ATTACHMENT 1-2 SOIL SURVEY REPORT

Soil Map Report
for Western Maine Renewables Project,
Moscow, Maine

December 2020

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APPENDICES

Certification Statement

The accompanying soil profile descriptions, soil survey map and this soil narrative report entitled "Soil Map Report for Western Maine Renewables Project", dated December 2020, were done in accordance with the standards adopted by the Maine Association of Professional Soil Scientists, February 1995, as amended and prepared by Ian Broadwater, C.S.S. #305.

1.0 Introduction

Tetra Tech has been retained by Western Maine Renewable Energy, LLC to assist in obtaining permits to construct and operate the proposed Western Maine Renewable Energy Project, a 58.5 MW wind farm on a former U.S. Air Force radar station site and some of the surrounding land in Moscow, Maine. As part of the permitting process, Tetra Tech identified the need for a Class B soil map soil in areas within the footprint of the project. The designed project includes 14 wind turbines and associated infrastructure including a new electrical substation.

Results of the soil survey will be used to support the stormwater analysis, construction planning, and erosion and sedimentation control plans, and to meet regulatory requirements. Accordingly, soil map units delineated in the field emphasized soil drainage condition and documented Hydrologic Soil Group (HSG) of the soil series observed.

Much of the land within the project area has been disturbed by past uses. The former radar station involved construction of buildings, roads, and infrastructure that remains on the site. In two fenced-in fields, metal wire was buried over tens of acres to assist in ground the radar equipment. Heavy duty and lighter duty roads were constructed in and around the perimeter of the former radar station. In addition to disturbance from the former radar station, much of the land proposed for use on the southwest turbine string has been subjected to forestry for many years. Consequently, skidder trials and other evidence of the activity are present. Figure 1 shows site features in relation to the project area and proposed turbine locations.

This report consists of this introduction, a discussion of the methodology used to complete the soil map, and a discussion of the soil map resulting from the effort. Four appendices are also attached to this document and they include

- Appendix A-Soil Map Unit Descriptions,
- Appendix B-Official Soil Series Descriptions by the U.S. Natural Resource Conservation Service (NRCS),
- Appendix C- Test Pit Logs, and
- Appendix D-Class B Soil Map resulting from this effort.

2.0 Methodology

The document "Guidelines for Maine Certified Soil Scientists for Soil Identification and Mapping" (MAPSS, 2009), published by the Maine Association of Professional Soil Scientists, contains standards for the content of soil maps and accuracy information based on class of mapping completed. No other warranty, expressed or implied, is made. This map product is within the technical standards of the National Cooperative Soil Survey. It is a special purpose product, intended for the assessment of site limitations to development of the site for a specific use. It was produced by a Certified Soil Scientist and is not the product of the NRCS.

Data provided on soil series are based on interpretation of published information by the NRCS. Due to the complexity of the glaciated landscape in Maine, variations in subsurface conditions may exist that were not evident or detected during the project fieldwork. Should significant variations in subsurface conditions become evident during site development, additional evaluation of site conditions may be warranted.

The guidelines describe five different levels of mapping (i.e., A through D, and L). According to the guidelines (MAPSS, 2009), a Class B survey map should conform to the following criteria:

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

For the maps created for this project, 2-foot topographic contours were available and are presented on the resultant map.

2.1 Field Procedures

Ian Broadwater, Maine Certified Soil Scientist SS305, completed the fieldwork to support the mapping in September, October, and the beginning of November 2020. Personnel from Basswood Environmental, LLC were subcontracted for assistance with the project.

Field observations were made using borings advanced by hand with a Dutch auger and 77 test pits dug using a 25,000-pound tracked excavator. To facilitate completion of the test pits, a timber harvester was used to cut access roads to the test pit locations. Soil observations were made to 48” below ground surface in the test pits, or as deep as conditions would allow. Limits to depth of auger borings were experienced by extremely dense subsoil and the presence of coarse fragments.

In an attempt gain as much information as possible, if an auger boring refused at less than a foot, additional attempts (up to 4) were made to advance auger borings deeper in the same area. In many cases it was successful providing valuable information on drainage conditions. A water spray bottle was used dampen the upper horizons, when needed, so soil colors could be taken with soil in a moist condition.

Circumstantial evidence of the soil depth was reviewed including the existing NRCS mapping of the site and vicinity. NRCS soil mapping shows many of the soils that were formed in lodgement till. One form of till reported at the site was more silt-based and one was sandier. Shallow to bedrock soil were also reported in some project areas.

The general field procedures used to make this soil map follow those of the National Soil Survey Handbook (NRCS, 2017). A majority of the soil series used on these maps are established soil series used in the State of Maine by the NRCS as depicted in the latest state soil catena.

After soil series boundaries and characteristics were interpreted, map unit descriptions were created specific to this site and they are provided in Appendix A. Test pits and soil series observations were located with a Global Position System, capable of submeter accuracy. Many of the test pits were excavated in potential stormwater and erosion control treatment areas.

2.2 Soil Map Units

The soil series interpretations provided are based on information in the soil series descriptions and technical information provided by the NRCS web soil survey. All limitations and constraints invoked by the NRCS for such interpretations also apply to this soil survey.

The map units observed are described in Appendix A. These descriptions are within the NRCS range for each official Soil Series Description unless otherwise noted. The taxonomic classification follows Keys to Soil Taxonomy (Soil Survey Staff, 2014). Information on soil morphology and physical characteristics were obtained from the NRCS Web Site.

The soil map units used for this survey are consociations and complexes. Consociations are dominated by a single soil series and similar soils. A complex is two or more soils that are so intermingled that they cannot be mapped individually. Several soil complexes were used on this map. Table 1 shows the soil map units used during creation of the soil map. It also shows the slope, map symbol and the documented HSG for each map unit.

Several soil consociation map units are used on this map (i.e., Colonel, Monarda, Peru, Pillsbury, etc.). In accordance with the soil mapping standards (MAPSS, 2009), the map units will have a minimum of 75% of the named soil or similar soils. The named soil will be the most common of all similar soils. The total number of dissimilar soils in any one map unit for consociations should not exceed 25% of the map unit of which no more than 15% is limiting. Similar soils are alike in most properties and share similar limitations such as HSG designation, or hydric/non-hydric status.

It is important to note that soils considered appropriate (non-limiting) for one use may be considered limiting for another use. Soil map units described in this report have been influenced by the intended use of the soil map; data to assist with design of the project stormwater and erosion controls, and other infrastructure. Consequently, the information provided may not be adequate for uses other than for those for which the soil map was originally developed.

Dissimilar soils do not share limits of some important diagnostic properties. For this project, the HSG is an important factor for designing stormwater and erosion controls. It is important to note that some dissimilar soils are more limiting in their use than the named soil. For instance, an inclusion of poorly drained soils can occur within a somewhat poorly drained soil map unit.

