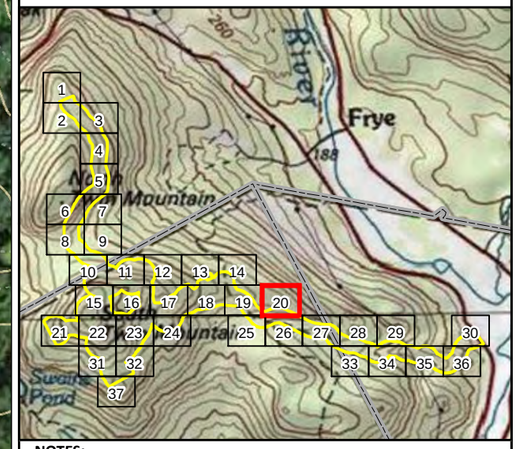

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OXFORD COUNTY, MAINE

TITLE:
CLASS L SOIL SURVEY

DRAWN BY:	D. KENWORTHY	PROJ NO.:	21ZP
CHECKED BY:	R. KELSHAW		
MONTH:	JANUARY		
YEAR:	2022		

FIGURE 3

Flycatcher LAND + SCIENCE + PEOPLE
PALMER

FILE NO.: Palmer_TwinEnergy_Soils_Fig3_ClassL_Detail_11x17L.mxd

Coordinate System: NAD 1983 StatePlane Maine West FIPS 1802 Feet (Foot US)
Map Rotation: 0

Plot Date: 1/28/2022, 11:34:36 AM by JAKEN -- LAYOUT: ANSI B(11"x17")
Path: D:\Flycatcher\Projects\Solaya\Palmer_TwinEnergy_Soils_Fig3_ClassL_Detail_11x17L.mxd

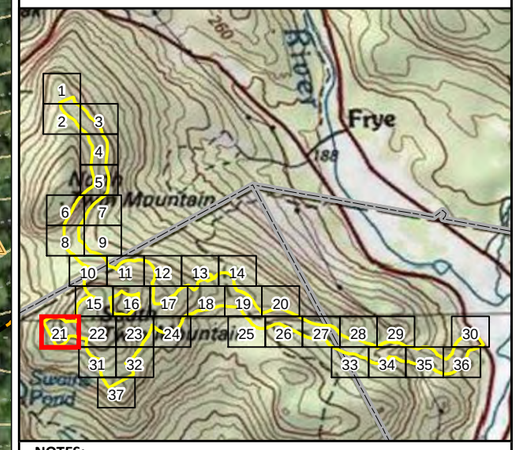
TrD
AlE
TpB
TrC
AB25
TpB
TpB
TrD
TrD
AB24
TpC
AlD
TP10
TrE
TrD
TrD
TpA
TrC

2060 2070 2050 2040 2030 2020 2010 2000 1990 1980 1970 1960 1950 1940 1930 1920 1910 1900 1890 1880 1870 1860 1850 1840 1830 1820 1810 1800 1790

LEGEND

- CLASS L SOIL SURVEY AREA
- BEDROCK OUTCROP
- AUGER BORING
- SOIL TEST PIT
- CORPS PLOT
- CULVERT
- SOIL MAP UNIT BOUNDARY
- UPLAND DRAINAGE
- DELINEATED INTERMITTENT STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED WETLAND
- CONTOUR LINE (10' INTERVAL)
- CONTOUR LINE (5' INTERVAL)

CERTIFIED SOIL SCIENTIST
Rodney D. Kelshaw
SS552
STATE OF MAINE



NOTES:

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N

0 100 200
Feet
1 " = 100 '
1:1,200

PROJECT:
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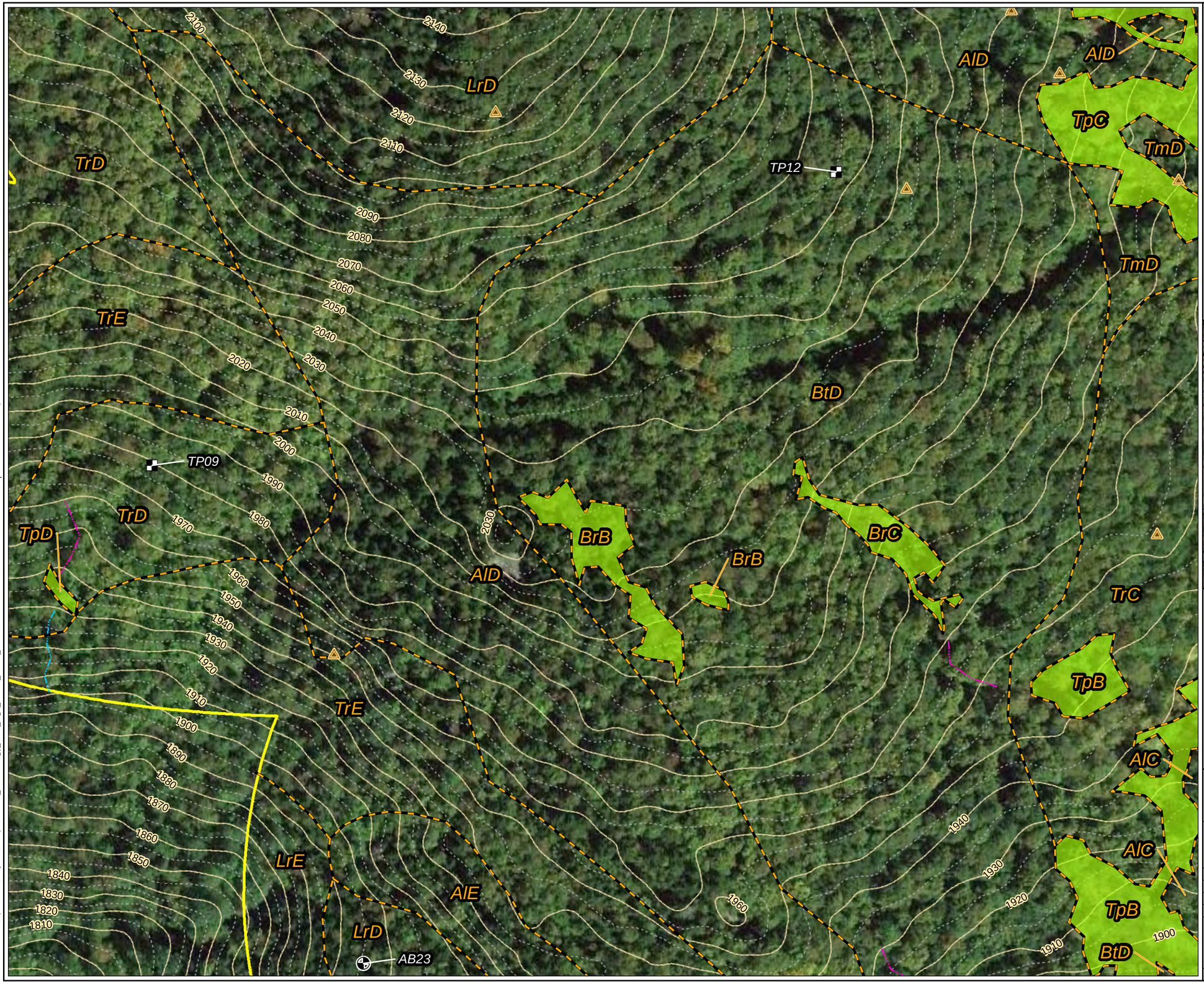

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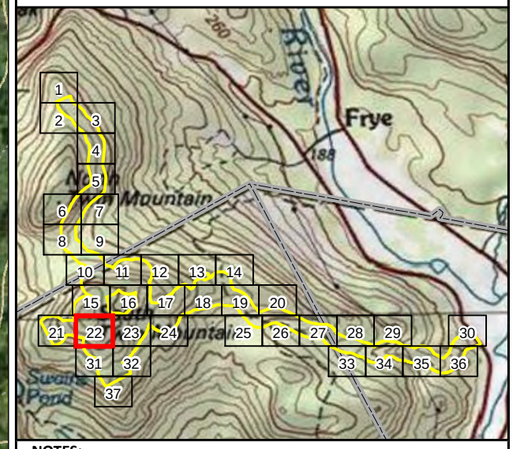

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AlD
TpC
TmD
TrE
BtD
BtC
AB20
AlC
LpA
TmD
TmD
TpC
BrC
BrB
BtC
TrC
BrC
BrC
TpB
TP02
BrB
BwD
TrD
TP15
BrB
AlB
AB03
TpB
TrE
TP13
TpB
AlC
BwE
TP03
TpB
BrC

1980 1970 1960 1950 1940 1930 1920 1910 1900 1880 1870 1860 1850 1840 1830 1820 1810 1800 1790 1770 1760 1750 1740 1730 1720 1710 1700 1690 1680 1670 1660 1650 1940 1890 1780

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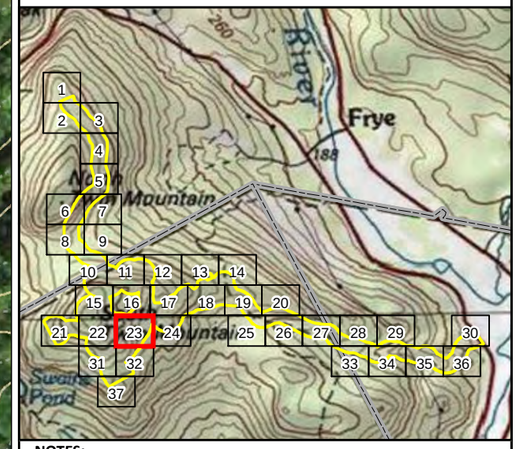

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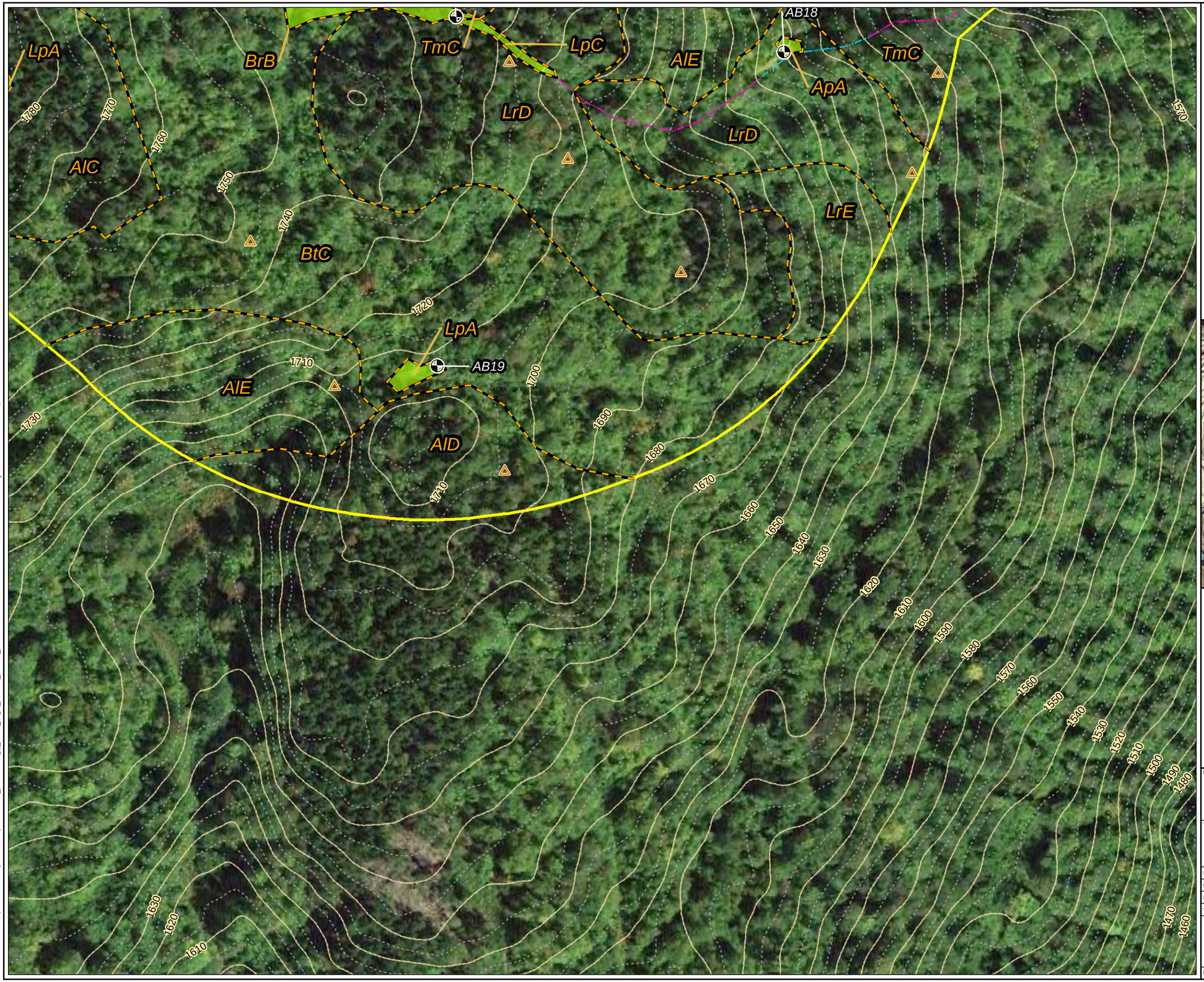

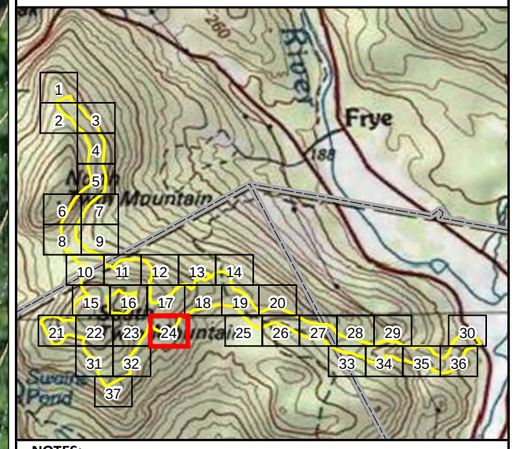

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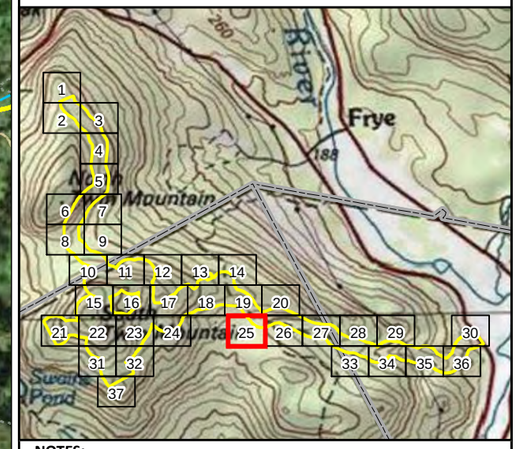

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AB10
BrB
BrA
CsB
ScD
CsC
1280
1220
1240
1250
1260
1270
1280
1290
1300
1310
1320
1330
1340
1350
1360

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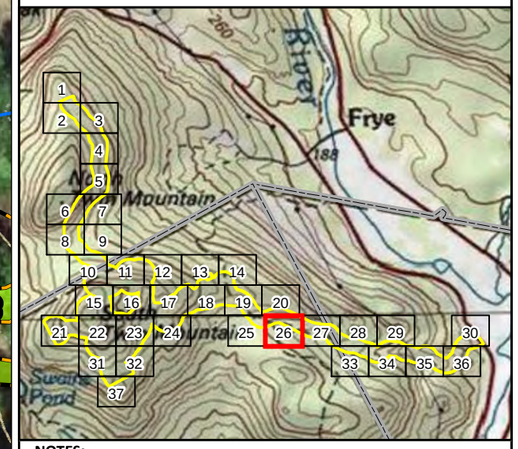

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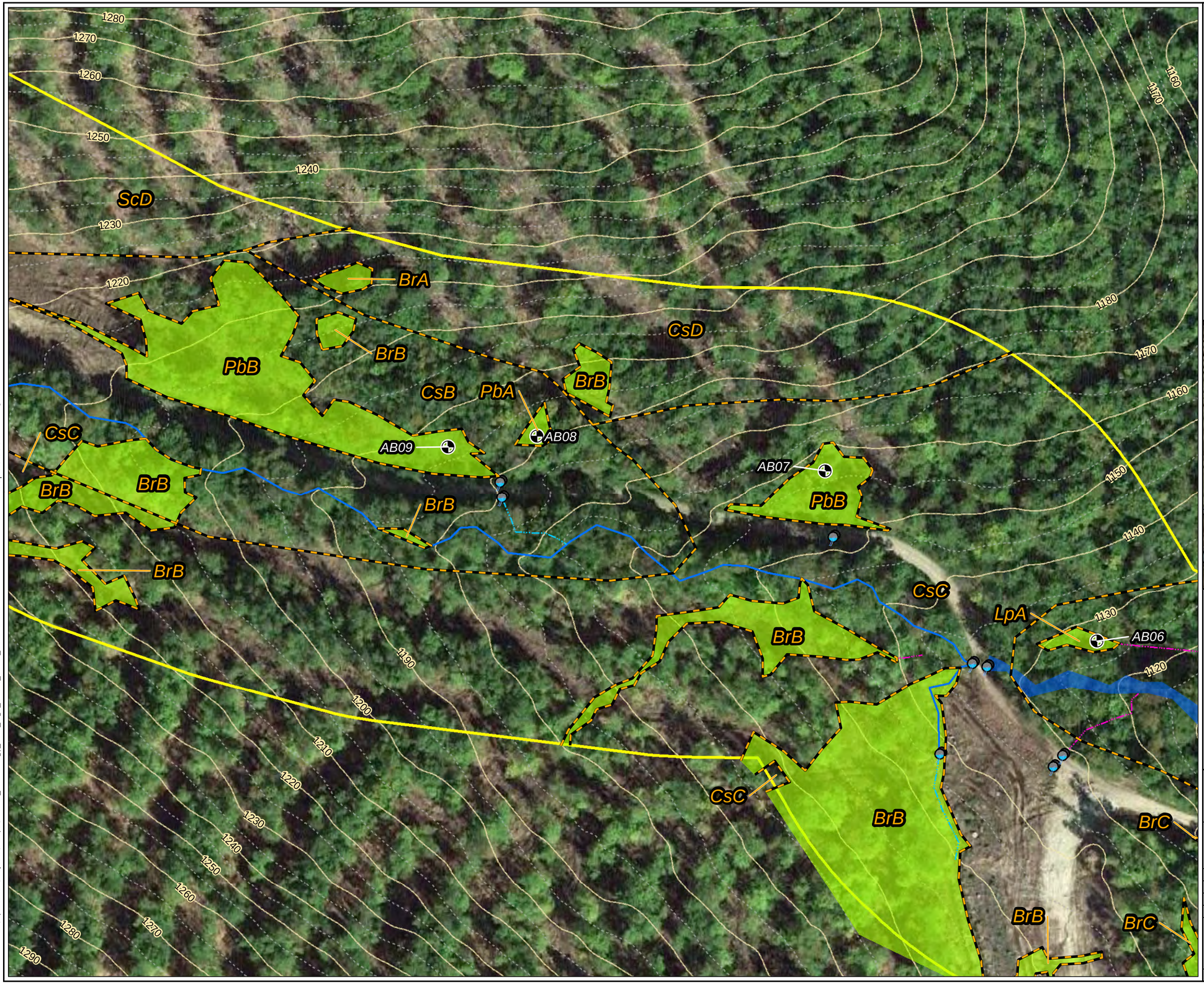