Slope phases, when pertinent, are designated with a letter at the end of the map unit symbol. Designation may be A through E which refers to slope class. The topographic slope class range for each series is shown on the Table 1 and the map legend.

The HSG identifies soils having the same runoff potential under similar storm conditions. Soil properties that influence runoff are those that influence the minimum rate of infiltration for a bare soil after prolonged wetting and when not frozen.

2.3 Wetland Survey and Hydric Soils

In preparation for this project, a wetland survey was conducted by Tetra Tech in 2020. Delineated wetlands were generally found to coincide with the hydric-nonhydric soil boundaries. Hydric soils refer to those soil series the NRCS considers to be either poorly or very poorly drained. Hydric soil needs to be present to have a wetland although wetland boundary determination also considers other factors such as vegetation and hydrology that could result in a different boundary relative to hydric soils.

3.0 Summary of Findings

The following summarizes the results of the soil survey. Supporting data including soil map unit descriptions are provided in Appendix A; official NRCS soil series descriptions in Appendix B, test pit logs in Appendix C; and the resultant soil map is in Appendix D.

A large area of the site was found to have been disturbed by the construction of the former radar station and/or tree harvesting activities. Consequently, five different Udorthent soil types were used to describe human modified areas within the project site. They are summarized below:

Name	Map Unit Symbol	Description
Udorthent 1	Ud1A	This unit is used to describe improved roads likely associated with the former radar station. This unit consists of roadbed with adjacent ditches. Roadbed granular fill is generally > than 15" and filter fabric is present at the fill/soil interface.
Udorthent 2	Ud2A	This unit is used to describe timber company woods roads. This unit consists of roadbed with adjacent ditches. Roadbed granular fill is < than 15" and no filter fabric is present at the fill/soil interface.
Udorthent 3	Ud3A	This unit is used to describe the former radar station grounding fields. At each of the two buildings associated with the former radar site, a large area was cleared and used to bury wire fencing for the purpose of ground the radars. Both areas show signs of disturbance. Characteristics range from gleyed subsoil to partially developed soils in others.
Udorthent 4	Ud4A	This unit is used to describe areas of soil spoils associated with the construction of the Stream Road and possibly the transmission line that used to serve the radar station.
Udorthent 5	Ud5A	This unit is used to describe areas contained coarse fill that appears to have been imported.

More detailed descriptions of these unit are provided in Appendix A.

The following describes the general soils characteristics by area of the project site. The soil map resulting from the investigation is contained in Appendix D and presented as a series of plates. An index map is also provided.

3.1 Northern Area

This area consists of Turbines 1 through 4 and the access road. At Turbine 1, soil resulting from both silty and sandy lodgement till were found. Telos silt loam, a somewhat poorly drained soil, was found to dominate the west side of the footprint while Colonel fine sandy loam dominated the east side. In wetland areas, both Monarda silt loam and Brayton fine sandy loam were found in different areas. This trend continued at Turbine 2. As the proposed roadway from Turbine 2 heads west to Turbine 3, Udorthent 3 (Ud3A) was encountered in the field which was used as a grounding area for the former radar station. Livestock fencing with a 1/8 -inch to ¼-inch gauge was buried in the cleared area within the fence. In this area of the site Udorthent 3 consisted of silty, gleyed subsoil. Udorthent 1 was then

encountered on the roadway that to accesses the building northwest of Turbines 1 and 2. Currently, this building is not proposed for use on this project. Soils arounds around Turbine 3 were found be mostly sandy loams including Colonel fine sandy loam, Brayton fine sandy loam, and Colonel-Peru Complex. An extensive area of Peacham mucky peat was also observed northwest of the turbine center.

At Turbine 4 to the south, the sandy trend continues with similar soils (Colonel, Brayton fine sandy loams) found on both sides of the north-south road that turns into Steam Road at the four-way intersection near Turbine 4.

It should also be noted that an area of spoils was found on the west side of north-south road. The materials appear to have been deposited when the road and/or transmission line, to the west of the road, was constructed. The area is noticeably elevated and measures about 20 to 30 feet wide. It was present for most of the length of the north-south road and Stream Road to the proposed new substation location. In this area, soils were less well developed but resembled a developing Colonel in many areas. In select areas, a concentration cobbles, stones and boulders areas were found within this soil map unit labeled as Ud4A.

Plates 1 through 3 of Figure 2 shows the Class B soil map for this area.

3.2 Southern Area

This area consists of Turbines 9 through 14, located Weyerhaeuser land that was not associated with the radar site but has been subjected to wood harvesting. This area also includes a portion of the east-west road just south of the North Gate. A section of this road, west of the intersection with Stream Road, is proposed for use to access these turbines.

Soil found along the east-west road, leading to the southwest string from Stream Road, were found to be sandy loams. Colonel-Peru Complex was mapped frequently as well as Peru and Colonel fine sandy loams. A small area of recent alluvium was also noted along the west side of a stream, on the north side of the east-west road.

Entering the proposed road to the southwest turbine string, soils transitioned to silt loams. Telos and Monarda were mapped along the proposed road leading to Turbine 9. The footprint of Turbines 9 and 10 was dominated by rock outcrops and shallow to very shallow soils. Consequently, broad areas were mapped as Monson-Outcrop Complex. Areas of Unclassified Soil 1 (Unc1A) were mapped some of the wetland areas in the footprints of these turbines. Unc1A is a poorly drained soil, very shallow or shallow to bedrock, with a mucky dark A horizon.

In the southern portion of the Turbine 10 footprint, soils transitioned back to sandier soils. However, a large portion of soils in the Turbine 11 footprint was also mapped as shallow or very shallow to bedrock (Abram-Outcrop Complex). Hogback-Rawsonville Complex was also mapped across a significant portion of the Turbine 11 footprint. Brayton fine sandy loam was found in wetland areas.

After the proposed access road crosses Chase Pond Road, the access road heads upslope to Turbine 12. Turbine 12 soils were similar in composition to Turbine 11 soils in that Abram-Outcrop Complex was mapped on a majority of the footprint. A smaller area of the footprint was mapped as Colonel fine sandy loam. Turbine 13 soils were much like to Turbine 12, however, no hydric soils or deep soils (i.e., Colonel fine sandy loam) were found. Deep soils are defined as those greater than 48 inches to bedrock.

Turbine 14 had shallow and deep soils but was free of mappable hydric soils. A steep rock face was noted at the entry to the Turbine 14 footprint from the proposed access road. Soils at the base of the rock face were found to be very stony.

Appendix A contains a description of soil map units used on the maps. Appendix B contains the NCRS soil series descriptions. Plates 3 through 8 of Figure 2 shows the Class B soil map for this area.

3.3 Center Area

This area includes Turbines 5 and the new substation. Outside of the roadbed and ditches associated with Stream Road, sandy soil series were observed on both sides of the road, coming down from the northern gate. These include Colonel, Peru, and Brayton fine sandy loams.

On the west side of the footprint of Turbine 5, Telos silt loam was found down slope of Colonel fine sandy loam indicating a transition to the finer grained soils. This general trend continued down to the proposed substation location with sandy loams found on the west side of Stream Road and near Stream Road on the east side. But Telos silt loam was found across most of the proposed substation area, south of Turbine 5.

The spoils soil from construction of the road and/or the transmission line on the west side of Stream Road, noted in the Northern Area, continued in this portion of the site. This map unit is labeled Ud4A. It does break at a large wetland on the west side of Stream Road but then is present again south of the wetland south to just the proposed location of the new substation.

Plates 9 through 10 of Figure 2 shows the Class B soil map for this area.

3.4 Southeast Area

This area includes Turbines 6, 7, and 8, access roads and the southern building associated with the former radar site. The road and associated ditches leading to the southern building, proposed for use as an O&M building for the wind farm, was classified as Ud1A. The land around the building as well as a strip of land along the fence line was classified as Ud5A.

Turbine 6 is located within the southern grounding field. Soil within the Turbine 6 footprint were developed enough to show characteristics of existing soil series. This is likely due to better drainage and relatively coarser fill used to bury the fencing when compared to the northern ground field. Consequently, Telos silt loam was mapped over a majority of the Turbine 5 footprint. An area of Pillsbury cobbly loam and Monson-Outcrop Complex was also mapped.

Turbine 7 and 8 footprints were dominated by Colonel fine sandy loam with Brayton fine sandy loam in many of the wetland areas. Monarda silt loam was also observed in a portion of wetlands in this area. In the Turbine 7 footprint, an area of shallower soil was found and mapped as Hogback-Rawsonville Complex.

Plates 11 through 14 of Figure 2 shows the Class B soil map for this area.

4.0 Conclusion

In conclusion, the resultant Class B soil map for the project area provides more detail on the composition of soils in the project area when compared to the existing NRCS mapping. This, in turn,

will allow more accurate design of stormwater and erosion control systems for the project. Of note is the fact that, a majority of the classified soil series used on the map that were non-hydric were assigned to HSG C. Exceptions to this are shallow and very shallow soils. In addition, all of the hydric soil series observed on the project are in HSG D, according to available literature.

5.0 References

MAPSS, 2009." Guidelines for Maine Certified Soil Scientists for Soil Identification and Mapping", Maine Association of Professional Soil Scientists, 2004, revised 2009.

NRCS, 2017. "National Soil Survey Handbook", Natural Resource Conservation Service, 2017.

Society of Soil Scientists of Northern New England (SSSNNE), 2009. "Ksat Values for New Hampshire Soils." SSSNNE Special Publication No. 5. September, 2009. Durham, NH.

Soil Survey Staff, 2014. "Keys to Soil Taxonomy", Natural Resource Conservation Service, 2014.

Figures

Northern Grounding Field

East-West Road

North Gate

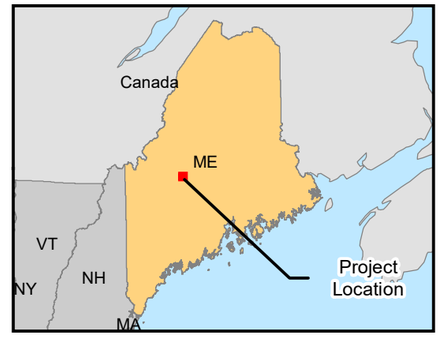
Proposed O&M Buillding (Existing)

Southern Grounding Field

Stream Road

Legend

- Study
- Detail Plate and Number
- Proposed Access Roads and Turbine Pads
- Turbine Location



N

0 1,000 2,000 Feet

Figure 1
Soil Map Study Area
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984
Universal Transverse Mercator, Zone 19 North

Not for Construction

Tables

Table 1
Summary of Soil Map Units
Western Maine Renewables Project
Moscow, Maine

Symbol	Unit	Slope %	Hydrologic Soil Group
AOC	Abram-Outcrop Complex	4-24	D/D
BrA	Brayton sandy loam	0-8	D
BrB	Brayton sandy loam	8-15	D
CoA	Colonel sandy loam	0-8	C
CoB	Colonel sandy loam	8-15	C
CoC	Colonel sandy loam	15-25	C
CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru sandy loam	0-8	C
PuB	Peru sandy loam	8-15	C
PuD	Peru sandy loam	25-45	C
RaB	Ragmuff silt loam	8-15	C[1]
TCC	Telos-Chesuncook Complex	0-15	C/C
TeA	Telos silt loam	0-8	C
TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
Unc1	Unclassified series 1	0-8	D

Notes:
1= Ragmuff HSG interpreted from other similar soil series with respect to depth, texture and drainage.
2. HSGs listed are from Society of Soil Scientists of Northern New England (SSSNNE), 2009. "Ksat Values for New Hampshire Soils." SSSNNE Special Publication No. 5. September, 2009. Durham, NH.
TBD=To be determined

Appendix A

Map Unit Descriptions

Appendix A

Soil Map Unit Description

Abram-Outcrop Complex (AOC)-This complex consists of areas of bedrock outcrops and the shallow soil, Abram sandy loam. In the areas mapped as AOC, bedrock outcrops appear randomly on the soil surface of small mounds and ridges surrounded by a thin veneer (10 inches or less) of sandy loam. The dissimilar soils, Hogback gravelly sandy loam and Rawsonville very fine sandy loam may also occur in this map unit as well as the hydric soils, Brayton fine sandy loam and Unclassified 1. This map unit generally has slopes up to 25%. The Hydrologic Soil Group (HSG) for this map unit is D.

Brayton fine sandy loam (Br)-This consociation is a hydric fine sandy loam and is found in wetland areas. Two slope phases were used for this map unit; A (0%-8%) and B (8%-15%). The dissimilar soils Colonel and Peru may occur in this map unit as well as Peacham mucky peat. The HSG for this map unit is D.

Colonel fine sandy loam (Co)- This consociation is a non-hydric fine sandy loam and is found in upland areas. Three slope phases were used for this map unit; A (0%-8%), B (8%-15%), and C (15%-25%). The dissimilar soil Brayton fine sandy loam and similar soil, Peru fine sandy loam, may occur in this map unit. The HSG for this map unit is C.