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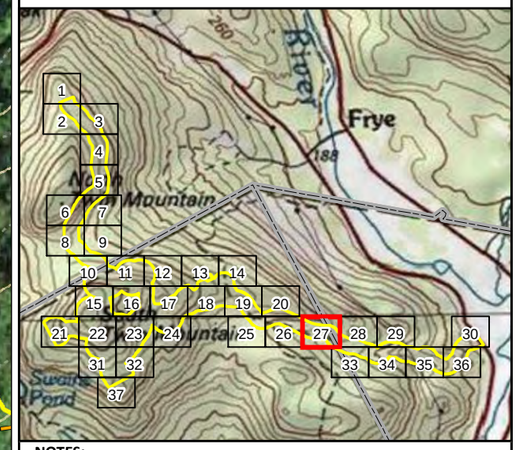

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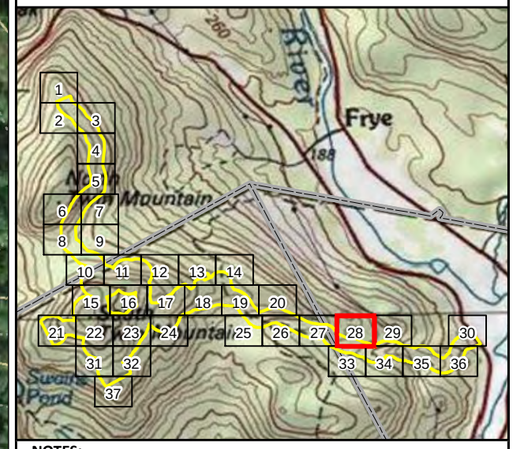

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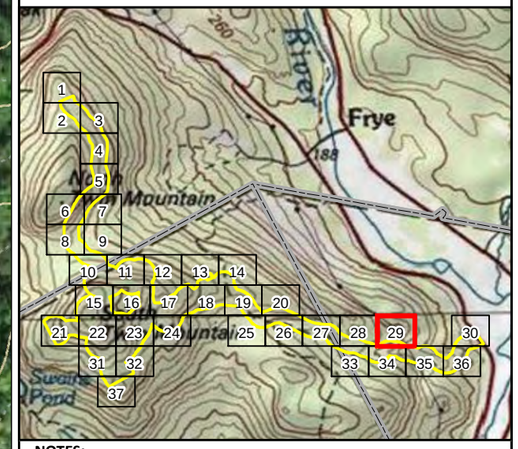

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Swift River Rd

120

630 620 560 570 580 590 600 610 630 640 650 660 670 680 690 710 700 720 540 550

MoD
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BrB
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TrC
TP100
AB100

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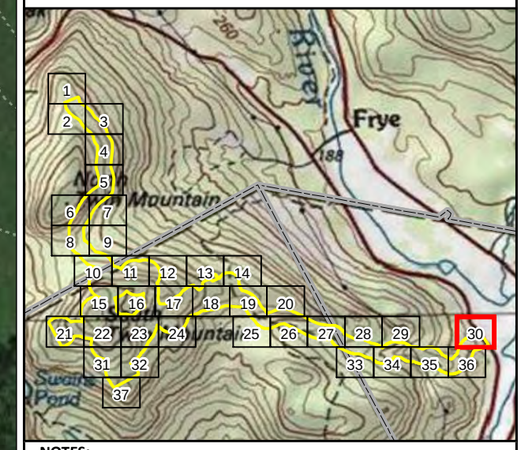

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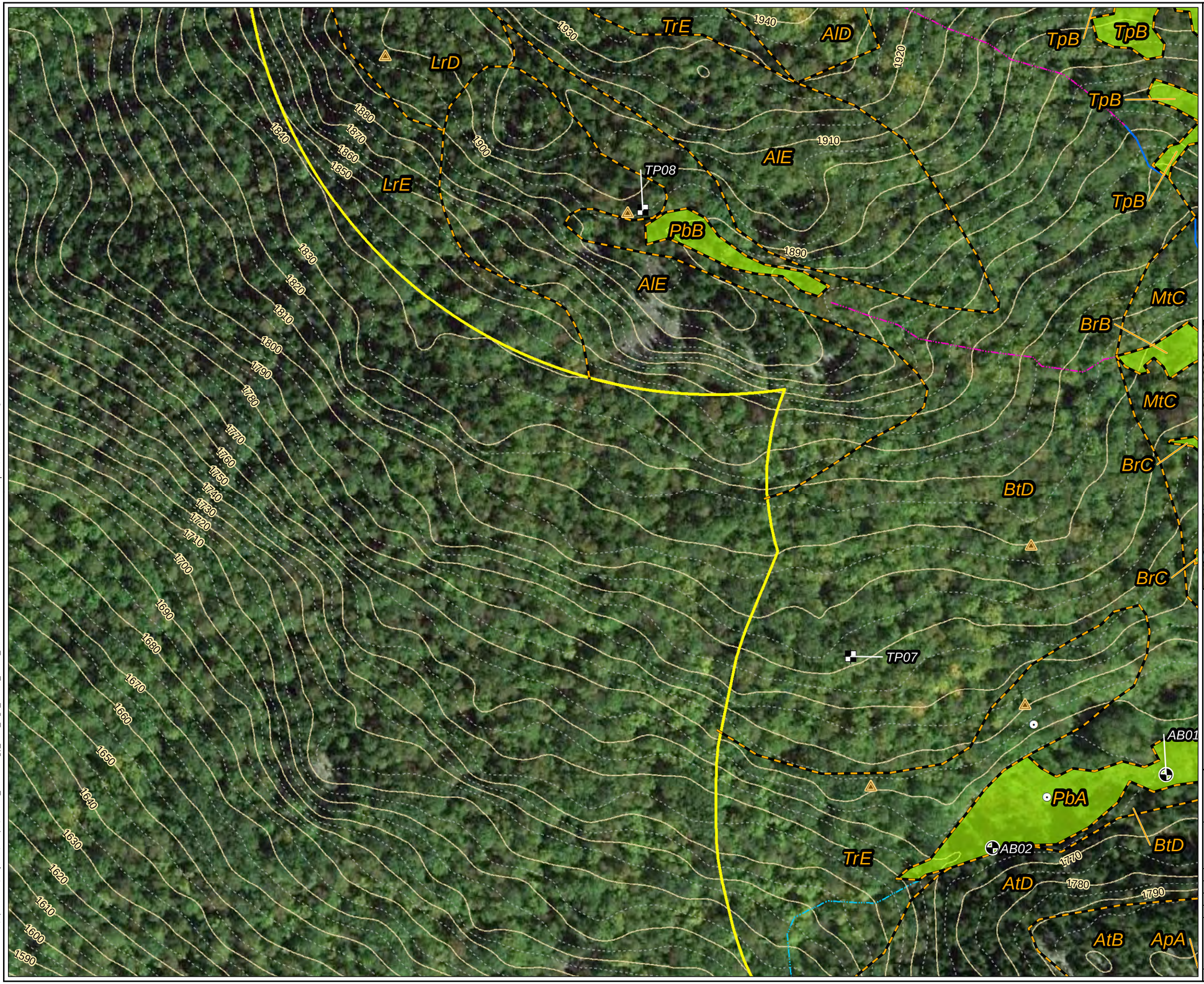
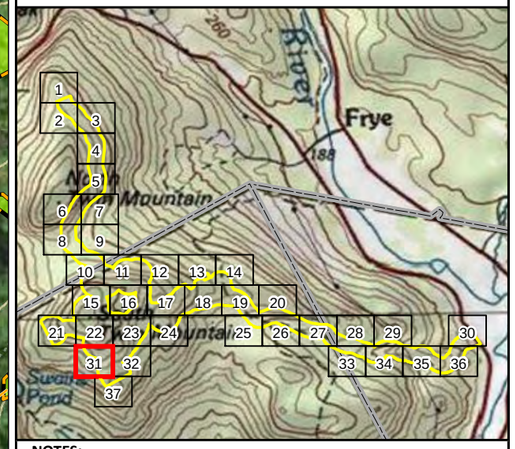


LEGEND

- CLASS L SOIL SURVEY AREA
- BEDROCK OUTCROP
- AUGER BORING
- SOIL TEST PIT
- CORPS PLOT
- CULVERT
- SOIL MAP UNIT BOUNDARY
- UPLAND DRAINAGE
- DELINEATED INTERMITTENT STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED WETLAND
- CONTOUR LINE (10' INTERVAL)
- CONTOUR LINE (5' INTERVAL)

CERTIFIED SOIL SCIENTIST
Rodney D. Kelshaw
SS552
STATE OF MAINE



NOTES:

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N

0 100 200
Feet
1 " = 100 '
1:1,200

PROJECT:
TWIN ENERGY LLC
TWIN ENERGY PROJECT
OXFORD COUNTY, MAINE

TITLE:
CLASS L SOIL SURVEY

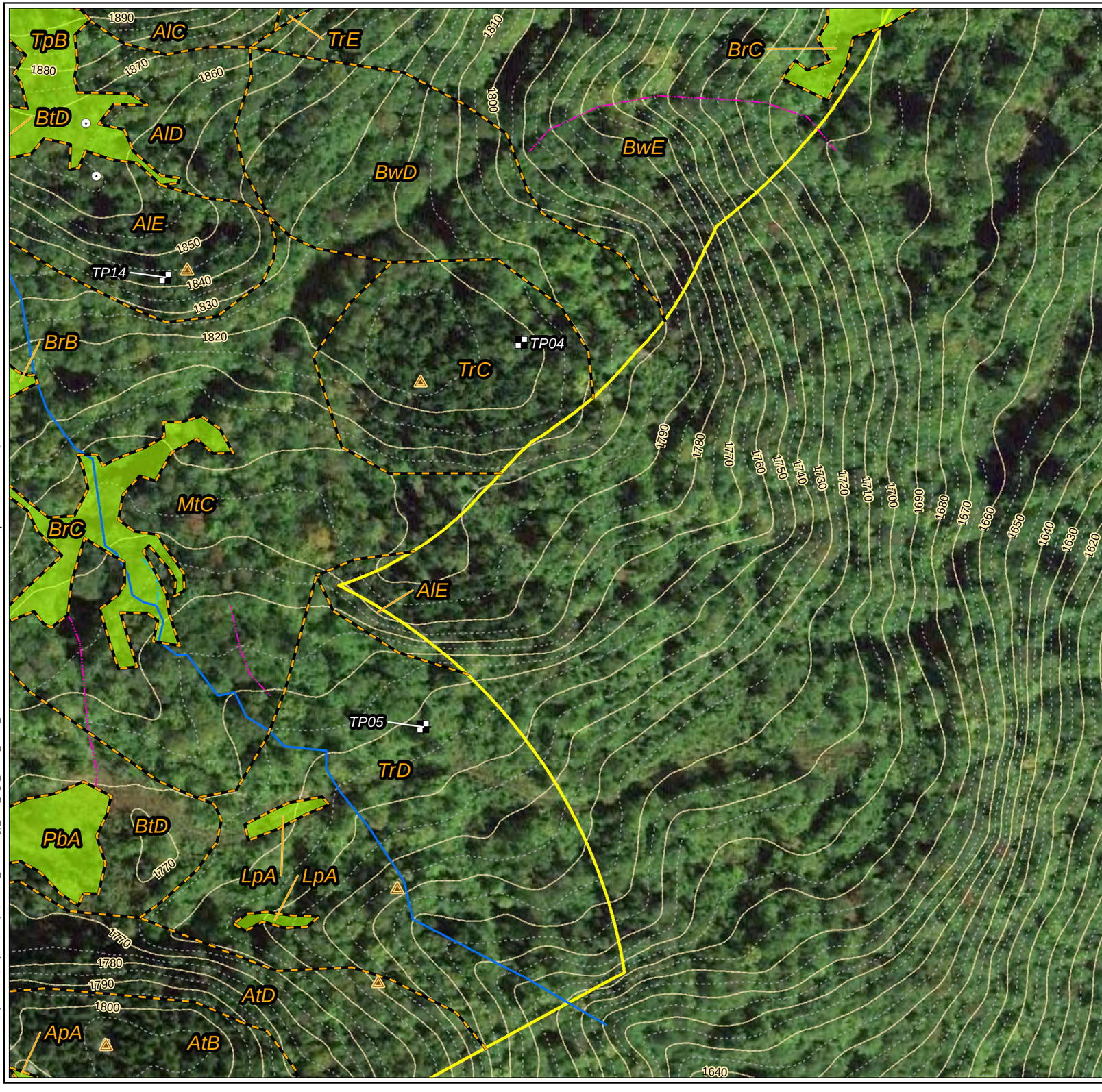
DRAWN BY:	D. KENWORTHY	PROJ NO.:	21ZP
CHECKED BY:	R. KELSHAW		
MONTH:	JANUARY		
YEAR:	2022		

FIGURE 3

Flycatcher LAND + SCIENCE + PEOPLE

PALMER

FILE NO.: Palmer_TwinEnergy_Soils_Fig3_ClassL_Detail_11x17L.mxd



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Map Rotation: 0

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LEGEND

- CLASS L SOIL SURVEY AREA
- BEDROCK OUTCROP
- AUGER BORING
- SOIL TEST PIT
- CORPS PLOT
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- SOIL MAP UNIT BOUNDARY
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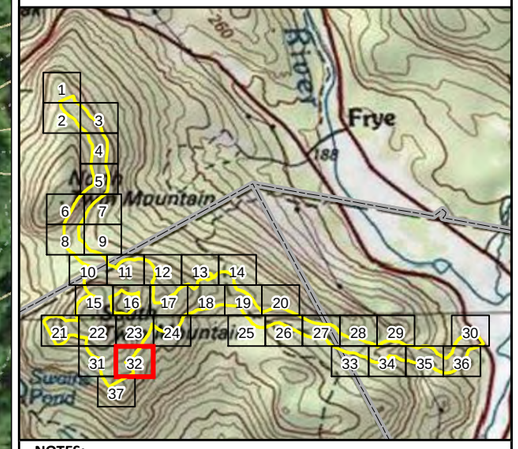
Rodney D. Kelshaw
SS552
STATE OF MAINE



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Feet

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TWIN ENERGY PROJECT
OXFORD COUNTY, MAINE

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CLASS L SOIL SURVEY

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MONTH:	JANUARY		
YEAR:	2022		

FIGURE 3

Flycatcher LAND + SCIENCE + PEOPLE

PALMER

FILE NO.: Palmer_TwinEnergy_Soils_Fig3_ClassL_Detail_11x17L.mxd

LEGEND

- CLASS L SOIL SURVEY AREA
- BEDROCK OUTCROP
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- SOIL TEST PIT
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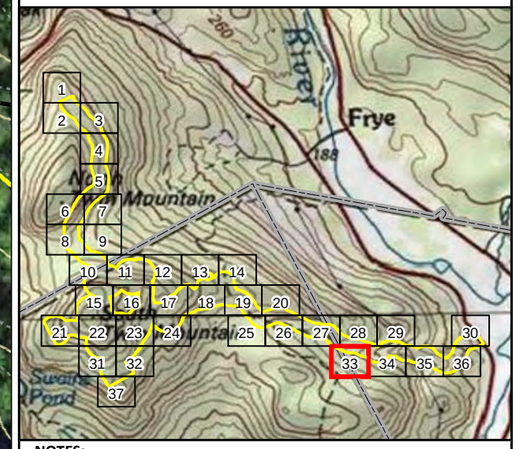

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Feet

1 " = 100 '
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TWIN ENERGY PROJECT
OXFORD COUNTY, MAINE

TITLE:
CLASS L SOIL SURVEY

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CHECKED BY:	R. KELSHAW		
MONTH:	JANUARY		
YEAR:	2022		

FIGURE 3
Page 33 of 37

Flycatcher LAND + SCIENCE + PEOPLE

PALMER

FILE NO.: Palmer_TwinEnergy_Soils_Fig3_ClassL_Detail_11x17L.mxd

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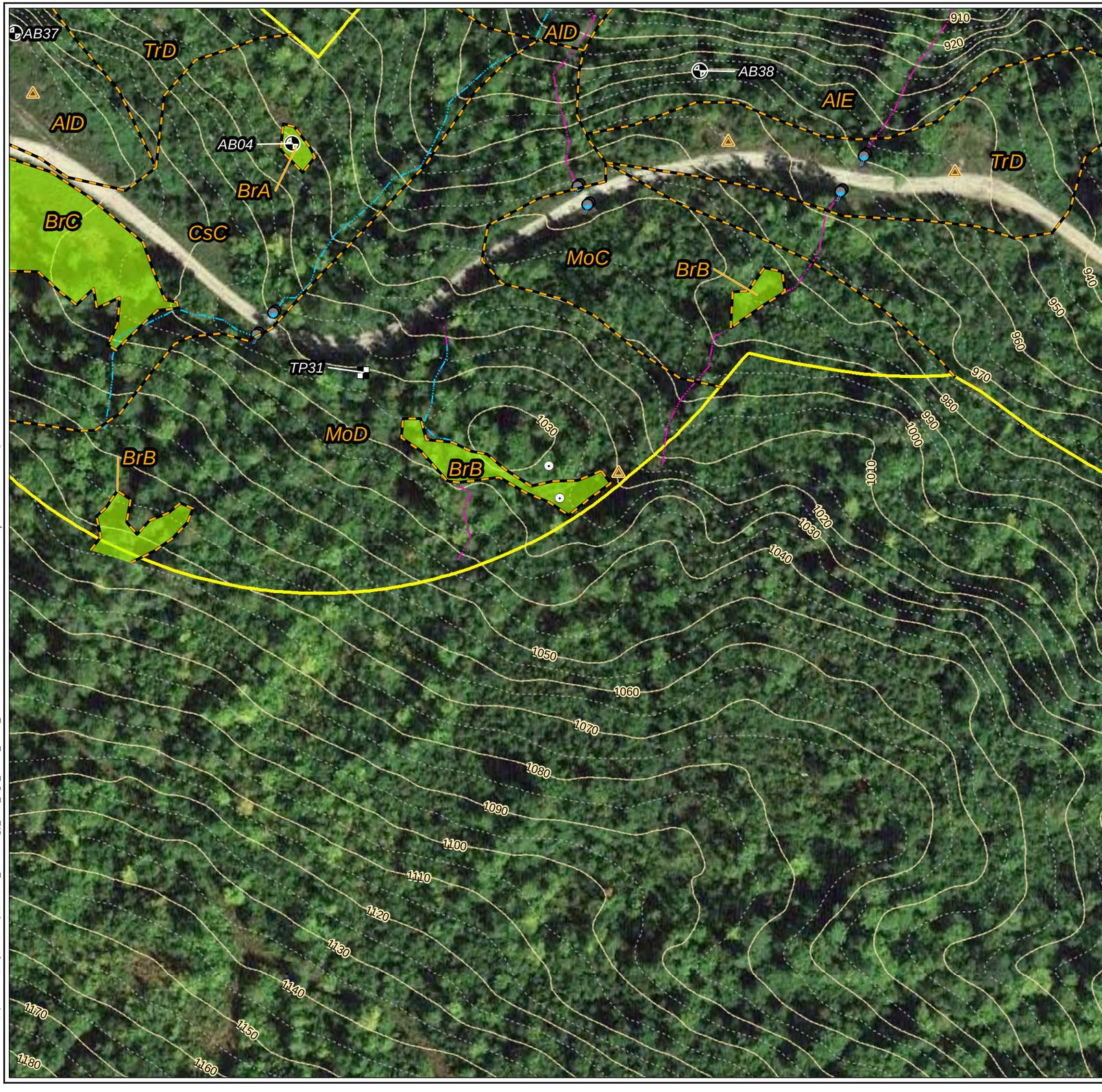

LEGEND

- CLASS L SOIL SURVEY AREA
- BEDROCK OUTCROP
- AUGER BORING
- SOIL TEST PIT
- CORPS PLOT
- CULVERT
- SOIL MAP UNIT BOUNDARY
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- DELINEATED INTERMITTENT STREAM
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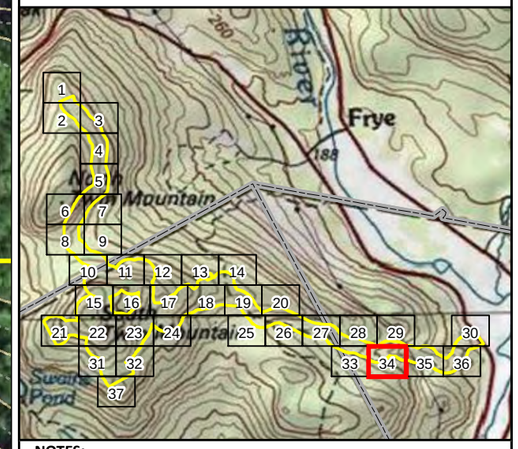

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Feet
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1:1,200

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TWIN ENERGY PROJECT
OXFORD COUNTY, MAINE

TITLE:
CLASS L SOIL SURVEY

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CHECKED BY:	R. KELSHAW		
MONTH:	JANUARY		
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FIGURE 3

Flycatcher LAND + SCIENCE + PEOPLE
PALMER

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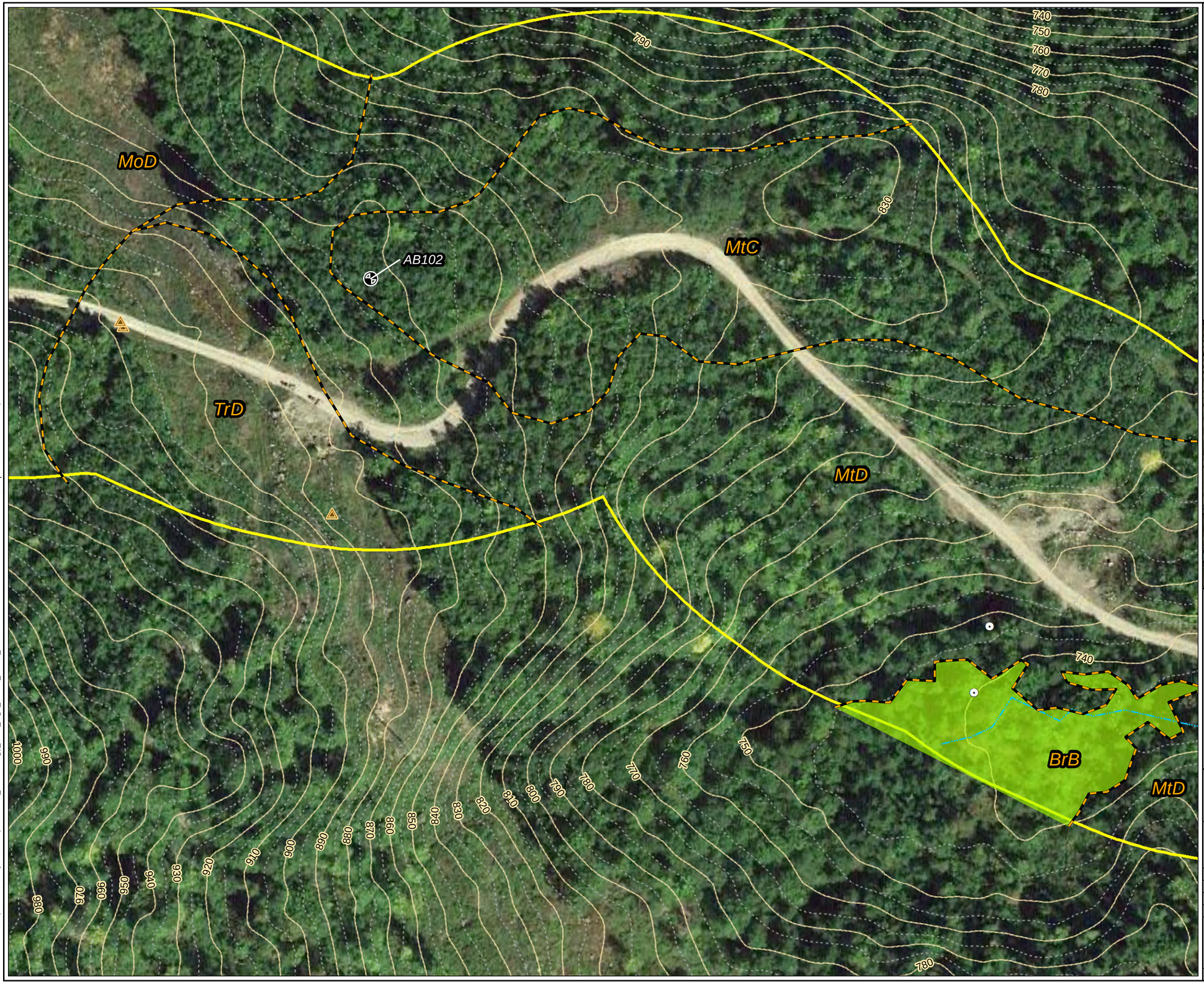

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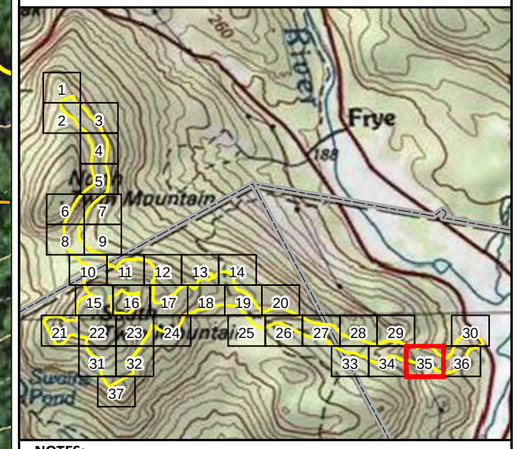
LEGEND

- CLASS L SOIL SURVEY AREA
- BEDROCK OUTCROP
- AUGER BORING
- SOIL TEST PIT
- CORPS PLOT
- CULVERT
- SOIL MAP UNIT BOUNDARY
- UPLAND DRAINAGE
- DELINEATED INTERMITTENT STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED WETLAND
- CONTOUR LINE (10' INTERVAL)
- CONTOUR LINE (5' INTERVAL)

CERTIFIED SOIL SCIENTIST
Rodney D. Kelshaw
SS552
STATE OF MAINE



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N

0 100 200
Feet
1 " = 100 '
1:1,200

PROJECT:
TWIN ENERGY LLC
TWIN ENERGY PROJECT
OXFORD COUNTY, MAINE

TITLE:
CLASS L SOIL SURVEY

DRAWN BY:	D. KENWORTHY	PROJ NO.:	21ZP
CHECKED BY:	R. KELSHAW		
MONTH:	JANUARY		
YEAR:	2022		

FIGURE 3

Flycatcher LAND + SCIENCE + PEOPLE
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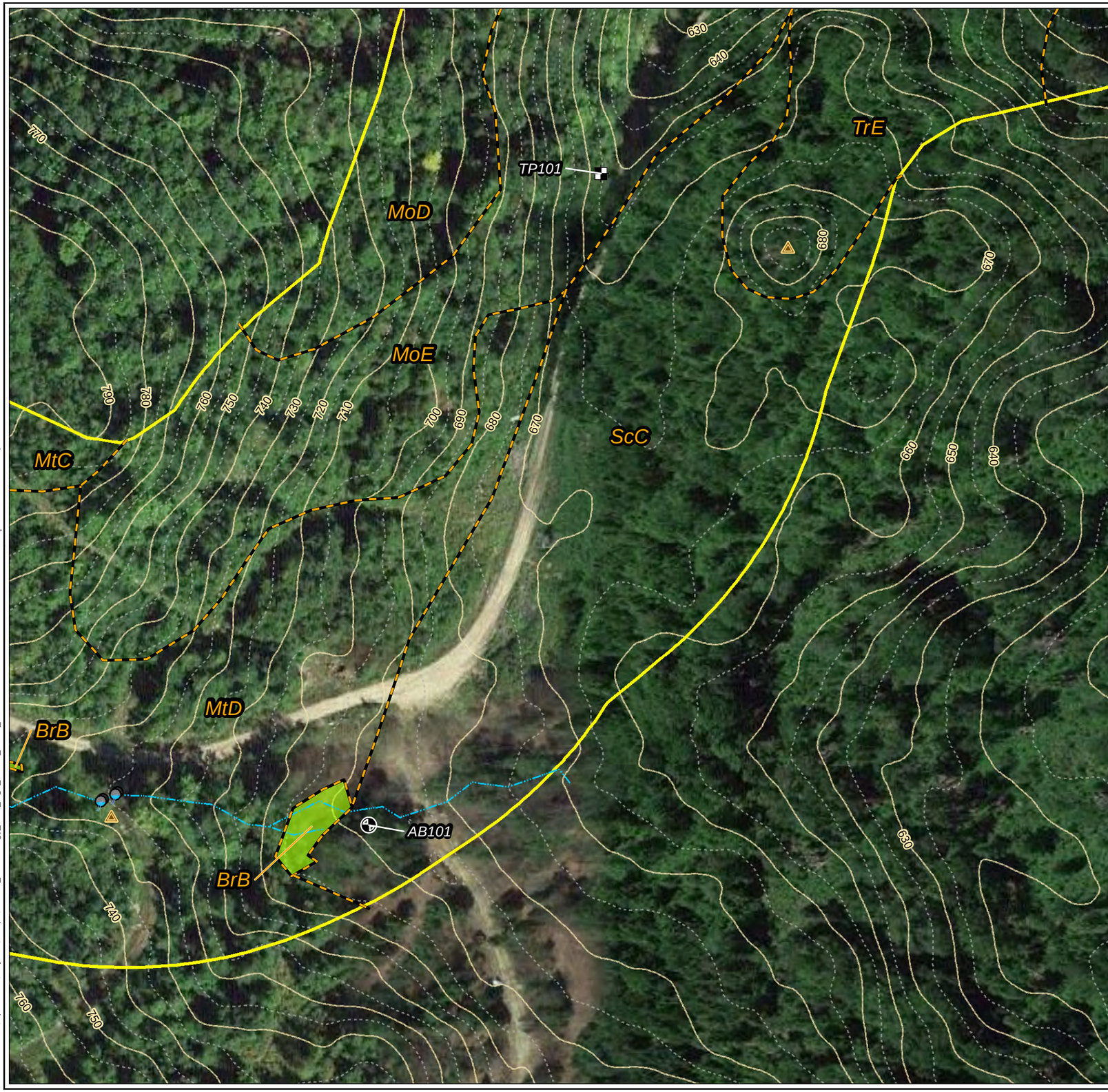

LEGEND

- CLASS L SOIL SURVEY AREA
- BEDROCK OUTCROP
- AUGER BORING
- SOIL TEST PIT
- CORPS PLOT
- CULVERT
- SOIL MAP UNIT BOUNDARY
- UPLAND DRAINAGE
- DELINEATED INTERMITTENT STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED WETLAND
- CONTOUR LINE (10' INTERVAL)
- CONTOUR LINE (5' INTERVAL)

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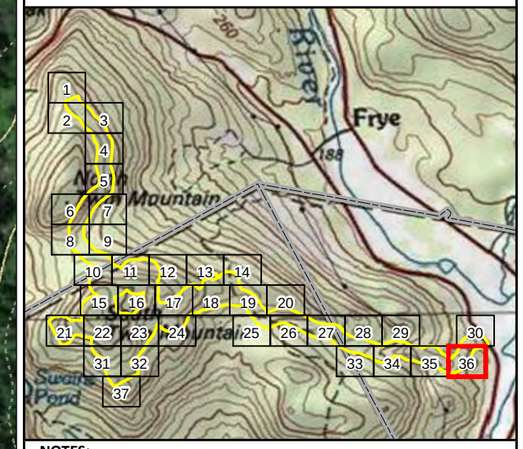
Rodney D. Kelshaw
SS552
STATE OF MAINE



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0 100 200
Feet
1 " = 100 '
1:1,200

PROJECT:
TWIN ENERGY LLC
TWIN ENERGY PROJECT
OXFORD COUNTY, MAINE

TITLE:
CLASS L SOIL SURVEY

DRAWN BY:	D. KENWORTHY	PROJ NO.:	21ZP
CHECKED BY:	R. KELSHAW		
MONTH:	JANUARY		
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FIGURE 3

Flycatcher LAND + SCIENCE + PEOPLE
PALMER

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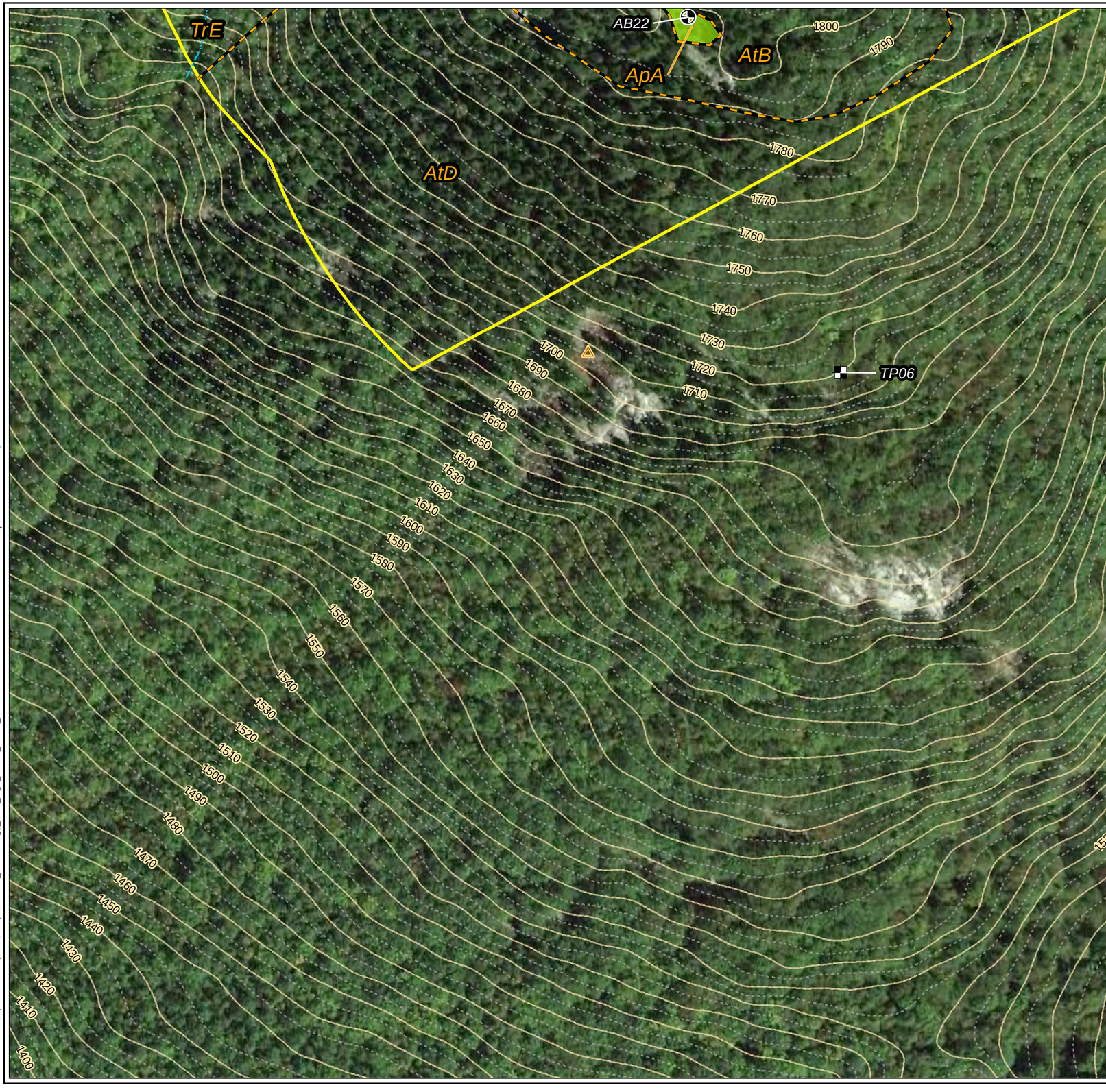
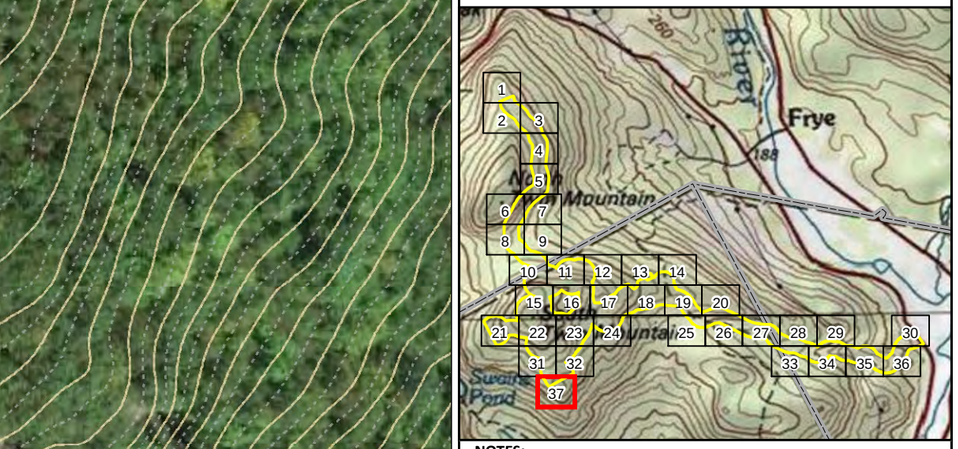


LEGEND

- CLASS L SOIL SURVEY AREA
- BEDROCK OUTCROP
- AUGER BORING
- SOIL TEST PIT
- CORPS PLOT
- CULVERT
- SOIL MAP UNIT BOUNDARY
- UPLAND DRAINAGE
- DELINEATED INTERMITTENT STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED WETLAND
- CONTOUR LINE (10' INTERVAL)
- CONTOUR LINE (5' INTERVAL)

CERTIFIED SOIL SCIENTIST
Rodney D. Kelshaw
SS552
STATE OF MAINE



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N

0 100 200
Feet
1 " = 100 '
1:1,200

PROJECT:
TWIN ENERGY LLC
TWIN ENERGY PROJECT
OXFORD COUNTY, MAINE

TITLE:
CLASS L SOIL SURVEY

DRAWN BY:	D. KENWORTHY	PROJ NO.:	21ZP
CHECKED BY:	R. KELSHAW		
MONTH:	JANUARY		
YEAR:	2022		

FIGURE 3
Page 37 of 37

Flycatcher LAND + SCIENCE + PEOPLE
PALMER

FILE NO.: Palmer_TwinEnergy_Soils_Fig3_ClassL_Detail_11x17L.mxd

Coordinate System: NAD 1983 StatePlane Maine West FIPS 1802 Feet (Foot US)
Map Rotation: 0
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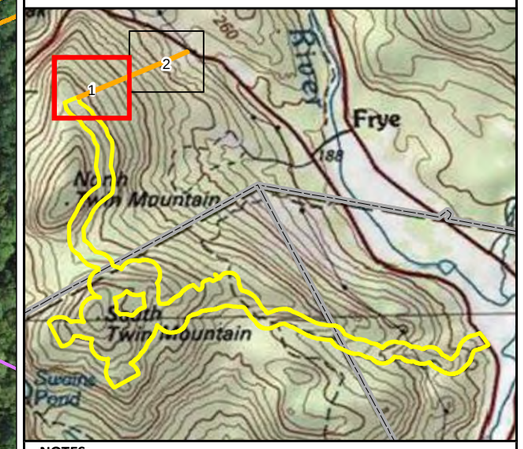
Map Unit Symbol	Map Unit Name	HSG	Drainage Class	Bedrock	Concrete Corrosion	Steel Corrosion	Frost Action	Soil Rutting Hazard (ME)	Erosion Hazard (Road/Trail)	Construction Limitations for Haul Roads/Log Landings (ME)	Infiltration Systems, Shallow
LUD	Lyman/Tunbridge/Becket Complex, 15-35% slopes, very stony	C	Well	Shallow to Very Deep	High	High	Moderate	Moderate	Severe	Severe	Severly Limited
LWD	Lyman/Tunbridge/Monadnock Complex, 15-35% slopes, very stony	D	Well	Shallow to Very Deep	High	High	Moderate	Moderate	Severe	Severe	Severly Limited
LWE	Lyman/Tunbridge/Monadnock Complex, 35-60% slopes, very stony	D	Well	Shallow to Very Deep	High	High	Moderate	Moderate	Severe	Severe	Severly Limited
SRD	Skerry/Becket Association, 15-35% slopes, very stony	C/D	Moderately Well	Very Deep	High	High	Moderate	Severe	Severe	Moderate	Severly Limited
STD	Skerry/Colonel Association, 15-35% slopes, very stony	C/D	Moderately Well	Very Deep	High	High	Moderate	Severe	Severe	Moderate	Severly Limited