Colonel-Peru Complex (CPC)-This complex was used to designate areas where Colonel and Peru fine sandy loams intermingle in the landscape with small mounds (10 to 20 feet in diameter) of moderately well drained Peru fine sandy occurring randomly with Colonel fine sandy loam in areas off the mounds. Slopes of 0% to 15% occur in the map unit. Dissimilar soils that may occur in this map unit include the hydric soil, Brayton fine sandy loam and well drained Marlow fine sandy loam may occur in this map unit. Depending on the location, very shallow (Abram) and shallow (Hogback) soils may also be present. The HSG for this map unit is C.

Hogback-Rawsonville Complex (LTC)- This map is a complex of a shallow and a moderately deep sandy loam. Both soil series are well drained. Bedrock in areas mapped as LTC generally occurs between 10 and 40 inches. Dissimilar soil that may occur in this unit include Colonel fine sandy loam, Peru fine sandy loam, both deep soils. Brayton fine sandy loam and Unclassified 1 may also occur as inclusions in wetlands. Slopes of 4% to 24% may occur in this map unit. Both soil series in this complex have are in HSG C.

Monarda silt loam (Mo)- This consociation is a hydric fine sandy loam and is found in wetland areas. Two slope phases were used for this map unit; A (0%-8%) and B (8%-15%). The dissimilar soils Colonel and Peru fine sandy loams may occur in this map unit. In addition, small inclusion of Brayton fine sandy loam and Burnham muck. The HSG for this map unit is D.

Monarda-Burnham Complex (MBC)- This complex was used to map designate areas where Monarda silt loam and Burnham muck are intermingled in the landscape. Both are hydric soils. Small pockets of Burnham muck occur randomly with Monarda silt loam. Slopes of 0% to 15% occur in the map unit. Dissimilar soils that may occur in this map unit include the hydric soil, Brayton fine sandy loam and somewhat poorly drained Telos silt loam and Colonel fine sandy loam may occur in this map unit. The HSG for this map unit is D.

Monson-Outcrop Complex (MOC)- This complex consists of areas of bedrock outcrops and the shallow soil, Monson silt loam. In the areas mapped as MOC, bedrock outcrops appear randomly on the soil surface of small mounds or ridges surrounded and are surrounded by a thin veneer (20 inches or less) of silt loam. This complex, by definition, includes very shallow (=/<10 inches) silt loam. Very shallow silt loam soils are not described by a documented series in Maine. The dissimilar soils Ragmuff silt loam, Elliotsville, Telos silt loam and Chesuncook silt loam may also occur in this map unit as well as the hydric soils, Monarda silt loam and Unclassified soil 1. Somewhat poorly drained shallow soils may also be present in small inclusions. This map unit generally has slopes up to 25 %. The HSG for this map unit is D.

Peacham mucky peat (Pe)- This consociation is a hydric mucky peat and is found in wetland areas. One slope phase was used for this map unit; A (0%-8%). The similar soil, Brayton fine sandy loam, may also occur in this map unit. The dissimilar soils Colonel fine sandy loam and Peru fine sandy loam may occur in this map unit as small inclusions. The HSG for this map unit is D.

Peru fine sandy loam (Pu)- This consociation is a non-hydric fine sandy loam and is found in upland areas. Three slope phases were used for this map unit; A (0%-8%), B (8%-15%), and D (25%-35%). The dissimilar soil Brayton fine sandy loam as small inclusions and the similar soil, Colonel fine sandy loam, also may occur in this map unit. The HSG for this map unit is C.

Pillsbury (Pi)- This consociation is a hydric cobbly loam and is found in wetland areas. One slope phase was used for this map unit; A (0%-8%). The similar soil, Brayton fine sandy loam, may also occur in this map unit. The dissimilar soils Colonel fine sandy loam and Peru fine sandy loam may occur in this map unit as small inclusions. The HSG for this map unit is D.

Telos-Chesuncook Complex (TCC)- This complex was used to map designate areas where Telos silt loam and Chesuncook silt loam are intermingled in the landscape. Chesuncook occurs on small natural mounds, with a foot or so of relief from the surrounding area. Telos is found in areas off the mounds. Slopes of 0% to 15% occur in the map unit. Dissimilar soils that may occur in this map unit include the hydric soils, Monarda silt loam and Brayton fine sandy loam. The HSG for this map unit is C.

Telos (Te)- This consociation is a non-hydric silt loam and is found in upland areas. Three slope phases were used for this map unit; A (0%-8%), B (8%-15%), and C (15%-25%). The dissimilar hydric soils, Monarda silt loam and Brayton fine sandy loam may occur in this map unit as well as the similar soil, Chesuncook silt loam. The HSG for this map unit is C.

Udorthent 1 (Ud1)- This unit is used to classify areas of roadway likely constructed when the former radar site was constructed. Roadways amped as this soil include Stream Road in the Project Area, and the access road to the north string (the continuation of Stream Road), and the access road to the proposed O&M Building. Roadways in these areas were constructed with filter fabric spread over the natural subsoil with generally greater than 20 inches of course fill over it. Drainage condition appears to be moderately well drained in most areas. In these areas, generally less than 20 inches of course granular fill was used over the exiting soil. Drainage condition appears to be moderately well drained in most areas. Slopes in the map unit are nearly level to 8%.

Udorthent 2 (Ud2)- This unit is used to classify areas of roadway likely constructed for access to logging lands. Roadways mapped as this unit include the E-W Road as well as Chase Pond Road as well as Stream Road in the Project Area, and the access road to the north string (the continuation of Stream Road), and the access road to the southeast turbine string (perimeter road outside the south grounding field fence). In these areas, generally less than 20 inches of course granular fill was used over the existing soil. In addition, filter fabric was not used in these areas, based on observations of test pits completed. Drainage condition appears to be moderately well drained in most areas. Slopes in the map unit are nearly level to 8%.

Udorthent 3 (Ud3)- This map unit was used to designate areas of fill used to cover the grounding wire in the north and south grounding fields. In the northern ground field, the material encountered in the project area was gleyed subsoil. Due to the gleyed colors, judging drainage condition was difficult but based on professional judgement, it is believed this unit is mostly somewhat poorly drained. Buried wire fencing was encountered in various locations within this map unit. Slopes in the map unit are nearly level to 8%.

Udorthent 4 (Ud4)- This map unit was created to show areas of roadway and/or transmission line construction spoils. In these areas, it appears excess soil and rocks were placed along the west side of Stream Road as well as the west side of the North-South Road that leads to the proposed northern turbine string. Much of the soil within this map unit appears to be a developing Colonel sandy loam. Colors were slightly paler than an undisturbed, "natural" Colonel soil. Some areas were also found to be very stony. Drainage condition in the unit was, in general, found to be somewhat poorly drained. Slopes in the map unit are nearly level to 8%.