Map Unit Symbol	Map Unit Name	HSG	Drainage Class	Bedrock	Concrete Corrosion	Steel Corrosion	Frost Action	Soil Rutting Hazard (ME)	Erosion Hazard (Road/Trail)	Construction Limitations for Haul Roads/Log Landings (ME)	Infiltration Systems, Shallow
LUD	Lyman/Tunbridge/Becket Complex, 15-35% slopes, very stony	C	Well	Shallow to Very Deep	High	High	Moderate	Moderate	Severe	Severe	Severly Limited
LWD	Lyman/Tunbridge/Monadnock Complex, 15-35% slopes, very stony	D	Well	Shallow to Very Deep	High	High	Moderate	Moderate	Severe	Severe	Severly Limited
LWE	Lyman/Tunbridge/Monadnock Complex, 35-60% slopes, very stony	D	Well	Shallow to Very Deep	High	High	Moderate	Moderate	Severe	Severe	Severly Limited
SRD	Skerry/Becket Association, 15-35% slopes, very stony	C/D	Moderately Well	Very Deep	High	High	Moderate	Severe	Severe	Moderate	Severly Limited
STD	Skerry/Colonel Association, 15-35% slopes, very stony	C/D	Moderately Well	Very Deep	High	High	Moderate	Severe	Severe	Moderate	Severly Limited

HTD
HTD
STD
LWE
LUD
LWD
LWC
STD
LWE
LWE
STD

LEGEND

- CLASS D STUDY AREA
- CLASS L STUDY AREA
- NRCS SOIL MAP UNIT BOUNDARY
- HYDRIC SOILS
- CORPS PLOT
- UPLAND DRAINAGE
- DELINEATED INTERMITTENT STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED WETLAND



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N

0 200 400
Feet

1 " = 200 '

1:2,400

PROJECT:

TWIN ENERGY LLC
TWIN ENERGY PROJECT
OXFORD COUNTY, MAINE

TITLE:

CLASS D SOIL SURVEY

DRAWN BY:	D. KENWORTHY	PROJ NO.:	21ZP
CHECKED BY:	R. KELSHAW		
MONTH:	JANUARY		
YEAR:	2022		

FIGURE 4
Page 1 of 2

Flycatcher LAND + SCIENCE + PEOPLE

PALMER

FILE NO.: Palmer_TwinEnergy_Soils_Fig4_ClassD_Detail_11x17L.mxd

Coordinate System: NAD 1983 StatePlane Maine West FIPS 1802 Feet (Foot US)
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LEGEND

- CLASS D STUDY AREA
- CLASS L STUDY AREA
- NRCS SOIL MAP UNIT BOUNDARY
- HYDRIC SOILS
- CORPS PLOT
- UPLAND DRAINAGE
- DELINEATED INTERMITTENT STREAM
- DELINEATED PERENNIAL STREAM
- DELINEATED PERENNIAL STREAM
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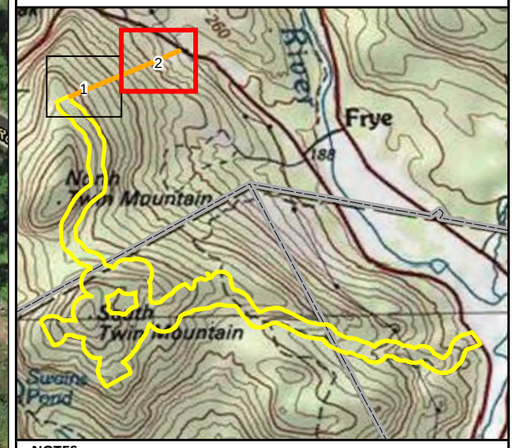

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N

0 200 400
Feet

1 " = 200 '
1:2,400

PROJECT:
TWIN ENERGY LLC
TWIN ENERGY PROJECT
OXFORD COUNTY, MAINE

TITLE:
CLASS D SOIL SURVEY

DRAWN BY:	D. KENWORTHY	PROJ NO.:	21ZP
CHECKED BY:	R. KELSHAW		
MONTH:	JANUARY		
YEAR:	2022		

FIGURE 4
Page 2 of 2

Flycatcher LAND + SCIENCE + PEOPLE

PALMER

FILE NO.: Palmer_TwinEnergy_Soils_Fig4_ClassD_Detail_11x17L.mxd

APPENDIX B: FORMS

Form E: Soil Conditions Summary Table

Form(s) F: Soil Profile / Classification Information (Test Pit Logs)

FORM E Rev. 7/21

SOIL CONDITIONS SUMMARY TABLE

SUMMARY LOG OF SUBSURFACE EXPLORATIONS AT PROJECT SITES

Project Name:	Applicant Name:	Project Location (municipality):
Twin Energy Project	Twin Energy LLC	Rumford, Roxbury, & Mexico

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 S.S.), or by • Geologic unit (if by C.G.)	Depths to (inches): Redoximorphic Features	Bedrock	Hydraulically Restrictive Layer	Limit of Exploration	Ground Surface Slope (%)	Ground Surface Elevation
	TP 01	☐	Abram fsl	N.O.	2	N.O.	2	>35	1700
	TP 02	☐	Skerry stfsl	16	N.O.	29	60	8-15	1770
	TP 03	☐	Becket vstfsl	42	N.O.	38	60	15-35	1785
	TP 04	☐	Tunbridge cobfsl	N.O.	21	N.O.	21	8-15	1820
	TP 05	☐	Tunbridge vstfsl, modwdr	25	44	N.O.	44	3-8	1755
	TP 06	☐	Abram fsl	N.O.	4	N.O.	4	8-15	1720
	TP 07	☐	Tunbridge stfsl; modwdr	20	22	N.O.	22	8-15	1800
	TP 08	☐	Tunbridge fsl	N.O.	28	N.O.	28	8-15	1910
	TP 09	☐	Tunbridge vbl surface; swpdr	13	33	13	33	>35	1980
	TP 10	☐	Abram fsl	N.O.	2	N.O.	2	8-15	1910
	TP 11	☐	Tunbridge sl; modwdr	23	28	N.O.	28	0-3	2150
	TP 12	☐	Skerry cobfsl	21	N.O.	32	34	3-8	2055
	TP 13	☐	Abram fsl	N.O.	1	N.O.	1	3-8	1930
	TP 14	☐	Abram fsl	N.O.	3	N.O.	3	>35	1835
	TP 15	☐	Tunbridge cobfsl, modwdr	32	38	32	38	15-35	1755
	TP 16	☐	Monadnock stfsl	N.O.	N.O.	N.O.	28	15-35	2000
	TP 17	☐	Abram fsl	N.O.	3	N.O.	3	>35	1995
	TP 18	☐	Tunbridge stfsl	N.O.	31	N.O.	31	8-15	1950
	TP 19	☐	Abram fsl	N.O.	2	N.O.	2	>35	1960
	TP 20	☐	Lyman vstfsl	N.O.	N.O.	N.O.	16	8-15	1890
	TP 21	☐	Peru vstfsl	16	N.O.	26	60	8-15	1725
	TP 22	☐	Marlow vcobsl	N.O.	N.O.	N.O.	40	>35	1815
	TP 23	☐	Tunbridge grfsl	N.O.	33	N.O.	33	>35	1655
	TP 24	☐	Marlow vcobsl	N.O.	N.O.	22	36	3-8	1780
	TP 25	☐	Peru vstsl	16	N.O.	26	60	8-15	1800
	TP 26	☐	Lyman fsl	N.O.	11	N.O.	11	15-35	1705
	TP 27	☐	Skerry grsl	17	N.O.	17	29	>35	1420
	TP 28	☐	Skerry grsl	17	N.O.	23	60	8-15	1550
	TP 29	☐	Skerry grsl	19	N.O.	22	100	8-15	1705
	TP 30	☐	Westbury sl	22	N.O.	22	48	3-8	1150
	TP 31	☐	Monadnock cobsl	N.O.	N.O.	N.O.	72	8-15	1720
		☐	N.O.= Not Observed						

INVESTIGATOR INFORMATION AND SIGNATURE

Signature

Rodney Kelshaw

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☐ Site Evaluator
☒ Soil Scientist
☐ Geologist
☐ Professional Engineer

2022-01-25

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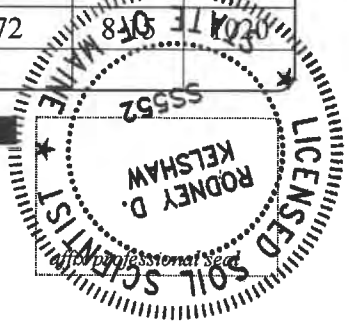

FORM E Rev. 7/21

SOIL CONDITIONS SUMMARY TABLE

SUMMARY LOG OF SUBSURFACE EXPLORATIONS AT PROJECT SITES

Project Name:	Applicant Name:	Project Location (municipality):
Twin Energy Project	Twin Energy LLC	Rumford, Roxbury, & Mexico

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 S.S.*), or by • Geologic unit (*if by C.G.*)	Depths to (*inches*): Redoximorphic Features	Bedrock	Hydraulically Restrictive Layer	Limit of Exploration	Ground Surface Slope (%)	Ground Surface Elevation
	TP 32	☐	Ricker	N.O.	2	N.O.	2	>35	1885
	TP 33	☐	Becket vcobsl	N.O.	N.O.	19	28	15-35	2020
	TP 34	☐	Abram fsl	3	3	N.O.	3	15-35	2070
		☐							
	TP 100	☐	Westbury fsl	7	N.O.	N.O.	75	3-8	585
	TP 101	☐	Waumbek fsl, bl surf	16	N.O.	N.O.	70	8-15	655
		☐							
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LICENSED SOIL SCIENTIST ★ RODNEY D. KELSHAW SS552 ★ STATE OF MAINE

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FORM E Rev. 7/21

SOIL CONDITIONS SUMMARY TABLE

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Twin Energy Project	Twin Energy LLC	Rumford, Roxbury, & Mexico

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 S.S.)*, or by ● Geologic unit *(if by C.G.)*	Depths to *(inches)*: Redoximorphic Features	Bedrock	Hydraulically Restrictive Layer	Limit of Exploration	Ground Surface Slope (%)	Ground Surface Elevation
	AB 01	☐	Brayton sandy loam	7	N.O.	N.O.	38	0-3	1768
	AB 02	☐	Peacham muck, mod deep	0	26	N.O.	26	0-3	1768
	AB 03	☐	Tunbridge sl, pdr	0	29	N.O.	29	0-3	1940
	AB 04	☐	Brayton sl	4	N.O.	15	15	0-3	1000
	AB 05	☐	Lyman sl, pdr	0	15	N.O.	15	3-8	1050
	AB 06	☐	Lyman stsl, pdr	0	19	N.O.	19	0-3	1125
	AB 07	☐	Peacham stsl	0	N.O.	17	17	3-8	1155
	AB 08	☐	Peacham stsl	0	N.O.	15	15	0-3	1185
	AB 09	☐	Peacham stsl	0	N.O.	15	15	3-8	1190
	AB 10	☐	Brayton stsl	7	N.O.	20	20	3-8	1315
	AB 11	☐	Brayton stsl	0	N.O.	16	16	3-8	1325
	AB 12	☐	Brayton stsl	0	N.O.	17	17	3-8	1355
	AB 13	☐	Brayton stsl	6	N.O.	17	17	0-3	1415
	AB 14	☐	Brayton stsl	6	N.O.	11	11	3-8	1365
	AB 15	☐	Brayton stsl	6	N.O.	21	21	3-8	1420
	AB 16	☐	Lyman mucky fsl	0	17	N.O.	17	8-15	1720
	AB 17	☐	Abram fsl, pdr	0	8	N.O.	8	0-3	1735
	AB 18	☐	Abram sl, pdr	0	5	N.O.	5	0-3	1650
	AB 19	☐	Lyman stsl, pdr	0	18	N.O.	18	0-3	1710
	AB 20	☐	Lyman stsl, pdr	0	11	N.O.	11	0-3	1785
	AB 21	☐	Lyman stsl, pdr	0	13	N.O.	13	3-8	1795
	AB 22	☐	Abram fsl, pdr	0	2	N.O.	2	0-3	1800
	AB 23	☐	Lyman stfsl	N.O.	17	N.O.	17	15-35	1895
	AB 24	☐	Tunbridge vfsl; modwdr	32	35	N.O.	35	15-35	1830
	AB 25	☐	Lyman vstsl; swpdr	15	18	N.O.	18	8-15	1965
	AB 26	☐	Abram fsl	N.O.	8	N.O.	8	15-35	2655
	AB 27	☐	Lyman mucky fsl, pdr	6	15	N.O.	15	15-35	1995
	AB 28	☐	Tunbridge stfsl	N.O.	26	N.O.	26	>35	1950
	AB 29	☐	Monadnock stfsl	N.O.	N.O.	N.O.	22	3-8	1960
	AB 30	☐	Ricker peat	N.O.	2	N.O.	2	3-8	1975
	AB 31	☐	Peru vstfsl	16	N.O.	26	60	8-15	1755
	AB 32	☐	Tunbridge stfsl	N.O.	37	N.O.	37	>35	1850

INVESTIGATOR INFORMATION AND SIGNATURE

Signature

Rodney Kelshaw
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☐ Site Evaluator
☒ Soil Scientist
☐ Geologist
☐ Professional Engineer

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RODNEY D. KELSHAW
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FORM E Rev. 7/21

SOIL CONDITIONS SUMMARY TABLE

SUMMARY LOG OF SUBSURFACE EXPLORATIONS AT PROJECT SITES

Project Name:	Applicant Name:	Project Location (municipality):
Twin Energy Project	Twin Energy LLC	Rumford, Roxbury, & Mexico

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 S.S.), or by • Geologic unit (if by C.G.)	Depths to (inches): Redoximorphic Features	Bedrock	Hydraulically Restrictive Layer	Limit of Exploration	Ground Surface Slope (%)	Ground Surface Elevation
	AB 33	☐	Lyman, fsl pdr	9	15	N.O.	15	0-3	1750
	AB 34	☐	Lyman vstfsl, pdr	9	N.O.	13	13	0-3	1715
	AB 35	☐	Brayton vstsl	4	N.O.	12	12	0-3	1270
	AB 36	☐	Lyman vstfsl	N.O.	16	N.O.	16	8-15	1610
	AB 37	☐	Tunbridgefsl, modwldr	21	25	N.O.	25	0-3	1045
	AB 38	☐	Lyman fsl	N.O.	17	N.O.	17	15-35	955
		☐							
	AB 100	☐	Tunbridge swpdr	15	21	N.O.	21	8-15	580
	AB 101	☐	Colonel sl	6	N.O.	20	20	3-8	690
	AB 102	☐	Colonel sl	4	N.O.	15	15	0-3	865
		☐							
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FORM F (SS1) Rev. 7/21

SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # TP01

☒ Test Pit ☐ Boring ☐ Probe

4 " Organic horizon thickness Ground surface elev. 1700

2 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
E	gr	fsl	SBK	VFR	N.O.
		2" BED ROCK			

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Soil Details

Soil Series/Phase Name: Abram fsl

Limiting Factor: 2 " Depth ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☒ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: >35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic: D Soil Group

Exploration Symbol # TP02

☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1770

60 " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ap1	dk rd br				
Ap2	br	stfsl	SBK	VFR	NOT
Bw1	dk yl br				
Bw2					OBSERVED
	H OLV	stsl		FR	
Bw3	br		pl		br 15%
B/C	OLV	cogrsl		FI	br 10%
			m		gr 20%
C	gr	stsl		VFI	
		60"	LOI		

Soil Details

Soil Series/Phase Name: Skerry stfsl

Limiting Factor: 16 " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic: D Soil Group

Exploration Symbol # TP03

☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1785

60 " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	dk rd br				
E	pk gr				
Bs1	dk rd br				
				VFR	
Bs2	St br	stfsl			NOT
			SBK		
Bw1	dk yl				
	br			FR	
Bw2	lt olv br				OBSERVED
B/C	OLV	vstfsl	m	FI	5% br
C				VFI	

Soil Details

Soil Series/Phase Name: Becket vstfsl

Limiting Factor: 38 " Depth ☐ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☒ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 15-35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic: C Soil Group

Exploration Symbol # TP04

☐ Test Pit ☐ Boring ☐ Probe

2 " Organic horizon thickness Ground surface elev. 1820

21 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ae	dk rd br	fsl			
E	pk gr				
Bhs	dk rd br	cobfsl	SBK	VFR	NOT
					OBSERVED
Bs	br	grfsl			
		21"	BEDROCK		

Soil Details

Soil Series/Phase Name: Tunbridge cobfsl

Limiting Factor: 21 " Depth ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☐ ED ☐ SED ☒ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic: C Soil Group

SOIL SCIENTIST INFORMATION AND SIGNATURE

Signature

2022-01-25
Date

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FORM F (SS1) Rev. 7/21

SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # TP05 — ☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness — Ground surface elev. 1755

44 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	rd blk	vcosl			NOT
Bhs	blk rd			VFR	
	br	vstsl	SBK		
Bs	dk br				OBSERVED
				FR	
B/C					St br 2½
C/B	yl br	vstcosl	m	FI	NOT
					OBSERVED
		44"	BEDROCK		

Soil Details

Soil Series/Phase Name: Tunbridge vstsl, mod wdr

Limiting Factor: 25 " Depth — ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 3-8 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: C

Exploration Symbol # TP06 — ☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness — Ground surface elev. 1720

4 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	dk rd brk	fsl	SBK	VFR	NOT
E	pk gr	cosl			OBSERVED
		4"	BEDROCK		

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Soil Details

Soil Series/Phase Name: Abram fsl

Limiting Factor: 4 " Depth — ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☒ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # TP07 — ☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness — Ground surface elev. 1800

22 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	rd brk	fsl			NOT
E	rd gr				
	dk rd	stfsl	SBK	VFR	OBSERVED
Bhs	br				
Bw	lt olv br	sl			St br 10%
		22"	BEDROCK		

Soil Details

Soil Series/Phase Name: Tunbridge stfsl, mod wdr

Limiting Factor: 20 " Depth — ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # TP08 — ☒ Test Pit ☐ Boring ☐ Probe

3 " Organic horizon thickness — Ground surface elev. 1910

28 " Depth: ☐ of exploration, or ☐ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
E	dk gr				NOT
	dk rd				
Bhs	br	fsl	SBK	VFR	OBSERVED
Bw1	dk br				
Bw2	lt olv br	sl			
		28"	BEDROCK		

Soil Details

Soil Series/Phase Name: Tunbridge fsl

Limiting Factor: 28 " Depth — ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☐ ED ☐ SED ☒ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: C

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # TP09 — ☒ Test Pit ☐ Boring ☐ Probe

1 " Organic horizon thickness — Ground surface elev. 1980

33 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	blk				NOT
E	dk rd gr	vstfsl	sbk	vfr	OBSERVED
Bs1	dk yl rd				
	dk rd			fi	dk yl brOBS
Bs2	dk yl br				NOT
	dk br	vstfsl	sbk	fr	OBSERVED
BC	dk yl br				
		33" BEDROCK			

Soil Details

Soil Series/Phase Name: Tunbridge vbl surface; sw edr

Limiting Factor: 13 " Depth — ☐ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☒ SPD ☐ PD ☐ VPD

Slope: >35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic: D Soil Group

Exploration Symbol # TP10 — ☒ Test Pit ☐ Boring ☐ Probe

3 " Organic horizon thickness — Ground surface elev. 1910

" Depth: ☐ of exploration, or ☐ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	dk rd br	fsl	sbk	vfr	N.O.
		2" BEDROCK			

LICENSED SOIL SCIENTIST — RODNEY D. KELSHAW — SS552 — STATE OF MAINE

Soil Details

Soil Series/Phase Name: Abram fsl

Limiting Factor: 2 " Depth — ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic: D Soil Group

Exploration Symbol # TP11 — ☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness — Ground surface elev. 2150

28 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	blk				
E	rd gr				NOT
Bhs	dk rd br	fsl			
Bs	br		sbk	vfr	OBSERVED
Bw1	dk yl br				
Bw2	lt olv br	sl			dk 5%
		28" BEDROCK			

Soil Details

Soil Series/Phase Name: Tunbridge sl; modwet

Limiting Factor: 23 " Depth — ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic: D Soil Group

Exploration Symbol # TP12 — ☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness — Ground surface elev. 2055

34 " Depth: ☒ of exploration, or ☐ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	dk rd br	fsl			NOT
Bs				vfr	
Bw1	st br				
Bw2	dk yl br	cobfsl	sbk		OBSERVED
				fr	
Bw3	lt olv br	vcobfsl			br 10%
C		DENSE			N.O.
		34" LOI			

Soil Details

Soil Series/Phase Name: Skerry cobfsl

Limiting Factor: 21 " Depth — ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 3-8 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic: D Soil Group

SOIL SCIENTIST INFORMATION AND SIGNATURE

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # TP13

☒ Test Pit ☐ Boring ☐ Probe

1 " Organic horizon thickness — Ground surface elev. 1930

1 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
E	gr	sl	sbk	vfr	
		1" BEDROCK			

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

LICENSED SOIL SCIENTIST — RODNEY D. KELSHAW — SS552 — STATE OF MAINE

Soil Details

Soil Series/Phase Name: Abram fsl

Limiting Factor: 1 " Depth — ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☒ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 3-8 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # TP14

☒ Test Pit ☐ Boring ☐ Probe

4 " Organic horizon thickness — Ground surface elev. 1935

3 " Depth: ☐ of exploration, or ☐ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
E	pl gr	cobfsl	sbk	vfr	N.O.
		3" BEDROCK			

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

Soil Details

Soil Series/Phase Name: Abram fsl

Limiting Factor: 3 " Depth — ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☒ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 7-35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # TP15

☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness — Ground surface elev. 1755

38 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ae	blk				
E	rd gr	fsl		vfr	NOT
Bhs	dk rd br		sbk		
Bw1	dk br	cobfsl		fr	OBSERVED
Bw2	br	cobsl	m	fi	St br 5%
		38" BEDROCK			

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

Soil Details

Soil Series/Phase Name: Tunbridge cobfsl; mod wet

Limiting Factor: 22 " Depth — ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 15-35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # TP16

☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness — Ground surface elev. 2000

28 " Depth: ☒ of exploration, or ☐ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ae	rd blk				
E	wk rd				
Bhs	dk rd br	fsl			NOT
Bs1			sbk	vfr	
Bs2	br	stfsl			OBSERVED
		28" LOT TOO STONY			

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

Soil Details

Soil Series/Phase Name: Monadnock stfsl

Limiting Factor: 28 " Depth — ☐ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☒ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 15-35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: B

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWN ENERGY PROJECT

Applicant Name: TWN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # TP17 ☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1995

3 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	brk gr	fsl	sbk	VFR	N.O.
		3" BEDROCK			

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

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Soil Details

Soil Series/Phase Name: Abram fsl

Limiting Factor: 3 " Depth — ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☒ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: >35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # TP18 ☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1950

31 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	v dsky rd	fsl			
E		sl			NOT
Bs_1	dk rd				
Bs_2	brn	fsl	sbk	VFR	
Bs_3	st brn	st fsl			OBSERVED
Bw	st brn + yl brn			FR	
		31" BEDROCK			

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

Soil Details

Soil Series/Phase Name: Tunbridge st fsl

Limiting Factor: 31 " Depth — ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☐ ED ☐ SED ☒ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: C

Exploration Symbol # TP19 ☒ Test Pit ☐ Boring ☐ Probe

4 " Organic horizon thickness Ground surface elev. 1960

2 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
E	wk rd	fsl	sbk	VFR	N.O.
		2" BEDROCK			

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

Soil Details

Soil Series/Phase Name: Abram fsl

Limiting Factor: 2 " Depth — ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☒ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: >35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # TP20 ☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1990

16 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	blk				
B					NOT
Bhs_1	dk rd brn	fsl	sbk	VFR	
Bhs_2	dk olv brn	vst fsl			OBSERVED
Bw	dk yl brn	vst sl		FR	
		16" REFUSAL			

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

Soil Details

Soil Series/Phase Name: Lyman vst fsl

Limiting Factor: 16 " Depth — ☐ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☒ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT | Applicant Name: TWIN ENERGY LLC | Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # TP21 — ☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness — Ground surface elev. 1725

60 " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
A	rd blk				NOT
E		vstfsl		VFR	
Bs	br				OBSERVED
Bw1	dk yl br		sbk		
Bw2	br			FR	5% br 10%
B/C	oliv br	vstfsl		FI	NOT OBSERVED
			pl	VFI	dk yl br 10%
C	oliv	60"	LOI		

Soil Details: Soil Series/Phase Name: Peru vstfsl

Limiting Factor: 16 " Depth — ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent | Hydric Soil: ☒ No ☐ Yes | Hydrologic: D Soil Group

Exploration Symbol # TP22 — ☒ Test Pit ☐ Boring ☐ Probe

1 " Organic horizon thickness — Ground surface elev. 1815

40 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
A/E		fsl			
Bhs	dk rd br				NOT
Bs1	dk br	vcobsl	sbk	VFR	OBSERVED
Bw	dk yl br	cobsl			
		40" BOULDER			

Soil Details: Soil Series/Phase Name: Marlow vcobsl

Limiting Factor: 40 " Depth — ☐ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☒ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: >35 Percent | Hydric Soil: ☒ No ☐ Yes | Hydrologic: C Soil Group

Exploration Symbol # TP23 — ☒ Test Pit ☐ Boring ☐ Probe

" Organic horizon thickness — Ground surface elev. 1655

33 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	v dsky rd	fsl			
E	wk rd				
Bhs	dk rd br			VFR	NOT
Bw1	dk yl br	grfsl	sbk		
Bw2	oliv br			FR	OBSERVED
B/C	br, oliv br, oliv	cobfsl			
		33" BEDROCK			

Soil Details: Soil Series/Phase Name: Tunbridge grfsl

Limiting Factor: 33 " Depth — ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: >35 Percent | Hydric Soil: ☒ No ☐ Yes | Hydrologic: C Soil Group

Exploration Symbol # TP24 — ☒ Test Pit ☐ Boring ☐ Probe

2 " Organic horizon thickness — Ground surface elev. 1780

34 " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	rd blk				
Bhs	dk rd br	fsl			NOT
Bs	br	cogrsl	sbk	VFR	
Bw		cobsl		FR	OBSERVED
B/C	lt olw br	vcobsl	pl	FI	
		LOI DENSE	34" TILL		

Soil Details: Soil Series/Phase Name: Marlow vcobsl

Limiting Factor: 15 " Depth — ☐ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☒ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 3-8 Percent | Hydric Soil: ☒ No ☐ Yes | Hydrologic: D Soil Group

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT | Applicant Name: TWIN ENERGY LLC | Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # TP25 — ☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness — Ground surface elev. 1800

60 " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
0					
A	rd blk				NOT
E		vstfsl		VFR	
Bs	br				OBSERVED
Bw1	dk yl		SBK		
				FR	
Bw2	br				st br 10%
B/C	olv br			FI	NOT
		vstsl			OBSERVED
					dk yl
C	olv		pl		br 10%
60		60" LOI			

Soil Details

Soil Series/Phase Name: Peru vstsl

Limiting Factor: 16 " Depth — ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic: D Soil Group

Exploration Symbol # TP26 — ☒ Test Pit ☐ Boring ☐ Probe

2 " Organic horizon thickness — Ground surface elev. 1705

11 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
0					
A	rd blk				NOT
Bs	dk rd br	fsl	SBK	VFR	OBSERVED
		11" BEDROCK			

Soil Details

Soil Series/Phase Name: Lyman fsl

Limiting Factor: 11 " Depth — ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☐ ED ☒ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 15-35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic: D Soil Group

Exploration Symbol # TP27 — ☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness — Ground surface elev. 1420

29 " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
0					
A	rd blk				
Bs	br	fsl		VFR	NOT
Bw1	dk yl		SBK		
	br	cosl		FR	OBSERVED
Bw2					
	lt olv				
C	br	grsl	pl	FI	st br 10%
				VFR	
		29" LOI DENSE TILL			

Soil Details

Soil Series/Phase Name: Skerry grsl

Limiting Factor: 17 " Depth — ☐ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 7-35 Percent

Hydric Soil: ☐ No ☐ Yes

Hydrologic: D Soil Group

Exploration Symbol # TP28 — ☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness — Ground surface elev. 1550

60 " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
0					
A	rd blk				
Bs	br	fsl		VFR	NOT
Bw1	dk yl br	cosl	SBK		
				FR	OBSERVED
Bw2					
	lt olv				
		grsl			
C	br		pl	FI	st br 10%
60		60" LOI			

Soil Details

Soil Series/Phase Name: Skerry grsl

Limiting Factor: 23 " Depth — ☐ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☐ No ☐ Yes

Hydrologic: D Soil Group

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): RUMFORD, ROXBURY & MEXICO

Exploration Symbol # TP29

☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness

Ground surface elev. 1705

100 " Depth: ☒ of exploration, or ☐ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
A	rd blk				NOT
E	wk rd	fsl			
Bs	st brn		SBK	VFR	
Bw	dk yl brn	sl			OBSERVED
B/C	lt olv brn			FR	st brn 2%
C/B	olv	grsl	pl	FI	NOT OBSERVED
		100" LOI DENSE TILL			

Depth below mineral soil horizon (inches)

Soil Details

Soil Series/Phase Name: Skerry grsl

Limiting Factor: 19" Depth; ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic: D Soil Group

Exploration Symbol # TP30

☒ Test Pit ☐ Boring ☐ Probe

0 " Organic horizon thickness

Ground surface elev. 1150

48" Depth: ☒ of exploration, or ☐ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	dk brn			VFR	NOT
Bw1	dk yl brn				
Bw2	olv brn	fsl			OBSERVED
Bw3	lt olv brn	sl	SBK	FR	dk yl brn 10%
B/C					
C	olv	grsl	pl	FI	st brn 15%
		48" LOI DENSE			

Depth below mineral soil horizon (inches)

Soil Details

Soil Series/Phase Name: Westbury sl

Limiting Factor: 14" Depth; ☐ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☒ SPD ☐ PD ☐ VPD

Slope: 3-8 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic: D Soil Group

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name:	Applicant Name:	Project Location (municipality):
TWIN ENERGY PROJECT	TWIN ENERGY LLC	RUMFORD, ROXBURY & MEXICO

TP31

Exploration Symbol # TP31 ☒ Test Pit ☐ Boring ☐ Probe

2 " Organic horizon thickness Ground surface elev. 1020

70 " Depth: ☒ of exploration, or ☐ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
E/A	dk to gr	sl			
Bw1	rd br			VFR	
Bw2	dk yl br	cobsl			
	lt olv br			FR	NOT OBSERVED
Bw	br		sbk		
B/C	olv br	vgrsl		VFR	
		70" LOI			

Soil Series/Phase Name: Monadnock cobsl

Limiting Factor: NOT OBSERVED Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☒ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: B

TP32

Exploration Symbol # TP32 ☒ Test Pit ☐ Boring ☐ Probe

" Organic horizon thickness Ground surface elev. 1885

2 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
O	7.5YR 2/2				

Soil Series/Phase Name: Ricker

Limiting Factor: 2 " Depth ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☐ ED ☒ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 735 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # TP33 ☒ Test Pit ☐ Boring ☐ Probe

2 " Organic horizon thickness Ground surface elev. 2020

28 " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
A	7.5 YR 3/2	fsl			
E	10 YR 6/6				
Bs	10 YR 5/6	cobfsl		FR	
					NOT
Bs2	10 YR	vcobfsl	SBK		OBSERVED
B/C	10 YR 5/6	vcobsl		FI	
		28" LOI FIRM			

Soil Details

Soil Series/Phase Name: Becket vcobsl

Limiting Factor: 19 " Depth — ☐ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 15-35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # TP34 ☒ Test Pit ☐ Boring ☐ Probe

2 " Organic horizon thickness Ground surface elev. 2070

3 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
E	10 YR 6/6	fsl	SBK	VFR	N.O.
		3" BEDROCK			

Soil Details

Soil Series/Phase Name: Abram fsl

Limiting Factor: 3 " Depth — ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☒ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 15-35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # _____ ☐ Test Pit ☐ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth: ☐ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox

Soil Details

Soil Series/Phase Name:

Limiting Factor: _____ " Depth — ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: _____ Percent

Hydric Soil: ☐ No ☐ Yes

Hydrologic Soil Group: _____

Exploration Symbol # _____ ☐ Test Pit ☐ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth: ☐ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox

Soil Details

Soil Series/Phase Name:

Limiting Factor: _____ " Depth — ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: _____ Percent

Hydric Soil: ☐ No ☐ Yes

Hydrologic Soil Group: _____

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # TP100 ☒ Test Pit ☐ Boring ☐ Probe

2 " Organic horizon thickness Ground surface elev. 585

75 " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
A	blk	l			NOT
Bw1	br				OBSERVED
		fsl			dk yl
	lt olv				
Bw2	br			FR	br 5%
					dk yl
			SBK		
Bw3	gr br				
		vfsl			br 10%
					NOT
B/C	lt olv				OBSERVED
					dk yl
	gr				br 10%
				FI	
					dk yl
C					br 30%
		LOI 75"	STONY		

Soil Details

Soil Series/Phase Name: WESTBURY fsl

Limiting Factor: 65 " Depth ☐ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☒ SPD ☐ PD ☐ VPD

Slope: 3-8 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # TP101 ☒ Test Pit ☐ Boring ☐ Probe

1 " Organic horizon thickness Ground surface elev. 655

70 " Depth: ☒ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
A	blk	l			NOT
Bw1		sl	sg		dk yl 5%
	yl br			VFR	
Bw2					NOT
	dk yl				OBSERVED
Bw3	br	fsl		FR	
	lt olv		SBK		lt gr 10%
B/C					
	br				dk yl
					br 5%
					v dk
C	olv	vfsl		FI	
					gr br
	br				30%
		70" LOI			

★ horizons

Soil Details

Soil Series/Phase Name: Waumbek fsl, bl sv

Limiting Factor: 16 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

LICENSED SOIL SCIENTIST
RODNEY D. KELSHAW
SS552
STATE OF MAINE

SOIL SCIENTIST INFORMATION AND SIGNATURE

Signature

Rodney Kelshaw

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # AB01 ☐ Test Pit ☒ Boring ☐ Probe

4 " Organic horizon thickness Ground surface elev. 1768

38 " Depth: ☒ of exploration, or ☐ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
A	v dk gr	fsl		VFR	NOT OBSERVED
B	gr		sbk		0F 5%
Bw		sl		FR	NOT
B/C	br		m	L	OBSERVED
		38"	LOI		

Soil Details: Soil Series/Phase Name: BRAYTON sl

Limiting Factor: 0 " Depth; ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic: D Soil Group

Exploration Symbol # AB02 ☐ Test Pit ☒ Boring ☐ Probe

26 " Organic horizon thickness Ground surface elev. 1768

26 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Oa	blk	muck			
		26"	BEDROCK		

Soil Details: Soil Series/Phase Name: PEACHAM muck, mod deep

Limiting Factor: 0 " Depth; ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☒ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic: D Soil Group

Exploration Symbol # AB03 ☐ Test Pit ☒ Boring ☐ Probe

3 " Organic horizon thickness Ground surface elev. 1940

29 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
A	blk	mucky fsl			N.O.
Bw1	dk gr br	sl		VFR	dk yl br 2%
Bw2	dk br	stsl	sbk	FR	NOT
		29"	BEDROCK		OBSERVED

Soil Details: Soil Series/Phase Name: Tunbridge sl, pdr

Limiting Factor: 0 " Depth; ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic: D Soil Group

Exploration Symbol # AB04 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1000

15 " Depth: ☒ of exploration, or ☐ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
A	v dk br	l		VFR	WT OBSERVED
B	gr br	sl	sbk	FR	dk yl br 15%
		15" LOI FIRM			dk gr 5%

Soil Details: Soil Series/Phase Name: Brayton sl

Limiting Factor: 4 " Depth; ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic: D Soil Group

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # AB05 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1050

15 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
fill	gr br	grs	sg	L	dk yl br 10%
Ap	blk	sl	sbk	FR	NDR
					OBSERVED
		15"	BEDROCK		

Soil Details

Soil Series/Phase Name: Lyman sl, pdr

Limiting Factor: 0 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 3-8 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic: D Soil Group

Exploration Symbol # AB06 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1125

19 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
A	blk	mucky sl		VFR	br 10%
			sbk		dk yl
Bw	gr br	stsl		FR	br 5%
		19"	BEDROCK		

Soil Details

Soil Series/Phase Name: Lyman stsl, pdr

Limiting Factor: 0 " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic: D Soil Group

Exploration Symbol # AB07 ☐ Test Pit ☒ Boring ☐ Probe

8 " Organic horizon thickness Ground surface elev. 1155

17 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Oa	blk	sapric muck			
Bw	olvgr	stsl	sbk	FR	org. stngs br 5%
		17"	DENSE TILL		

Soil Details

Soil Series/Phase Name: Peacham stsl

Limiting Factor: 0 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☒ VPD

Slope: 3-8 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic: D Soil Group

Exploration Symbol # AB08 ☐ Test Pit ☒ Boring ☐ Probe

9 " Organic horizon thickness Ground surface elev. 1185

15 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Oa	blk	sapric muck			
Bw	olvgr	stsl	sbk	FR	org. stngs br 5%
		15"	LOI DENSE TILL		

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Soil Details

Soil Series/Phase Name: Peacham stsl

Limiting Factor: 0 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☒ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic: D Soil Group

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT | Applicant Name: TWIN ENERGY LLC | Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # AB09 ☐ Test Pit ☒ Boring ☐ Probe

9 " Organic horizon thickness Ground surface elev. 1190

15 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Oa	blk	sapric muck			
Bw	ov gr	stsl	SBK	FR	org stripe 5%
		15" LOI DENSE TILL			

Soil Details: Soil Series/Phase Name: Peacham stsl | Limiting Factor: 0 " Depth; ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock | Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☒ VPD | Slope: 3-8 Percent | Hydric Soil: ☐ No ☒ Yes | Hydrologic: D Soil Group