Udorthent 5 (Ud5)- This map unit is used to designate areas of course granular fill not associated with a roadway. These areas are along the wood stockade fencing in the northern and southern grounding fields. Course granular fill was also found at a constructed landing pad at the location of the new proposed substation. Soils in this map unit were generally somewhat poorly drained. Slopes in the map unit are nearly level to 8%.

Unclassified soil 1 (Unc1)- This map unit is used to designate areas that are shallow (10 to 20 inches) or very shallow (0.1 to 10 inches) to bedrock and are composed of a mucky A horizon or an moderately to well decomposed organic horizon over a mucky mineral horizon. The drainage condition of soil in this map unit is poor, therefore, a hydric soil. This unit is used mostly on the southwest turbine string at Turbine 9 and 10 but also occurs in the footprint of Turbine 6 in the southeast. There is no documented soil series used in Maine that describes these conditions, hence, the Unclassified descriptor in the title. Slopes in the map unit are nearly level to 8%. Because this is a hydric soil, it should be be classified as HSG D.

Appendix B

NRCS Soil Series Descriptions

LOCATION ABRAM ME+NY VT

Established Series
Rev. KJL-NRK-WDH-NRB
12/2015

ABRAM SERIES

The Abram series consists of very shallow, excessively drained soils formed in a thin mantle of glacial till on ridges and mountains. Permeability is moderately rapid. Slope ranges from 0 to 80 percent. Mean annual temperature is about 7 degrees C, and mean annual precipitation is about 1118 mm at the type location.

TAXONOMIC CLASS: Loamy, isotic, frigid Lithic Haplorthods

TYPICAL PEDON: Abram sandy loam, on a 40 percent southwest-facing slope in a very stony wooded area. (Colors are for moist soil.)

Oa--0 to 3 cm; black (10YR 2/1) sapric material; moderate medium granular structure; very friable; many very fine and fine roots; extremely acid; abrupt wavy boundary. (0 to 15 cm thick)

E--3 to 5 cm; pinkish gray (7.5YR 6/2) sandy loam; weak fine granular structure; friable; common very fine and fine roots; 10 percent angular gravel; extremely acid; abrupt wavy boundary. (0 to 20 cm thick)

Bhs--5 to 8 cm; very dusky red (2.5YR 2/2) sandy loam; weak fine granular structure; very friable; common very fine and fine roots; 10 percent angular gravel; very strongly acid; abrupt smooth boundary.

Bs--8 to 13 cm; brown (7.5YR 4/4) sandy loam; weak fine granular structure; very friable; common very fine and fine roots; 10 percent angular gravel; very strongly acid; abrupt wavy boundary. (Combined thickness of the B horizons is 3 to 15 cm.)

R--13 cm; hard bedrock.

TYPE LOCATION: Oxford County, Maine; Town of Hiram; 1.2 miles southeast of Little Clemmons Pond on the south slope of Bill Merrill Mountain; USGS Cornish topographic quadrangle; lat. 43 degrees 51 minutes 10 seconds N. and long. 70 degrees 51 minutes 36 seconds W., NAD 27

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 3 to 25 cm. The layer of mineral soil directly above the bedrock is more than one third of the total soil thickness.

Texture is silt loam, very fine sandy loam, fine sandy loam, sandy loam, or loam in the fine-earth fraction. Rock fragments are 0 to 35 percent by volume throughout the mineral soil and are mainly angular gravel. Stones and boulders cover from 0 to 3 percent of the surface. Reaction ranges from extremely acid to strongly acid throughout.

The O horizon is neutral or has hue of 2.5YR to 10YR, value of 2 to 3 and chroma of 0 to 2. It is moderately or highly decomposed plant material.

The A horizon, where present, has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 or 2. Some areas have an Ap horizon with hue of 10YR, value of 3, and chroma of 3 or 4.

The E horizon has hue of 5YR to 10YR, value of 4 to 7, and chroma of 1 or 2. It has weak fine or medium granular or subangular blocky structure. Consistence is very friable or friable.

The B horizon has hue of 2.5YR to 10YR, with value and chroma of 2 to 6. It has weak or moderate, fine or medium granular structure. Consistence is very friable or friable.

The bedrock is generally granite, phyllite, schist, or gneiss.

COMPETING SERIES: These are the Creasey, Lyman, and Monson series in the same family. These soils are all 25 cm or greater to bedrock.

GEOGRAPHIC SETTING: Abram soils are on the crests and side slopes of bedrock controlled ridges and mountains. Slope ranges from 0 to 80 percent but is typically 8 to 40 percent. The soils formed in a thin mantle of glacial till derived mainly from granite, phyllite, schist and gneiss. The climate is humid and cool temperate. The mean annual precipitation ranges from 864 to 1270 mm and the mean annual temperature ranges from 3 to 8 degrees C. The frost-free season ranges from 80 to 160 days. Elevations range from 2 to 762 meters above mean sea level in Maine and Vermont and up to 975 meters in New York.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Becket, Berkshire, Dixfield, Hermon, Lyman, Monadnock, Marlow, Peru, Ricker, Skerry, Thorndike, and Tunbridge soils. Ricker soils are thin organic soils over bedrock in convex positions. All these other soils have thicker sola, and are generally in valleys and on lower side slopes.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Excessively drained. Saturated hydraulic conductivity is high throughout the mineral soil.

USE AND VEGETATION: Most areas are wooded. Common tree species include eastern white pine, jack pine, red spruce, white spruce, balsam fir, paper birch, gray birch, eastern hemlock, red oak, and eastern hophornbeam. Vegetation also includes shrubs, ferns, sedges, mosses, and lichens.

DISTRIBUTION AND EXTENT: Maine, New York, and Vermont. (MLRAs 143 and 144B) The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Oxford County, Maine, 1987.

REMARKS:
1. The Abram series includes soils formerly mapped with rock land and very rocky phases of Lyman and Canaan soils.
2. A major inclusion in mapping will be soils that lack a spodic horizon.
3. Diagnostic horizons and features recognized in this pedon are:
a. Albic horizon - the zone from 3 to 5 cm (E horizon).
b. Spodic horizon - the zone from 5 to 13 cm (Bhs and Bs horizons).
c. Lithic contact - hard bedrock at 13 cm.

ADDITIONAL DATA: Soil Interpretation Record Numbers for the Abram Series are: Abram, ME0115; Abram, stony, ME0131; and Abram, bouldery, ME0140.

National Cooperative Soil Survey
U.S.A.

LOCATION BRAYTON ME+CT MA NY VT

Established Series
Rev. KJL-DEW-ANA
06/2018

BRAYTON SERIES

The Brayton series consists of very deep, poorly drained soils on toeslopes and depressions of glaciated uplands. These soils formed in dense till. Saturated hydraulic conductivity is moderately high or high in the solum and moderately low or moderately high in the dense substratum. Slope ranges from 0 to 25 percent. Mean annual temperature is about 7 degrees C, and mean annual precipitation is about 1092 mm.