Exploration Symbol # AB10 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1315

21 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
A	blk	mucky sasl		VFR	NOT OBSERVED
Bw1	br	stsl			
Bw2	gr br	stsl	SBK	FR	br 15% gr 10%
Bw3	br	stcosl			NOT OBSERVED
		21" DENSE TILL PROBE			

Soil Details: Soil Series/Phase Name: Brayton stsl | Limiting Factor: 7 " Depth; ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock | Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD | Slope: 3-8 Percent | Hydric Soil: ☐ No ☒ Yes | Hydrologic: D Soil Group

Exploration Symbol # AB11 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1325

16 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	blk	mucky sl		VFR	NOT OBSERVED
B	dk gr sl	sl	SBK	FR	br 5%
BC	gr br	stsl			
		16" REFUSAL STONY			

Soil Details: Soil Series/Phase Name: Brayton stsl | Limiting Factor: 0 " Depth; ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock | Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD | Slope: 3-8 Percent | Hydric Soil: ☐ No ☒ Yes | Hydrologic: D Soil Group

Exploration Symbol # AB12 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1355

17 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	blk	mucky sl		VFR	NOT OBSERVED
B	dk gr br	vfstsl	SBK	FR	DR 5%
BC	gr br	stsl			
		17" REFUSAL STONY			

Soil Details: Soil Series/Phase Name: Brayton stsl | Limiting Factor: 0 " Depth; ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock | Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD | Slope: 3-8 Percent | Hydric Soil: ☐ No ☒ Yes | Hydrologic: D Soil Group

LICENSED SOIL SCIENTIST RODNEY D. KELSHAW SS552 STATE OF MAINE

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # AB13 ☐ Test Pit ☒ Boring ☐ Probe

4 " Organic horizon thickness Ground surface elev. 1415

17 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bw1					N.O.
Bw2	gr br			FR	dk yl br 20%
B/C	dk gr br	stsl	sbk	FI	NOT OBSERVED
		17" LOI DENSE TILL			

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

Soil Details

Soil Series/Phase Name: Brayton stsl

Limiting Factor: 6 " Depth ☑ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic: D Soil Group

Exploration Symbol # AB14 ☐ Test Pit ☒ Boring ☐ Probe

4 " Organic horizon thickness Ground surface elev. 1305

11 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bw1					N.O.
Bw2	gr br	stsl	sbk	FR	dk yl br 20%
B/C	dk gr br			FI	NOT OBSERVED
		11" LOI DENSE TILL			

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

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Soil Details

Soil Series/Phase Name: Brayton stsl

Limiting Factor: 6 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 3-8 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic: D Soil Group

Exploration Symbol # AB15 ☐ Test Pit ☒ Boring ☐ Probe

4 " Organic horizon thickness Ground surface elev. 1420

21 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bw1					N.O.
Bw2	gr br			FR	dk yl br 20%
B/C	dk gr br	stsl	sbk	FI	NOT OBSERVED
		17" LOI DENSE TILL			

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

Soil Details

Soil Series/Phase Name: Brayton stsl

Limiting Factor: 6 " Depth ☑ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 3-8 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic: D Soil Group

Exploration Symbol # AB16 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1720

17 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
					FREE WATER
O/A	blk	mucc 3 mucky fsl	sbk	FR	
		17" BEDROCK			

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

Soil Details

Soil Series/Phase Name: Lyman mucky fsl

Limiting Factor: 0 " Depth ☑ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic: D Soil Group

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # AB17 ☐ Test Pit ☒ Boring ☐ Probe

6 " Organic horizon thickness Ground surface elev. 1735

8 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Eg	gr	fsl	SBK	VFR	St Dr 10%
Bw	dk br	sl			V.O.
		8" BEDROCK			

Soil Details

Soil Series/Phase Name: Abram fsl, pdr

Limiting Factor: 8 " Depth ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB18 ☐ Test Pit ☒ Boring ☐ Probe

4 " Organic horizon thickness Ground surface elev. 1650

5 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Eg	gr	fsl	SBK	VFR	FREE WATER
Bw	dk br	sl			
		5" BEDROCK			

Soil Details

Soil Series/Phase Name: Abram sl, pdr

Limiting Factor: 0 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group: D

LICENSED SOIL SCIENTIST RODNEY D. KELSHAW SS552 STATE OF MAINE

Exploration Symbol # AB19 ☐ Test Pit ☒ Boring ☐ Probe

4 " Organic horizon thickness Ground surface elev. 1710

18 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Eg	gr	sl			FREE
Bw1	dk br		SBK	VFR	WATER
Bw2	lt olv br	stsl			
		18" BEDROCK			

Soil Details

Soil Series/Phase Name: Lyman stsl, pdr

Limiting Factor: 0 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB20 ☐ Test Pit ☒ Boring ☐ Probe

4 " Organic horizon thickness Ground surface elev. 1785

11 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Eg	gr	sl			FREE
Bw1	dk br		SBK	VFR	WATER
Bw2	lt olv br	stsl			
		11"	BEDROCK		

Soil Details

Soil Series/Phase Name: Lyman stsl, pdr

Limiting Factor: 0 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group: D

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # AB21 — ☐ Test Pit ☒ Boring ☐ Probe

4 " Organic horizon thickness Ground surface elev. 1795

13 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bw1	dk brn	stsl	sbk	vfr	FREE WATER
Bw2	gr brn				
B/C	brn	bs	gr	fi	
		13" BEDROCK			

Soil Details: Soil Series/Phase Name: Lyman stsl, pdr

Limiting Factor: 0 " Depth — ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 3-8 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB22 — ☐ Test Pit ☒ Boring ☐ Probe

6 " Organic horizon thickness Ground surface elev. 1800

2 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Bg	gr	fsl	sbk	vfr	PREDOM
		2" BEDROCK			

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Soil Details: Soil Series/Phase Name: Abram fsl, pdr

Limiting Factor: 0 " Depth — ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☒ No ☒ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB23 — ☐ Test Pit ☒ Boring ☐ Probe

4 " Organic horizon thickness Ground surface elev. 1895

17 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
E	dk rd gr				NOT
Bhs	dk rd brn	stfsl	sbk	vfr	OBSERVED
Bs	dk brn				
		17" BEDROCK			

Soil Details: Soil Series/Phase Name: Lyman stfsl

Limiting Factor: 17 " Depth — ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☐ ED ☒ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 15-35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB24 — ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1830

35 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	blk				NOT
Bhs1	dsk rd	fsl		vfr	OBSERVED
			sbk		oxidized
Bhs2	dk rd brn	vfsl		fr	rhizomene
B	blk				NOT
		35" BEDROCK			

Soil Details: Soil Series/Phase Name: Tunbridge vfsl; mdwdr

Limiting Factor: 32 " Depth — ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 15-35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: Twin Energy Project

Applicant Name: Twin Energy LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # AB25 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1965

18 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap					NOT
Bhs	DK	fsl	SDK	VFR	OBSERVED
Bw	br	vstsl		FR	br 10%
Bw2		18"	BEDROCK		

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

Soil Details

Soil Series/Phase Name: Lyman vstsl, sw, pdr

Limiting Factor: 15 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☒ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB26 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 2055

8 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	DK				
E	rd gr	fsl	SDK	VFR	NOT OBSERVED
		8" BEDROCK			

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

Soil Details

Soil Series/Phase Name: Abram fsl

Limiting Factor: 8 " Depth ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☒ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 15-35 Percent

Hydric Soil: ☐ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB27 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1995

15 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	DK	mucky	SDK	VFR	FREE WATER
B	DK 3 dk rd br	fsl			
		15"	BEDROCK		

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

Soil Details

Soil Series/Phase Name: Lyman mucky fsl, pdr

Limiting Factor: 0 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 15-35 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB28 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1950

26 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap		fsl			
	dk rd				NOT
Bhs	br	stfsl	SDK	VFR	OBSERVED
		26"	BEDROCK		

Depth below mineral soil horizon (inches): 0, 10, 20, 30, 40, 50, 60

Soil Details

Soil Series/Phase Name: Tunbridge stfsl

Limiting Factor: " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☒ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 7-35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: C

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: Twin Energy Project

Applicant Name: Twin Energy LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # AB29 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1960

22 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	v dk rd	fsl			
E	wk rd	sifsl			not
Bs1	dk rd			vfr	
Bs2	br	stsl	sbk		observed
Bs3	st br			fr	
	dk yl br	22" REFUSAL STONY			

Soil Details

Soil Series/Phase Name: Monadnock stsl

Limiting Factor: 22 " Depth; ☐ Groundwater ☒ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☒ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 3-8 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: B

Exploration Symbol # AB30 ☐ Test Pit ☒ Boring ☐ Probe

2 " Organic horizon thickness Ground surface elev. 1975

2 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Oi	blk	fibric peat			
		2" BEDROCK			

Soil Details

Soil Series/Phase Name: Ricker peat

Limiting Factor: 2 " Depth; ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☒ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 3-8 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

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Exploration Symbol # AB31 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1755

16 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
Bw1	dk gr br	stsl	sbk	vfr	not
Bw2	gr br				
B/C	br	ls	gr	fi	observed
		16" REFUSAL BOULDER			

Soil Details

Soil Series/Phase Name: Peru vstfsl

Limiting Factor: 16 " Depth; ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB32 ☐ Test Pit ☒ Boring ☐ Probe

1 " Organic horizon thickness Ground surface elev. 1820

37 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
E	wk rd				
Bhs	rd blk				
Bs	br				not
		stfsl	sbk	vfr	
Bw1	dk yl br				observed
		37" BEDROCK			

Soil Details

Soil Series/Phase Name: Tunbridge stfsl

Limiting Factor: 37 " Depth; ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☐ ED ☐ SED ☒ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: >35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: C

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # AB33 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1750

15 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
A	blk	sl	sbk	FR	VERY DARK & SATURATED
B	dk gr br				St to Sl 5% dk gr 25%
		15" BEDROCK			

Soil Series/Phase Name: Lyman, fsl pdr

Limiting Factor: 0 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB34 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1715

13 " Depth: ☒ of exploration, or ☐ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
A	blk	exstsl	sbk	VFR	VERY DARK & SATURATED
B	dk gr br				dk gr 15%
		13" LOI STONY			

Soil Series/Phase Name: Lyman vstfsl, pdr

Limiting Factor: 0 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB35 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1270

12 " Depth: ☒ of exploration, or ☐ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
A	blk				NOT OBSERVED
B	dk gr br	vstsl	sbk	VFR	St for 10%
		12" LOI STONY			

Soil Series/Phase Name: Brayton vstsl

Limiting Factor: 4 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☒ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☐ No ☒ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB36 ☐ Test Pit ☒ Boring ☐ Probe

0 " Organic horizon thickness Ground surface elev. 1110

10 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
Ap	v dsk to blk	fsl			NOT OBSERVED
E	dk rd gr	vstfsl	sbk	VFR	OBSERVED
		10" BEDROCK			

Soil Series/Phase Name: Lyman vstfsl

Limiting Factor: 10 " Depth ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☐ ED ☒ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

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SOIL PROFILE / CLASSIFICATION INFORMATION

SOIL SCIENTIST DESCRIPTION OF SOIL CONDITIONS AT PROJECT SITES

Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # AB37 ☐ Test Pit ☒ Boring ☐ Probe

2 " Organic horizon thickness Ground surface elev. 1045

23 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
A	dk red br				
B_{s1}	yl rd	fsl	SBK	VFR	NOT
B_{s2}	St br	sl			OBSERVED
Bw	lt ow br			FR	dk yl br 20%
		23" BEDROCK			

Soil Details

Soil Series/Phase Name: Tunbridge fsl, modwell

Limiting Factor: 19 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☒ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB38 ☐ Test Pit ☒ Boring ☐ Probe

2 " Organic horizon thickness Ground surface elev. 955

17 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
A	dk red br				
B_{s1}	yl rd	fsl	SBK	VFR	NOT
B_{s2}	St br	sl			OBSERVED
		17" BEDROCK			

Soil Details

Soil Series/Phase Name: Lyman fsl

Limiting Factor: 17 " Depth ☐ Groundwater ☐ Restrictive Layer ☒ Bedrock

Drainage Class: ☐ ED ☒ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: 15-35 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB100 ☐ Test Pit ☒ Boring ☐ Probe

1 " Organic horizon thickness Ground surface elev. 580

21 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
A	vdk gr br				NOT
B_{w1}	dk yl br	l	SBK	FR	OBSERVED
B_{w2}	yl br	fsl			dk br
		21" REFUSAL			

Soil Details

Soil Series/Phase Name: Tunbridge Swpdr

Limiting Factor: 15 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☒ SPD ☐ PD ☐ VPD

Slope: 8-15 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

Exploration Symbol # AB101 ☐ Test Pit ☒ Boring ☐ Probe

1 " Organic horizon thickness Ground surface elev. 690

20 " Depth: ☐ of exploration, or ☒ to refusal

Horizon	Color	Texture	Structure	Consistence	Redox
A	br			L	NOT
B_{w1}	blk	sl			OBSERVED
B_{w2}	dk yl		SBK		lt yl br 10%
BC	br	fsl		FI	gr br 20%
		20" REFUSAL			

Soil Details

Soil Series/Phase Name: Colonel sl

Limiting Factor: " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☒ SPD ☐ PD ☐ VPD

Slope: 3-8 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic Soil Group: D

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Project Name: TWIN ENERGY PROJECT

Applicant Name: TWIN ENERGY LLC

Project Location (municipality): Rumford, Roxbury & Mexico

Exploration Symbol # AB102 ☐ Test Pit ☒ Boring ☐ Probe

2 " Organic horizon thickness Ground surface elev. 865

15 " Depth: ☐ of exploration, or ☒ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox
	VARIOUS				NOT OBSERVED
	VARIOUS				
	10YR 3/3	SL	SBK		10YR 4/1
	10YR 5/3				10YR 5/1
	15" REFUSAL STONY				

Soil Details

Soil Series/Phase Name: Colonel sl

Limiting Factor: 4 " Depth ☒ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☒ SPD ☐ PD ☐ VPD

Slope: 0-3 Percent

Hydric Soil: ☒ No ☐ Yes

Hydrologic: D Soil Group

Exploration Symbol # _____ ☐ Test Pit ☐ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth: ☐ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox

Soil Details

Soil Series/Phase Name:

Limiting Factor: _____ " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: _____ Percent

Hydric Soil: ☐ No ☐ Yes

Hydrologic: _____ Soil Group

Exploration Symbol # _____ ☐ Test Pit ☐ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth: ☐ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox

Soil Details

Soil Series/Phase Name:

Limiting Factor: _____ " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: _____ Percent

Hydric Soil: ☐ No ☐ Yes

Hydrologic: _____ Soil Group

Exploration Symbol # _____ ☐ Test Pit ☐ Boring ☐ Probe

_____ " Organic horizon thickness Ground surface elev. _____

_____ " Depth: ☐ of exploration, or ☐ to refusal

Depth below mineral soil horizon (inches)

Horizon	Color	Texture	Structure	Consistence	Redox

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Soil Details

Soil Series/Phase Name:

Limiting Factor: _____ " Depth ☐ Groundwater ☐ Restrictive Layer ☐ Bedrock

Drainage Class: ☐ ED ☐ SED ☐ WD ☐ MWD ☐ SPD ☐ PD ☐ VPD

Slope: _____ Percent

Hydric Soil: ☐ No ☐ Yes

Hydrologic: _____ Soil Group

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APPENDIX C

Map Unit Descriptions

Map Unit: **Abram/Lyman/Rock Outcrop Complex**
Classification: Abram: Loamy, isotic, frigid Lythic Haplorthods
Lyman: Loamy, isotic, frigid Lithic Haplorthods
Map Unit Symbol: AlB, AlC, AlD, AlE

SETTING
Parent Material: Thin mantel of glacial till
Landform: Glaciated uplands
Position in Landscape: Ridges and mountains
Slope Gradient Range: **(B)** 3-8%, **(C)** 8-15%, **(D)** 15-35%, **(E)** >35%

COMPOSITION AND SOIL CHARACTERISTICS
Depth to Water Table: Abram: < 10" to bedrock with no water table
Lyman: 10 to 20" to bedrock with no water table

Typical Profile Description:
Abram:

0 – 3"	Peat
3 – 10"	Brown, fine sandy loam, sbk, VFR
10"	Bedrock

Lyman:

0 – 2"	Peat
2 – 4"	Very dusky red, fine sandy loam, sbk, VFR
4 – 7"	Grayish brown, fine sandy loam, sbk, VFR
7 – 13"	Dark reddish brown, fine sandy loam, sbk, VFR
13 – 17"	Dark brown, fine sandy loam, sbk, VFR
17"	Bedrock

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)
Similar: Knob Lock **Dissimilar:** Becket

USE AND MANAGEMENT
This map unit is mapped across the entire Survey Area; however, the majority are located centrally in higher elevations on ridgelines, knolls and associated side slopes. The most limiting factor associated with this map unit is the shallow depth to bedrock, which affects construction of roads, construction of turbine pads, installing foundations, and implementation of stormwater infiltration best management practices. Because the drainage is excessively drained this map unit is also considered very limiting for the establishment of grass which is typically used for long-term stabilization. However, blast rock can be a valuable material for road building due to its strength and is not susceptible to erosion. The D and E slope groups are also very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, "Severe" and "Very Limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures (such as blasting). The dominant soil within this map unit is Abram.

Map Unit: **Abram sandy loam, poorly drained**
Classification: Loamy, isotic, frigid Lythic Haplorthods
Map Unit Symbol: ApA

SETTING
Parent Material: Thin mantel of glacial till
Landform: Glaciated uplands
Position in Landscape: Ridges and mountains
Slope Gradient Range: **(A)** 0-3%

COMPOSITION AND SOIL CHARACTERISTICS
Depth to Water Table: 0 to 7”

Typical Profile Description:

0 – 6”	Muck
6 – 12”	Gray, fine sandy loam, sbk, VFR Redox Con. strong brown 10%
12 – 14”	Dark brown, sl, sbk, VFR
14”	Bedrock

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)
Similar: Knob Lock poorly drained **Dissimilar:** Abram and Knob Lock

USE AND MANAGEMENT
This map unit is located centrally in higher elevations in discrete pockets, perched on ridges between ridgelines and knolls. Major use and management concerns are that these poorly drained soils are hydric and are mapped as wetlands, and as such, alterations to these areas could require regulatory oversight. The preferred method of planning project components around these soils is avoidance. Accepted construction techniques such as matting or bridging to minimize soil disturbance and compaction are recommended if project alterations are planned in these areas. An additional limiting factor associated with this map unit is the shallow depth to bedrock, which affects construction of roads, construction of turbine pads, installing foundations, and implementation of stormwater infiltration best management practices. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures (such as blasting). Erosion and sediment controls should be installed prior to beginning construction activities to avoid erosion and sedimentation of wetlands and other adjacent resources.

Map Unit: **Abram/Tunbridge Complex**
Classification: Abram: Loamy, isotic, frigid Lythic Haplorthods
Tunbridge: Coarse-loamy, isotic, frigid Typic Haplorthods
Map Unit Symbol: AtB, AtD

SETTING
Parent Material: Thin mantel of glacial till
Landform: Glaciated uplands
Position in Landscape: Ridges and mountains
Slope Gradient Range: **(B)** 3-8%, **(D)** 15-35%

COMPOSITION AND SOIL CHARACTERISTICS
Depth to Water Table: Abram: < 10" to bedrock with no water table
Tunbridge: 20 to 40" to bedrock with no water table

Typical Profile Description:
Abram:

0 – 3"	Peat
3 – 10"	Brown, fine sandy loam, sbk, VFR
10"	Bedrock

Tunbridge:

0 – 3"	Peat
3 – 5"	Very dusky red, fine sandy loam, sbk, VFR
5 – 7"	Grayish brown, fine sandy loam, sbk, VFR
7 – 13"	Dark reddish brown, fine sandy loam, sbk, VFR
13 – 23"	Dark brown, fine sandy loam, sbk, VFR
23 – 32"	Dark yellowish brown, fine sandy loam, sbk, VFR
32"	Bedrock

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)
Similar: Lyman **Dissimilar:** Becket

USE AND MANAGEMENT
This map unit is mapped across the entire Survey Area; however, the majority are located centrally in higher elevations on ridgelines, knolls and associated side slopes. The most limiting factor associated with this map unit is the shallow depth to bedrock, which affects construction of roads, construction of turbine pads, installing foundations, and implementation of stormwater infiltration best management practices. However, blast rock can be a valuable material for road building due to its strength and is not susceptible to erosion. The D slope group is very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, "Severe" and "Very Limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures (such as blasting). The dominant soil within this map unit is Abram.

Map Unit: **Brayton sandy loam**
Classification: Loamy, mixed, active, nonacid, frigid, shallow Aeric Endoaquepts
Map Unit Symbol: BrA, BrB, BrC, BrD

SETTING
Parent Material: Lodgement till
Landform: Ground moraines
Position in Landscape: Depressions and on toeslopes
Slope Gradient Range: **(A)** 0-3%, **(B)** 3-8%, **(C)** 8-15%, **(D)** 15-35%

COMPOSITION AND SOIL CHARACTERISTICS
Depth to Water Table: 0 to 7”

Typical Profile Description:
Surface Layers:
0 – 5” Black, muck; very stony
5 – 9” Gray, very stony sandy loam, sbk, FR
Redox Con. dark yellowish brown 5%
9 – 14” Olive gray, very stony sandy loam, sbk, FR
Redox Con. dark yellowish brown 5%
Subsurface Layers:
14 – 24” Light olive brown, very stony sandy loam, pl, FI
Redox Con. dark yellowish brown 5%
24 – 26” Light olive brown, stony sandy loam, m, FI
Redox Con. strong brown 30%
Substratum:
26” Lodgment till, m, VFI

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)
Similar: Colonel **Dissimilar:** Peru

USE AND MANAGEMENT
This map unit is mapped in wetland areas across the entire Survey Area in a variety of landscape settings; including pockets in higher elevations, steep drainages, riparian to watercourses, an in lowland valleys. Major use and management concerns are that Brayton soils are hydric and mapped as wetlands. As such, alterations 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 construction of roads, construction of turbine pads, installing foundations, and implementation of stormwater infiltration best management practices could require additional engineering. The preferred method of planning project components around these soils is avoidance. Accepted construction techniques such as matting or bridging to minimize soil disturbance and compaction are recommended if project alterations are planned in these areas. Erosion and sediment controls should be installed prior to beginning construction activities to avoid erosion and sedimentation of wetlands and other adjacent resources. The D slope group is very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has

one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures.

Map Unit: **Becket/Tunbridge Complex**

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

Map Unit Symbol: BtC, BtD, BtE

SETTING

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

Landform: Becket: Glaciated uplands
Tunbridge: Hills

Position in Landscape: Becket: Ridge summits and shoulders
Tunbridge: Summit, shoulder, backslope

Slope Gradient Range: **(C)** 8-15%, **(D)** 15-35%, **(E)** >35%

COMPOSITION AND SOIL CHARACTERISTICS

Depth to Water Table: Becket: >40"
Tunbridge: 20 to 40" to bedrock with no water table

Typical Profile Description:

Becket:

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

Tunbridge:

0 – 3" Peat
3 – 5" Very dusky red, fine sandy loam, sbk, VFR
5 – 7" Grayish brown, fine sandy loam, sbk, VFR
7 – 13" Dark reddish brown, fine sandy loam, sbk, VFR
13 – 23" Dark brown, fine sandy loam, sbk, VFR
23 – 32" Dark yellowish brown, fine sandy loam, sbk, VFR
32" Bedrock

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)

Similar: Monadnock **Dissimilar:** Brayton

USE AND MANAGEMENT

This map unit occurs in the west central portion of the Survey Area in mid-level elevations surrounding the knolls and ridges. Typically, seasonal water table is not a major concern for construction activities and ongoing project use since these soils are well

drained. The depth to bedrock in these areas rapidly changes from 20-inches below the mineral soil surface to greater than 40-inches, so limitations are that deep soils that are ruttable are adjacent to shallower soils that may require blasting for road construction, and there is no discernable pattern based on viewing the ground surface. However, the loamy mantle and underlying sandy till can typically be used on-site for road building and other site development, and blast rock can be a valuable material for road building due to its strength and is not susceptible to erosion. The D and E slope groups are very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. The dominant soil within this map unit is Becket.

Map Unit: **Becket/Westbury Complex**
Classification: Becket: Coarse-loamy, isotic, frigid Oxyaquic Haplorthods
Westbury: Coarse-loamy, isotic, frigid Typic Fragiaquods
Map Unit Symbol: BwC, BwD, BwE

SETTING
Parent Material: Loamy mantle overlying dense, sandy till on drumlins and glaciated uplands
Landform: Glaciated uplands
Position in Landscape: Becket: Ridge summits and shoulders
Westbury: Backslopes and toeslopes
Slope Gradient Range: **(C)** 8-15%, **(D)** 15-35%, **(E)** >35%

COMPOSITION AND SOIL CHARACTERISTICS
Depth to Water Table: Becket: >40”
Westbury: 7 to 16”

Typical Profile Description:
Becket:
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

Westbury:
Surface Layers:
0 – 3” Dark brown, fine sandy loam, sbk, VFR
3 – 5” Dark yellowish brown, fine sandy loam, sbk, VFR
5 – 14” Olive brown, fine sandy loam, sbk, VFR
14 – 22” Light olive brown, sandy loam, sbk, FR
Redox Con. dark yellowish brown 10%
Subsurface Layers:

22 – 32” Light olive brown, gravelly fine sandy loam, pl, FI
23 – 48” Dark yellowish brown, fine sandy loam, sbk, VFR
Redox Con. strong brown 15%
Substratum:
48” Dense

Hydrologic Soil Group (HSG): **See Table 1**
Drainage Class: **See Table 1**
Depth to Bedrock: **See Table 1**
Concrete Corrosion: **See Table 1**
Steel Corrosion: **See Table 1**
Potential for Frost Action: **See Table 1**
Soil Rutting Hazard (ME): **See Table 1**
Erosion Hazard (Road/Trail) **See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME) **See Table 1**
Infiltration Systems, Shallow: **See Table 1**

INCLUSIONS (within mapping unit)
Similar: Skerry **Dissimilar:** Tunbridge

USE AND MANAGEMENT

This map unit occurs in the west central portion of the Survey Area in mid-level elevations surrounding the knolls and ridges. Westbury 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 construction of roads, construction of turbine pads, installing foundations, and implementation of stormwater infiltration best management practices could require additional engineering. Accepted construction techniques such as matting or bridging to minimize soil disturbance and compaction are recommended to minimize rutting. The depth to the water table in these areas rapidly changes from 7-inches below the mineral soil surface to greater than 40-inches, so limitations are that there is no discernable pattern between the two based on viewing the ground surface. The areas with higher water table are more prone to rutting and freeze/thaw cycles. However, the loamy mantle and underlying sandy till can typically be used on-site for road building and other site development. The D and E slope groups are very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. The dominant soil within this map unit is Becket.

Map Unit: **Colonel/Skerry Complex**

Classification: Colonel: Loamy, isotic, frigid, shallow Aquic Haplorthods
Skerry: Coarse-loamy, isotic, frigid Aquic Haplorthods

Map Unit Symbol: CsB, CsC, CsD

SETTING

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

Landform: Hills, drumlins and ground moraines in glaciated uplands

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

Slope Gradient Range: **(B)** 3 -8%, **(C)** 8-15%, **(D)** 15-35%

COMPOSITION AND SOIL CHARACTERISTICS

Depth to Water Table: Colonel: 7 to 16"
Skerry: 16 to 40"

Typical Profile Description:

Colonel:

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

Skerry:

Surface Layers:

0 – 3" Dark reddish brown, stony fine sandy loam, sbk, VFR
3 – 7" Dark brown, stony fine sandy loam, sbk, VFR
7 – 11" Dark yellowish brown, stony fine sandy loam, sbk, FR

Subsurface Layers:

11 – 16" Light olive brown, stony sandy loam, pl, FR
16 – 29" Light olive brown, stony sandy loam, pl, FR
Redox Con. brown 15%
29 – 46" Olive, coarse gravelly sandy loam, pl, FI
Redox Con. brown 10% & Redox Dep. gray 20%

Substratum:

46 – 60"+ Olive, coarse gravelly sandy loam, pl, VFI
Redox Con. brown 10% & Redox Dep. gray 20%

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)

Similar: Becket and Westbury **Dissimilar:** Brayton and Peacham

USE AND MANAGEMENT

These map units are mapped primarily in the lower lying elevations along “Yonder Way”, the existing access road at the eastern end of the Survey Area. 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 D slope group is very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. The dominant soil within this map unit is Colonel.

Map Unit: **Lyman sandy loam, poorly drained**
Classification: Loamy, isotic, frigid Lithic Haplorthods
Map Unit Symbol: LpA, LpB, LpC

SETTING
Parent Material: Loamy supraglacial till
Landform: Glaciated uplands
Position in Landscape: Ridge summits and shoulders
Slope Gradient Range: **(A)** 0-3%, **(B)** 3-8%, **(C)** 8-15%

COMPOSITION AND SOIL CHARACTERISTICS
Depth to Water Table: 0 to 7”

Typical Profile Description:

0 – 2” Peat
2 – 4” Very dusky red, fine sandy loam, sbk, VFR
4 – 7” Grayish brown, fine sandy loam, sbk, VFR
Redox Dep. gray 5%, saturated
7 – 13” Dark reddish brown, fine sandy loam, sbk, VFR
13 – 17” Dark brown, fine sandy loam, sbk, VFR
17” Bedrock

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)
Similar: Abram poorly drained **Dissimilar:** Tunbridge

USE AND MANAGEMENT

This map unit is located centrally in higher elevations in discrete pockets, perched on ridges between ridgelines and knolls. Major use and management concerns are that these poorly drained soils are hydric and are mapped as wetlands, and as such, alterations to these areas could require regulatory oversight. The preferred method of planning project components around these soils is avoidance. Accepted construction techniques such as matting or bridging to minimize soil disturbance and compaction are recommended if project alterations are planned in these areas. An additional limiting factor associated with this map unit is the shallow depth to bedrock, which affects construction of roads, construction of turbine pads, installing foundations, and implementation of stormwater infiltration best management practices. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures (such as blasting). Erosion and sediment controls should be installed prior to beginning construction activities to avoid erosion and sedimentation of wetlands and other adjacent resources.

Map Unit: **Lyman/Tunbridge/Rock Outcrop Complex**
Classification: Lyman: Loamy, isotic, frigid Lithic Haplorthods
Tunbridge: Coarse-loamy, isotic, frigid Typic Haplorthods
Map Unit Symbol: LrB, LrC. LrD, LrE

SETTING
Parent Material: Loamy supraglacial till
Landform: Glaciated uplands
Position in Landscape: Ridge summits and shoulders
Slope Gradient Range: **(B)** 3-8%, **(C)** 8-15%, **(D)** 15-35%, **(E)** >35%

COMPOSITION AND SOIL CHARACTERISTICS
Depth to Water Table: Lyman: 10 to 20" to bedrock with no water table
Tunbridge: 20 to <40" to bedrock with no water table

Typical Profile Description:
Lyman:
0 – 2" Peat
2 – 4" Very dusky red, fine sandy loam, sbk, VFR
4 – 7" Grayish brown, fine sandy loam, sbk, VFR
7 – 13" Dark reddish brown, fine sandy loam, sbk, VFR
13 – 17" Dark brown, fine sandy loam, sbk, VFR
17" Bedrock
Tunbridge:
0 – 3" Peat
3 – 5" Very dusky red, fine sandy loam, sbk, VFR
5 – 7" Grayish brown, fine sandy loam, sbk, VFR
7 – 13" Dark reddish brown, fine sandy loam, sbk, VFR
13 – 23" Dark brown, fine sandy loam, sbk, VFR
23 – 32" Dark yellowish brown, fine sandy loam, sbk, VFR
32" Bedrock

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)
Similar: Abram **Dissimilar:** Becket

USE AND MANAGEMENT
This map unit is mapped across the entire Survey Area; however, the majority are located centrally in higher elevations on ridgelines, knolls and associated side slopes. The most limiting factor associated with this map unit is the shallow depth to bedrock, which affects construction of roads, construction of turbine pads, installing foundations, and implementation of stormwater infiltration best management practices. However, blast rock can be a valuable material for road building due to its strength and is not susceptible to erosion. The D and E slope groups are also very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, "Severe" and "Very Limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures (such as blasting). The dominant soil within this map unit is Lyman.

Map Unit: **Lyman/Tunbridge/Becket Complex**

Classification: Lyman: Loamy, isotic, frigid Lithic Haplorthods
Tunbridge: Coarse-loamy, isotic, frigid Typic Haplorthods
Becket: Coarse-loamy, isotic, frigid Oxyaquic Haplorthods

Map Unit Symbol: LuB, LuD

SETTING

Parent Material: Lyman & Tunbridge: Loamy supraglacial till
Becket: Loamy mantle overlying dense, sandy till on drumlins and glaciated uplands

Landform: Lyman & Tunbridge: Hills
Becket: Glaciated uplands

Position in Landscape: Lyman & Tunbridge: Summit, shoulder, backslope
Becket: Ridge summits and shoulders

Slope Gradient Range: **(B)** 3-8%, **(D)** 15-35%

COMPOSITION AND SOIL CHARACTERISTICS

Depth to Water Table: Lyman: 10 to 20" to bedrock with no water table
Tunbridge: 20 to 40" to bedrock with no water table
Becket: >40"

Typical Profile Description:

Lyman:

0 – 2"	Peat
2 – 4"	Very dusky red, fine sandy loam, sbk, VFR
4 – 7"	Grayish brown, fine sandy loam, sbk, VFR
7 – 13"	Dark reddish brown, fine sandy loam, sbk, VFR
13 – 17"	Dark brown, fine sandy loam, sbk, VFR
17"	Bedrock

Tunbridge:

0 – 3"	Peat
3 – 5"	Very dusky red, fine sandy loam, sbk, VFR
5 – 7"	Grayish brown, fine sandy loam, sbk, VFR
7 – 13"	Dark reddish brown, fine sandy loam, sbk, VFR
13 – 23"	Dark brown, fine sandy loam, sbk, VFR
23 – 32"	Dark yellowish brown, fine sandy loam, sbk, VFR
32"	Bedrock

Becket:

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 Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**

Construction Limitations for Haul Roads/Log Landings (ME) **See Table 1**
Infiltration Systems, Shallow: **See Table 1**

INCLUSIONS (within mapping unit)
Similar: Monadnock **Dissimilar:** Brayton

USE AND MANAGEMENT

This map unit occurs in small areas in the central portion of the Survey Area in mid-level elevations surrounding the knolls and ridges. Typically, seasonal water table is not a major concern for construction activities and ongoing project use since these soils are well drained. The depth to bedrock in these areas rapidly changes from 10-inches below the mineral soil surface to greater than 40-inches, so limitations are that deep soils that are ruttable are adjacent to shallower soils that may require blasting for road construction, and there is no discernable pattern based on viewing the ground surface. However, the loamy mantle and underlying sandy till can typically be used on-site for road building and other site development, and blast rock can be a valuable material for road building due to its strength and is not susceptible to erosion. The D slope group is very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. The dominant soil within this map unit is Lyman.

Map Unit: **Monadnock fine sandy loam**
Classification: Coarse-loamy over sandy or sandy-skeletal, isotic over mixed, frigid Typic
Map Unit Symbol: MoB, MoC, MoD, MoE

SETTING
Parent Material: 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: **(B)** 3-8%, **(C)** 8-15%, **(D)** 15-35%, **(E)** >35%,

COMPOSITION AND SOIL CHARACTERISTICS
Depth to Water Table: > 40”

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 Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)
Similar: Becket **Dissimilar:** Tunbridge

USE AND MANAGEMENT
These map units are mapped primarily in the lower lying elevations along “Yonder Way”, the existing access road at the eastern end of the Survey Area, and in transitional areas within the central portion of the Survey Area. Monadnock soils are well drained, very deep to bedrock, and lack dense till so there is typically not a concern with the seasonal high-water table being close to the mineral soil surface. So, activities impacted by a high-water table, such as construction of roads, construction of turbine pads, installing foundations, and implementation of stormwater infiltration best management practices may not require additional engineering. This sandy till can typically be used on-site for road building and other site development. The D and E slope groups are very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures.

Map Unit: **Monadnock/Tunbridge Complex**

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

Map Unit Symbol: MtC, MtD

SETTING

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

Landform: Monadnock: Upland till plains, hills and ridges
Tunbridge: Glaciated uplands

Position in Landscape: Monadnock: Side slope and nose slope
Tunbridge: Ridge summits and shoulders

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

COMPOSITION AND SOIL CHARACTERISTICS

Depth to Water Table: Monadnock: > 40”
Tunbridge: 20 to <40” to bedrock with no water table

Typical Profile Description:

Monadnock:

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

Tunbridge:

0 – 3” Peat
3 – 5” Very dusky red, fine sandy loam, sbk, VFR
5 – 7” Grayish brown, fine sandy loam, sbk, VFR
7 – 13” Dark reddish brown, fine sandy loam, sbk, VFR
13 – 23” Dark brown, fine sandy loam, sbk, VFR
23 – 32” Dark yellowish brown, fine sandy loam, sbk, VFR
32” Bedrock

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)

Similar: Becket **Dissimilar:** Brayton

USE AND MANAGEMENT

These map units are mapped primarily in the lower lying elevations along “Yonder Way”, the existing access road at the eastern end of the Survey Area. Typically, seasonal water table is not a major concern for construction activities and ongoing project use

since these soils are well drained. The depth to bedrock in these areas rapidly changes from 20-inches below the mineral soil surface to greater than 40-inches, so limitations are that deep soils that are ruttable are adjacent to shallower soils that may require blasting for road construction, and there is no discernable pattern based on viewing the ground surface. However, the loamy mantle and underlying sandy till can typically be used on-site for road building and other site development, and blast rock can be a valuable material for road building due to its strength and is not susceptible to erosion. The D slope group is very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. The dominant soil within this map unit is Monadnock.

Map Unit: **Peacham/Brayton Complex**

Classification: Peacham: Loamy, mixed, superactive, nonacid, frigid, shallow Histic Humaquepts
Brayton: Loamy, mixed, active, nonacid, frigid, shallow Aeric Endoaquepts

Map Unit Symbol: PbA, PbB

SETTING

Parent Material: Peacham: Thick peat/muck over glaciofluvial deposits
Brayton: Lodgement till

Landform: Peacham: Sandy deposits in depressions on outwash plains, deltas, and terraces.
Brayton: Ground moraines

Position in Landscape: Nearly level areas and in depressions.