TAXONOMIC CLASS: Loamy, mixed, active, nonacid, frigid, shallow Aeric Endoaquepts

TYPICAL PEDON: Brayton fine sandy loam, in a gently sloping, very stony forested area. (Colors are for moist soil unless otherwise stated.)

Oi--0 to 2 cm; slightly decomposed leaves, needles and twigs.

Oa--2 to 13 cm; black (5YR 2/1) highly decomposed organic material; weak very fine granular structure; very friable, many very fine, fine and medium, and common coarse roots; extremely acid; abrupt wavy boundary. (Combined thickness of the O horizons is 0 to 15 cm.)

A--13 to 18 cm; very dark gray (10YR 3/1) fine sandy loam, gray (10YR 6/1) dry; weak fine and medium granular structure; very friable; many very fine, fine and medium, and common coarse roots; 10 percent rock fragments; extremely acid; abrupt wavy boundary. (0 to 15 cm thick)

Eg--18 to 25 cm; gray (10YR 5/1) gravelly fine sandy loam; few medium distinct pinkish gray (5YR 6/2) masses of iron accumulation and few fine faint gray (10YR 6/1) iron depletions; weak very fine subangular blocky structure; friable; many very fine and fine, and common medium roots; 20 percent rock fragments; extremely acid; abrupt wavy boundary. (0 to 10 cm thick)

Bg--25 to 41 cm; grayish brown (2.5Y 5/2) fine sandy loam; weak very fine and fine subangular blocky structure; friable; common very fine and fine roots; many medium prominent dark yellowish brown (10YR 4/6) masses of iron accumulation and few fine faint gray (10YR 6/1) iron depletions; 10 percent rock fragments; strongly acid; clear wavy boundary. (13 to 51 cm thick)

BC--41 to 58 cm; light olive brown (2.5Y 5/4) fine sandy loam; weak thin platy structure; firm; many medium faint dark yellowish brown (10YR 4/4) masses of iron accumulation and few fine prominent gray (10YR 6/1) iron depletions; 10 percent rock fragments; moderately acid; clear wavy boundary. (0 to 25 cm thick)

Cd1--58 to 74 cm; olive (5Y 5/3) fine sandy loam; moderate thin and medium platy; very firm; many medium prominent yellowish brown (10YR 5/6) and common medium prominent dark yellowish brown masses of iron accumulation, few fine prominent gray (10YR 6/1) iron depletions; 10 percent rock fragments; slightly acid; clear wavy boundary.

Cd2--74 to 165 cm; olive (5Y 4/3) fine sandy loam; massive; very firm; common medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulation, few fine prominent gray (10YR 6/1) iron depletions; 10 percent rock fragments; slightly acid.

TYPE LOCATION: Hancock County, Maine; town of Mariaville; off Maine Route 181, about 1.3 miles north of the bridge spanning the West Branch of Union River, about 500 feet southeast of highway; USGS Amherst topographic quadrangle; lat. 44 degrees 46 minutes 47 seconds N. and long. 68 degrees 22 minutes 15 seconds W., NAD 27.

RANGE IN CHARACTERISTICS: The combined thickness of the A, E, B and BC horizons is 25 to 50 cm. Depth to bedrock from the mineral soil surface is more than 152 cm. Reaction ranges from extremely acid to moderately acid in the A and Eg horizons and from strongly acid to slightly acid in the B and BC horizons. One or more subhorizons in the subsoil below a depth of 25 cm have pH greater than 5.5. The Cd layer ranges from moderately acid to neutral. Rock fragments in the mineral soil range from 5 to 35 percent by volume. The proportions of rock fragments are about 80 percent gravel, 15 percent cobbles, and 5 percent stones. Some pedons have channers and flagstones. Stones and boulders cover from 0 to 25 percent of the surface. Textures of the solum are silt loam, loam, very fine sandy loam, fine sandy loam, or sandy loam in the fine-earth fraction with less than 10 percent clay. The substratum textures are loam, very fine sandy loam, fine sandy loam, or sandy loam in the fine-earth fraction with less than 10 percent clay. Consistence is very friable to firm in the solum and firm or very firm in the dense substratum.

The O horizon, where present, is fibric, hemic and/or sapric material.

The A or Ap horizon, where present, has hue of 10YR to 5Y, value of 2 to 4, and chroma of 1 to 4. Structure is granular.

The Eg horizon, where present, has hue of 10YR to 5Y, value of 5 or 6, and chroma of 1 or 2.

The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4. It has subangular blocky, granular or platy structure.

The BC horizon, where present, has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 4. It has subangular blocky or platy structure.

One or more subhorizon in the subsoil has matrix chroma of 2 or less. The combined thickness of the B and BC horizons is at least 6 inches.

The Cd layer has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 to 4. It is prismatic parting to platy, platy or it is massive. Aggregations bounded by planes or zones of weakness are considered inherent in the parent material.

COMPETING SERIES: This is the Aurelie series. Aurelie soils have 18 to 27 percent clay throughout the particle size control section. Monarda and Pillsbury are in closely related families. They have pH less than 5.5 in the subsoil below a depth of 25 cm and Monarda soils have 10 to 18 percent clay in the particle-size control section.

GEOGRAPHIC SETTING: Brayton soils are in depressions and on toeslopes of glaciated uplands. Slopes range from 0 to 25 percent. The soils formed in dense till derived mainly from granite, phyllite, schist, slate, and shale of Wisconsin age. The climate is humid and cool temperate. Mean annual temperature ranges from 3 to 8 degrees C, and mean annual precipitation commonly ranges from 864 to 1219 mm but includes up to 1524 mm in the coastal area of Mt. Desert Island, Maine. The frost-free season ranges from 90 to 160 days. Elevations range from about 2 to 762 m above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Colonel, Dummerston, Fullam, Hubbardton, Lyman, Macomber, Marlow, Peru, Skerry, Taconic, Tunbridge, and Peacham soils. The Colonel, Lyman, Marlow, Peru, Skerry, and Tunbridge soils have spodic horizons, are better drained, and are on higher topographic positions. Peacham soils have a histic epipedon and are in lower topographic positions. The

Dummerston, Fullam, Hubbardton, Macomber, and Taconic soils are better drained and are on higher topographic positions.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Poorly drained. A perched water table is above the dense substratum from autumn through spring. Estimated saturated hydraulic conductivity is moderately high or high in the solum and moderately low or moderately high in the dense substratum.