Slope Gradient Range: **(A)** 0 -3%, **(B)** 3 -8%

COMPOSITION AND SOIL CHARACTERISTICS

Depth to Water Table: 0 to 7"

Typical Profile Description:

Peacham:

Surface Layers:

0 – 29" Black, muck

Substratum:

29 – 32" Strong brown, stony sandy loam; firm in place and loose in hand

Brayton:

Surface Layers:

0 – 5" Black, muck; very stony

5 – 9" Gray, very stony sandy loam, sbk, FR
Redox Con. dark yellowish brown 5%

9 – 14" Olive gray, very stony sandy loam, sbk, FR
Redox Con. dark yellowish brown 5%

Subsurface Layers:

14 – 24" Light olive brown, very stony sandy loam, pl, FI
Redox Con. dark yellowish brown 5%

24 – 26" Light olive brown, stony sandy loam, m, FI
Redox Con. strong brown 30%

Substratum:

26" Lodgment till, m, VFI

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)

Similar: Tunbridge poorly drained **Dissimilar:** Skerry

USE AND MANAGEMENT

This map unit occurs in wetland areas across the entire Survey Area in a variety of landscape settings; including pockets in higher elevations, steep drainages riparian to watercourses, an in lowland valleys. Major use and management concerns are that

Peacham and Brayton soils are hydric and mapped as wetlands. As such, alterations to these areas could require regulatory oversight. These 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 construction of roads, construction of turbine pads, installing foundations, and implementation of stormwater infiltration best management practices could require additional engineering. Peacham has thick organic surface layers which can lead to instability. The preferred method of planning project components around these soils is avoidance. Accepted construction techniques such as matting or bridging to minimize soil disturbance and compaction are recommended if project alterations are planned in these areas. Erosion and sediment controls should be installed prior to beginning construction activities to avoid erosion and sedimentation of wetlands and other adjacent resources. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. The dominant soil within this map unit is Peacham.

Map Unit: **Peru/Marlow Complex**
Classification: Peru: Coarse-loamy, isotic, frigid, Aquic Haplorthods
Marlow: Coarse-loamy, isotic, frigid, Oxyaquic Haplorthods
Map Unit Symbol: PmC, PmD, PmE

SETTING
Parent Material: Lodgement till
Landform: Ground moraines, hills and mountains
Position in Landscape: Hill summits, sideslope, foot slope, and base slope
Slope Gradient Range: **(C)** 8-15%, **(D)** 15-35%, **(E)** >35%

COMPOSITION AND SOIL CHARACTERISTICS
Depth to Water Table: Peru: 16 to 40"
Marlow: >40"
Typical Profile Description:
Peru:
Surface Layers:
0 – 2" Black, mucky peat
2 – 4" Pinkish gray, fine sandy loam, sbk, VFR
4 – 6" Reddish brown, fine sandy loam, sbk, VFR
Subsurface Layers:
6 – 14" Brown, fine sandy loam, sbk, FR
14 – 24" Dark yellowish brown, fine sandy loam, sbk, FR
Substratum:
24 – 30" Olive brown, m, VFI
Redox. Con. strong brown 2%
30 – 32" Lodgment till, m, VFI
Marlow:
Surface Layers:
0 – 3" Black, mucky peat
3 – 6" Dark reddish gray, very gravelly fine sandy loam, sbk, VFR
6 – 8" Pinkish gray, very gravelly fine sandy loam, sbk, VFR
8 – 11" Strong brown, very gravelly fine sandy loam, sbk, VFR
11 – 20" Strong brown, extremely gravelly fine sandy loam, sbk, VFR
Subsurface Layers:
20 – 24" Dark yellowish brown, extremely gravelly fine sandy loam, sbk, FR
Substratum:
24 – 39" Dark yellowish brown, extremely gravelly fine sandy loam l, FR
39 – 40" Lodgment till, m, FI

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)
Similar: Becket and Skerry **Dissimilar:** Brayton and Tunbridge

USE AND MANAGEMENT

This map unit occurs primarily along the proposed electrical collector line/access road that extends northerly from the array area. Major use and management concerns are that Peru and Marlow soils are both very deep to bedrock yet occur on dense till. This can create a seasonal high-water table close to the mineral soil surface, particularly in Peru soils. So, activities impacted by a high-water table, such as road construction, could require additional engineering. These soils can be compacted if exposed to heavy equipment however the potential for rutting is moderate, which is less severe than other soils mapped within the Project area. The loamy mantle and underlying sandy till can typically be used on-site for road building and other site development. Erosion and sediment controls should be installed prior to commencement of construction activities to avoid erosion and sedimentation of adjacent and off-site resources. Phases of this soil included within the map unit are areas with a very stony/boulder surface and very stony subsurface layers. The D and E slope groups are very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. The dominant soil within this map unit is Peru.

Map Unit: **Skerry/Colonel Complex**

Classification: Skerry: Coarse-loamy, isodic, frigid, Aquic Haplorthods
Colonel: Loamy, isotic, frigid, shallow Aquic Haplorthods

Map Unit Symbol: ScC, ScD

SETTING

Parent Material: Loamy mantle overlying dense, sandy lodgement till

Landform: Drumlins and ground morains

Position in Landscape: Glaciated upland foot slope and base slope

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

COMPOSITION AND SOIL CHARACTERISTICS

Depth to Water Table: Skerry: 16 to 40”
Colone: 7 to 16”

Typical Profile Description:

Skerry:

Surface Layers:

0 – 2”	Dark reddish brown, peat
2 – 4”	Gray, fine sandy loam, VFR
4 – 6”	Dark reddish brown, fine sandy loam, sbk, VFR
6 – 8”	Yellowish red, fine sandy loam, sbk, VFR
8 – 19”	Reddish yellow, fine sandy loam, sbk, VFR

Subsurface Layers:

19 – 26”	Brown, fine sandy loam, sbk, VFR Redox Con. strong brown 2%
26 – 32”	Olive brown, cobbly fine sandy loam, m, FI Redox Con. Very dark gray 25%

Substratum:

32”	Lodgment till, m, VFI

Colonel:

Surface Layers:

0 – 3”	Black, muck; stony
3 – 9”	Gray, stony sandy loam, sbk, VFR
9 – 14”	Olive gray, stony sandy loam, sbk, FR

Subsurface Layers:

14 – 24”	Light olive brown, sandy loam, pl, FR Redox Con. dark yellowish brown 5%
24 – 26”	Light olive brown, sandy loam, m, FI Redox. Con. strong brown 10%

Substratum:

26”	Lodgment till, m, VFI

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)

Similar: Becket **Dissimilar:** Brayton

USE AND MANAGEMENT

This map unit occurs primarily along the proposed electrical collector line/access road that extends northerly from the array area. Major use and management concerns are that Skerry and Colonel soils are both very deep to bedrock yet range from somewhat poorly drained to moderately well drained on dense till. This can create a seasonal high-water table close to the mineral soil surface. So, activities impacted by a high-water table, such as road construction, could require additional engineering. These soils can be compacted if exposed to heavy equipment however the potential for rutting is moderate, which is less severe than other soils mapped within the Project area. The loamy mantle and underlying sandy till can typically be used on-site for road building and other site development. Erosion and sediment controls should be installed prior to commencement of construction activities to avoid erosion and sedimentation of adjacent and off-site resources. Phases of soil included within the map unit are areas with a very stony/bouldery surface and very stony subsurface layers. The D slope group is very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. The dominant soil within this map unit is Skerry.

Map Unit: **Tunbridge/Monadnock Complex**

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

Map Unit Symbol: TmC, TmD, TmE

SETTING

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

Landform: Tunbridge: Glaciated uplands
Monadnock: Upland till plains, hills and ridges

Position in Landscape: Tunbridge: Ridge summits and shoulders
Monadnock: Side slope and nose slope

Slope Gradient Range: **(C)** 8-15%, **(D)** 15-35%, **(E)** >35%

COMPOSITION AND SOIL CHARACTERISTICS

Depth to Water Table: Tunbridge: 20 to <40" to bedrock with no water table
Monadnock: > 40"

Typical Profile Description:

Tunbridge:

0 – 3" Peat
3 – 5" Very dusky red, fine sandy loam, sbk, VFR
5 – 7" Grayish brown, fine sandy loam, sbk, VFR
7 – 13" Dark reddish brown, fine sandy loam, sbk, VFR
13 – 23" Dark brown, fine sandy loam, sbk, VFR
23 – 32" Dark yellowish brown, fine sandy loam, sbk, VFR
32" Bedrock

Monadnock:

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 Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)

Similar: Becket **Dissimilar:** Brayton

USE AND MANAGEMENT

These map units are mapped primarily in the lower lying elevations along "Yonder Way", the existing access road at the eastern end of the Survey Area, and in transitional areas within the central portion of the Survey Area. Typically, seasonal water table is

not a major concern for construction activities and ongoing project use since these soils are well drained. The depth to bedrock in these areas rapidly changes from 20-inches below the mineral soil surface to greater than 40-inches, so limitations are that deep soils that are ruttable are adjacent to shallower soils that may require blasting for road construction, and there is no discernable pattern based on viewing the ground surface. However, the loamy mantle and underlying sandy till can typically be used on-site for road building and other site development, and blast rock can be a valuable material for road building due to its strength and is not susceptible to erosion. The D and E slope groups are very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. The dominant soil within this map unit is Tunbridge.

Map Unit: **Tunbridge sandy loam, poorly drained**
Classification: Coarse-loamy, isotic, frigid Typic Haplorthods
Map Unit Symbol: TpA, TpB, TpC, TpD

SETTING
Parent Material: Loamy supraglacial till
Landform: Glaciated uplands
Position in Landscape: Ridge summits and shoulders
Slope Gradient Range: **(A)** 0-3%, **(B)** 3-8%, **(C)** 8-15%, **(D)** 15-35%

COMPOSITION AND SOIL CHARACTERISTICS
Depth to Water Table: 0 to 7”

Typical Profile Description:

0 – 3” Peat
3 – 5” Very dusky red, fine sandy loam, sbk, VFR
Redox Dep. gray 5%, saturated
5 – 7” Grayish brown, fine sandy loam, sbk, VFR
7 – 13” Dark reddish brown, fine sandy loam, sbk, VFR
13 – 23” Dark brown, fine sandy loam, sbk, VFR
23 – 32” Dark yellowish brown, fine sandy loam, sbk, VFR
32” Bedrock

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)
Similar: Lyman poorly drained **Dissimilar:** Tunbridge and Abram

USE AND MANAGEMENT

This map unit is mapped in discrete locations within the Survey Area in nearly level areas at the base of steep slopes and along steep slopes. Major use and management concerns are that these poorly drained soils are hydric and are mapped as wetlands. As such, impacts to these areas could require regulatory oversight. The preferred method of planning project components around these soils is avoidance. Accepted construction techniques such as matting or bridging to minimize soil disturbance and compaction are recommended if project alterations are planned in these areas. An additional “Very Limiting” factor associated with this map unit is the moderately deep depth to bedrock, which affects construction of roads, construction of buildings with basements, and implementation of stormwater infiltration best management practices. When reviewing Table 1, “Severe” and “Very Limited” indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. The D slope group is also very steep which can be a limiting factor for site design and stormwater control.

Map Unit: **Tunbridge/Lyman/Rock Outcrop Complex**
Classification: Tunbridge: Coarse-loamy, isotic, frigid Typic Haplorthods
Lyman: Loamy, isotic, frigid Lithic Haplorthods
Map Unit Symbol: TrC, TrD, TrE

SETTING
Parent Material: Loamy supraglacial till
Landform: Glaciated uplands
Position in Landscape: Ridge summits and shoulders
Slope Gradient Range: **(C)** 8-15%, **(D)** 15-35%, **(E)** >35%

COMPOSITION AND SOIL CHARACTERISTICS
Depth to Water Table: Tunbridge: 20 to <40" to bedrock with no water table
Lyman: 10 to 20" to bedrock with no water table

Typical Profile Description:
Tunbridge:
0 – 3" Peat
3 – 5" Very dusky red, fine sandy loam, sbk, VFR
5 – 7" Grayish brown, fine sandy loam, sbk, VFR
7 – 13" Dark reddish brown, fine sandy loam, sbk, VFR
13 – 23" Dark brown, fine sandy loam, sbk, VFR
23 – 32" Dark yellowish brown, fine sandy loam, sbk, VFR
32" Bedrock
Lyman:
0 – 2" Peat
2 – 4" Very dusky red, fine sandy loam, sbk, VFR
4 – 7" Grayish brown, fine sandy loam, sbk, VFR
7 – 13" Dark reddish brown, fine sandy loam, sbk, VFR
13 – 17" Dark brown, fine sandy loam, sbk, VFR
17" Bedrock

Hydrologic Soil Group (HSG):	**See Table 1**
Drainage Class:	**See Table 1**
Depth to Bedrock:	**See Table 1**
Concrete Corrosion:	**See Table 1**
Steel Corrosion:	**See Table 1**
Potential for Frost Action:	**See Table 1**
Soil Rutting Hazard (ME):	**See Table 1**
Erosion Hazard (Road/Trail)	**See Table 1**
Construction Limitations for Haul Roads/Log Landings (ME)	**See Table 1**
Infiltration Systems, Shallow:	**See Table 1**

INCLUSIONS (within mapping unit)
Similar: Abram **Dissimilar:** Becket

USE AND MANAGEMENT
This map unit occurs across the entire Survey Area; however, the majority are located centrally in higher elevations on ridgelines, knolls and associated side slopes. The most limiting factor associated with this map unit is the shallow depth to bedrock, which affects construction of roads, construction of turbine pads, installing foundations, and implementation of stormwater infiltration best management practices. However, blast rock can be a valuable material for road building due to its strength and is not susceptible to erosion. The D and E slope groups are also very steep which can be a limiting factor for site design and stormwater control. When reviewing Table 1, "Severe" and "Very Limited" indicates that the soil has one or more features that are

unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures (such as blasting). The dominant soil within this map unit is Tunbridge.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms. The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Drainage Class

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained.

Excessively drained: Water is removed very rapidly. Internal free water occurrence commonly is very rare or very deep. The soils are commonly coarse textured and have very high saturated hydraulic conductivity or are very shallow.

Somewhat excessively drained: Water is removed from the soil rapidly. Internal free water occurrence commonly is very rare or very deep. The soils are commonly coarse textured and have high saturated hydraulic conductivity or are very shallow.

Well drained: Water is removed from the soil readily but not rapidly. Internal free water occurrence commonly is deep or very deep; annual duration is not specified. Water is available to plants throughout most of the growing season in humid regions. Wetness does not inhibit root growth for significant periods during most growing seasons. The soils are mainly free of, or are deep or very deep to, redoximorphic features related to wetness.

Moderately well drained: Water is removed from the soil somewhat slowly during some periods of the year. Internal free water occurrence is commonly moderately deep and transitory through permanent. The soils are wet for only a short time within the rooting depth during the growing season but long enough that most mesophytic crops are affected. They commonly have a moderately low or lower saturated hydraulic conductivity in a layer within the upper 1 meter, periodically receive high rainfall, or both.

Somewhat poorly drained: Water is removed slowly so that the soil is wet at a shallow depth for significant periods during the growing season. Internal free water occurrence is commonly shallow to moderately deep and transitory to permanent. Wetness markedly restricts the growth of mesophytic crops, unless artificial drainage is provided. The soils commonly have one or more of the following characteristics: low or very low saturated hydraulic conductivity, a high water table, additional water from seepage, or nearly continuous rainfall.

Poorly drained: Water is removed so slowly that the soil is wet at shallow depths periodically during the growing season or remains wet for long periods. Internal free water occurrence is shallow or very shallow and common or persistent. Free water is commonly at or near the surface long enough during the growing season that most mesophytic crops cannot be grown, unless the soil is artificially drained. The soil, however, is not continuously wet directly below plow depth. Free water at shallow depth is common. The water table is commonly the result of low or very low saturated hydraulic conductivity, nearly continuous rainfall, or a combination of these.

Very poorly drained: Water is removed from the soil so slowly that free water remains at or very near the surface during much of the growing season. Internal free water occurrence is very shallow and persistent or permanent. Unless the soil is artificially drained, most mesophytic crops cannot be grown. The soils are commonly level or depressed and frequently ponded. In areas where rainfall is high or nearly continuous, slope gradients may be greater.

Subaqueous: Free water is above the soil surface. Internal free water occurrence is permanent, and there is a positive water potential at the soil surface for more than 21 hours of each day. The soils have a peraquic soil moisture regime.

Bedrock

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

All others are Very Deep (> 60 inches of mineral soil above bedrock)

Corrosion of Concrete

"Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens concrete. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the concrete in installations that are entirely within one kind of soil or within one soil layer. The risk of corrosion is expressed as "low," "moderate," or "high."

Corrosion of Steel

"Risk of corrosion" pertains to potential soil-induced electrochemical or chemical action that corrodes or weakens uncoated steel. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel in installations that are entirely within one kind of soil or within one soil layer.

Frost Action

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Soil Rutting Hazard (ME)

Ratings for this interpretation indicate the hazard of surface rut formation through the operation of forestland equipment. Soil displacement and puddling (soil deformation and compaction) may occur simultaneously with rutting. Ratings are based on depth to a water table, rock fragments on or below the surface, the Unified classification of the soil, depth to a restrictive layer, and slope. Ratings are both verbal and numerical. The hazard is described as "slight," "moderate," or "severe." A rating of "slight" indicates that the soil is subject to little or no rutting. "Moderate" indicates that rutting is likely. "Severe" indicates that ruts form readily.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

Erosion Hazard (Road/Trail)

The ratings in this interpretation indicate the hazard of soil loss from unsurfaced roads and trails. The ratings are based on soil erosion factor K, slope, and content of rock fragments. The ratings are both verbal and numerical. The hazard is described as "slight," "moderate," or "severe." A rating of "slight" indicates that little or no erosion is likely; "moderate" indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and "severe" indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

Construction Limitations for Haul Roads and Log Landings (ME)

The ratings for limitations affecting the construction of haul roads and log landings are based on slope, flooding, permafrost, plasticity index, the hazard of soil slippage, content of sand, the Unified classification of the soil, rock fragments on or below the surface, depth to a restrictive layer that is indurated, depth to a water table, and ponding.

Ratings are both verbal and numerical. Rating class terms indicate the degree to which the soils are suited to this aspect of forestland management. The limitations are described as "slight," "moderate,' or "severe." A rating of "slight" indicates that no significant limitations affect construction activities. "Moderate" indicates that one or more limitations can cause some difficulty in construction. "Severe" indicates that one or more limitations can make construction very difficult or very costly.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the

greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

Infiltration Systems, Shallow

Shallow infiltration systems are stormwater management practices that are placed 1 to 3 feet in the ground, depending on the application. These systems include pervious pavement, buffer strips, filter strips, and vegetated swales. They slow the movement of stormwater to surface waters and filter a significant portion of pollutants from the stormwater. The fundamental function of these systems is to hold the runoff generated by an area, such as a parking lot, from the first 1 inch of rainfall during a 24-hour storm preceded by 48 hours of no measurable precipitation. There should be little or no ponding at the surface. The water should infiltrate into the surrounding soil in 24 to 48 hours. Only that part of the soil between depths of 24 and 80 inches is evaluated.

The ratings are based on the soil properties that affect infiltration of the stormwater, construction and maintenance of the system, and public safety and health. Saturated hydraulic conductivity (Ksat), depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect the transmission of rainwater. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the water in downslope areas. Some slopes may become unstable and move upon addition of water.

Soils underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the bottom of the system may adversely affect water quality and public health. In these soils the shallow infiltration system may not adequately filter the stormwater, particularly if the adsorptive capacity of the soil below the system is low. As a result, the ground water may become contaminated. In areas underlain by limestone, solution channels and subsequent subsidence may damage adjacent infrastructure. Also, areas underlain by limestone may be subject to ground-water contamination.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified infiltration system. "Not limited" indicates that the soil has features that are very favorable for the specified system. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified system. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified system. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified system (1.00) and the point at which the soil feature is not a limitation (0.00).

APPENDIX D

MAPSS Class L and D Soil Survey Standards

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 sub-meter accuracy under the direction of a qualified professional.
4. Base map – with two-foot contour lines.

CLASS D (MEDIUM INTENSITY) SOIL SURVEY

5. 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.
6. Scale of 1-inch equals 2,000 feet or larger (e.g. 1" = 1,320')
7. Ground control – as determined by the mapper.
8. 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-horizons within 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 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.