USE AND VEGETATION: Most areas of this soil are forested. Some areas are cleared and used for hay and pasture. Forest vegetation is mainly red spruce, white spruce, black spruce, balsam fir, eastern white pine, red maple, northern white cedar, and paper birch, yellow birch and hemlock.

DISTRIBUTION AND EXTENT: Connecticut, Maine, Massachusetts, New York, and Vermont. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Essex County, New York, 1954.

REMARKS: After reviewing location, geographic coordiantes changed from USGS Amherst topographic quadrangle; lat. 44 degrees 46 minutes 48 seconds N. and long. 68 degrees 22 minutes 19 seconds W., NAD 27.

Diagnostic horizons and features recognized in this pedon include:
1. Ochric epipedon - the zone from 0 to 18 cm (Oi, Oa and A horizons).
2. Cambic horizon - the zone from 25 to 58 cm (Bg and BC horizons).
3. Densic contact - very firm, dense basal till at a depth of 58 cm.
4. Aeric Feature - both value and chroma of 3 or more in the zone from 41 to 58 (BC horizon).
5. Aquic conditions - redox depletions throughout the subsoil. (Eg, Bg and BC horizons).

The Aurelie series is included in the competing soils section with a previous revision.

Previous remarks June, 2004 revision:
The type location is changed with this revision based on consensus that placement in the shallow family is reflective of the dominant characteristics of the series. It is acknowledged that historically the series exceeded 50 cm to densic contact in some places. The series is re-classified from Epiaquepts to Endoaquepts in accordance with Soil Taxonomy which, in reference to applying keys, stipulates that diagnostic horizons and properties below a densic contact are excluded. It is assumed the depth to bedrock from the mineral surface of this pedon exceeds 152 cm. This soil was previously type located in New York and classified as Coarse-loamy, mixed, nonacid, frigid Aeric Fragiaquepts. The classification was changed as a result of the Northeast Fragipan Study. This series also included somewhat poorly drained soils but has since been restricted to poorly drained.

ADDITIONAL DATA: Source of the data used in establishing taxonomic class and range in characteristics is Maine Agricultural Experiment Station Technical Bulletin 94, September 1979.
Soil Interpretation Record Numbers for the Brayton Series are: Brayton, ME0100; Brayton, stony, ME0101; Brayton bouldery, ME0123; Brayton, variant ME0090.

National Cooperative Soil Survey
U.S.A.

LOCATION BURNHAM ME+NH NY

Established Series
Rev. LRF-KJL-WDH-NRB
06/2016

BURNHAM SERIES

The Burnham series consists of very deep, very poorly drained soils in depressions on glaciated uplands. These soils formed in dense glacial till. Slope ranges from 0 to 3 percent. Mean annual temperature is about 5 degrees C, and mean annual precipitation is about 1118 mm at the type location.

TAXONOMIC CLASS: Loamy, mixed, superactive, nonacid, frigid, shallow Histic Humaquepts

TYPICAL PEDON: Burnham muck, in a nearly level, very stony, forested area. (Colors are for moist soil.)

Oa1--0 to 10 cm; black (10YR 2/1) muck (sapric material); moderate very fine and fine granular structure; very friable; many very fine and fine, and few medium and coarse roots; slightly acid; clear wavy boundary.

Oa2--10 to 33 cm; dark reddish brown (5YR 2/2) muck (sapric material); weak fine and medium granular structure; friable; common very fine, and few fine and medium roots; slightly acid; abrupt wavy boundary. (Combined thickness of the O horizon is 20 to 41 cm.)

Bg--33 to 46 cm; gray (N 5/0) channery silt loam; weak thick platy structure; firm; few very fine and fine roots; many coarse prominent olive (5Y 5/3) masses of iron accumulation; 10 percent channers, 5 percent cobbles; neutral; abrupt wavy boundary. (10 to 41 cm thick).

Cdg1--46 to 86 cm; olive gray (5Y 4/2) channery silt loam; weak thick platy structure; firm; many coarse faint dark gray (N 4/0) iron depletions and many medium prominent light olive brown (2.5Y 5/4) masses of iron accumulation; 15 percent channers; neutral; gradual wavy boundary. (41 to 124 cm thick).

Cdg2--86 to 165 cm; dark grayish brown (2.5Y 4/2) channery silt loam; weak medium platy structure; firm; many medium faint gray (5Y 5/1) iron depletions and many medium distinct yellowish brown (10YR 5/4) masses of iron accumulation; 20 percent channers; neutral.

TYPE LOCATION: Piscataquis County, Maine; Town of Sangerville; 0.8 mile east of South Sangerville Road on West Road and 50 feet on north side of road; USGS Sangerville topographic quadrangle; lat. 45 degrees 40 minutes 30 seconds N. and long. 69 degrees 55 minutes 35 seconds W., NAD 27.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 33 to 50 cm. Depth to bedrock is more than 152 cm. The weighted average of clay in the particle-size control section is 10 to 18 percent. Rock fragment content ranges from 5 to 35 percent throughout. Rock fragments are mainly channers and gravel with some cobbles and stones. Stones and boulders cover from 0 to 15 percent of the surface. Texture of the fine-earth fraction is silt loam or loam throughout the mineral soil. Reaction ranges from strongly acid to slightly alkaline throughout the soil except for the O and A horizons, where present, which range from extremely acid to slightly acid.

The O horizon has hue of 5YR to 10YR, value of 2 or 3 and chroma of 1 or 2. It is muck or mucky peat. It has weak or moderate very fine to medium granular structure or it is massive.

The A horizon, where present, has hue of 10YR or 2.5Y, value of 3 or 4 and chroma of 2. It has granular structure or it is massive. Consistence is very friable or friable.

The Eg horizon, where present, is neutral or has hue of 10YR to 5Y, value of 3 to 6, and chroma of 0 to 2. It is massive or has platy, granular or prismatic structure. Moist consistence is friable or firm.

The Bg horizon is neutral or has hue of 5Y, value of 4 or 5, and chroma of 0 to 2. It has platy, granular, subangular blocky or prismatic structure. Moist consistence is friable or firm.

The Cdg horizon is neutral or has hue of 2.5Y to 5GY, value of 4 or 5, and chroma of 0 to 3. It has prismatic or platy structure, or it is massive. Moist consistence is firm or very firm.

COMPETING SERIES: This is the Peacham series. Peacham soils have less than 10 percent clay in the particle-size control section.

GEOGRAPHIC SETTING: Burnham soils are on glaciated uplands. Slope ranges from 0 to 3 percent. The soils formed in dense glacial till derived mainly from slate and other dark colored sedimentary and metamorphic rocks. The climate is humid and cool temperate. The mean annual temperature ranges from 3 to 7 degrees C, and mean annual precipitation ranges from 864 to 1168 mm. The frost-free season ranges from 80 to 130 days. Elevation ranges from 37 to 671 meters above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Bangor, Chesuncook, Dixmont, Elliottsville, Howland, Monarda, Monson, Penquis, Plaisted, Telos, Thorndike, Winnecook and Wonsqueak soils. The Bangor, Chesuncook, Dixmont, Howland, Plaisted and Telos soils are better drained soils at higher elevations in the landscape. Elliottsville, Monson, Penquis, Thorndike and Winnecook soils are better drained, shallower to bedrock soils at higher elevations in the landscape. Monarda soils are in a similar position as the Burnham soils, but are better drained and do not have a histic epipedon. Wonsqueak soils are in depressions and large concave areas and have thicker accumulations of organic matter.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Very poorly drained. Saturated hydraulic conductivity is moderately high to high in the organic surface, moderately high in the solum, and moderately low or low in the substratum.

USE AND VEGETATION: Forest. Common tree species include balsam fir, eastern white pine, eastern hemlock, northern white cedar, black spruce, red spruce, black ash, tamarack, and red maple. Forest ground cover is mainly sphagnum moss, cinnamon fern, interrupted fern and sensitive fern.

DISTRIBUTION AND EXTENT: Maine. (MLRAs 143, 144B and 146) The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Waldo County, Maine, 1940.

REMARKS: Diagnostic horizons and features recognized in this pedon include:

1. Histic epipedon - the zone from 0 to 33 cm (Oa horizons).
2. Frigid temperature regime.
3. Aquic conditions - redox features at the mineral soil surface and throughout the profile.

ADDITIONAL DATA: Source of data used in establishing the taxonomic classification and range of characteristics is Maine Agricultural Experiment Station, Technical Bulletin 137, 1990.

Soil Interpretation Record Numbers for the Burnham series are: Burnham, ME0038; and Burnham, stony,

ME0057.

National Cooperative Soil Survey
U.S.A.

LOCATION CHESUNCOOK ME+VT

Established Series
Rev. KJL-LRF-WDH
09/2014

CHESUNCOOK SERIES

The Chesuncook series consists of very deep, moderately well drained soils on till plains, hills, ridges, and mountains. These soils formed in dense glacial till. Saturated hydraulic conductivity is moderately high or high in the solum, and low to moderately high in the dense substratum. Slope ranges from 3 to 45 percent. Mean annual temperature is about 4 degrees C, and mean annual precipitation is about 1092 mm at the type location.

TAXONOMIC CLASS: Coarse-loamy, isotic, frigid Aquic Haplorthods

TYPICAL PEDON: Chesuncook silt loam, on a 9 percent northeast-facing slope in a very stony forested area. (Colors are for moist soil.)

Oa--0 to 3 centimeters; black (5YR 2/1) highly decomposed plant material; weak fine granular structure; many very fine and few medium and coarse roots; extremely acid; abrupt wavy boundary. (0 to 10 centimeters thick.)

E--3 to 10 centimeters; pinkish gray (7.5YR 6/2) silt loam; weak very fine granular structure; very friable; many very fine and few fine, medium and coarse roots; 10 percent gravel and channers, 2 percent cobbles and 1 percent stones; extremely acid; abrupt broken boundary. (0 to 10 centimeters thick.)

Bhs--10 to 13 centimeters; dark reddish brown (5YR 3/3) silt loam; moderate very fine granular structure; very friable; many very fine and fine, and few medium and coarse roots; 10 percent gravel and channers, 3 percent cobbles and 1 percent stones; very strongly acid; abrupt broken boundary. (0 to 10 centimeters thick.)

Bs1--13 to 27 centimeters; reddish brown (5YR 4/4) silt loam; moderate very fine granular structure; very friable; many very fine and fine, and few medium and coarse roots; 10 percent gravel and channers, 3 percent cobbles and 1 percent stones; very strongly acid; clear wavy boundary.

Bs2--27 to 45 centimeters; dark yellowish brown (10YR 4/4) gravelly silt loam; weak fine granular structure; very friable; common very fine and fine, and few medium roots; 15 percent gravel and channers, 3 percent cobbles and 1 percent stones; strongly acid; clear wavy boundary. (Combined thickness of the Bs horizon is 10 to 45 centimeters.)

BC--45 to 53 centimeters; light olive brown (2.5Y 5/4) gravelly loam; weak medium platy structure; friable; few very fine and fine roots; common medium distinct dark yellowish brown (10YR 4/6) masses of iron accumulation and few medium distinct grayish brown (2.5Y 5/2) iron depletions; 20 percent gravel and channers, 3 percent cobbles and 1 percent stones; strongly acid; clear wavy boundary. (0 to 20 centimeters thick.)

Cd--53 to 165 centimeters; light olive brown (2.5Y 5/3) gravelly loam; strong very coarse prisms parting to weak very thick plates; very firm; light brownish gray (2.5Y 6/2) faces of prisms which are separated by a thin layer of strong brown (7.5YR 5/6); common medium prominent strong brown (7.5YR 4/6) masses of iron accumulation and common coarse faint light olive gray (5Y 6/2) iron depletions; 25 percent gravel and channers, 3 percent cobbles and 1 percent stones; moderately acid.

TYPE LOCATION: Piscataquis County, Maine; Township of Shirley; 2.1 miles northwest of West Shirley Bog outlet; USGS Bald Mtn Pond, ME topographic quadrangle; Latitude 45 degrees, 22 minutes, 27 seconds N. and Longitude 69 degrees, 43 minutes, 16 seconds W., NAD 1927.

RANGE IN CHARACTERISTICS: Thickness of the mineral solum ranges from 50 to 70 centimeters. Depth to bedrock is more than 165 centimeters. The weighted average of clay in the particle-size control section is 10 to 18 percent. Rock fragment content ranges from 5 to 25 percent in the A, E and B horizons, from 10 to 35 percent in the BC horizon, and from 10 to 35 percent in the Cd layer. Rock fragments are mainly gravel, with stones and cobbles ranging from 0 to 20 percent throughout the mineral soil. Stones and boulders cover from 0 to 15 percent of the surface. Reaction ranges from extremely acid to moderately acid in the solum and from very strongly acid to neutral in the substratum. Redoximorphic features are deeper than 41 centimeters from the mineral soil surface.

The Oa horizon has hue of 10YR to 5YR, value of 2 to 3, and chroma of 1 or 2. Some pedons have Oi and/or Oe horizons.

Some pedons have an Ap or A horizon with hue of 10YR, and value and chroma of 3 or 4. Texture of the fine-earth fraction is silt loam, loam, very fine sandy loam, or fine sandy loam. Consistence is very friable or friable.

The E horizon has hue of 5YR to 10YR, value of 6 or 7, and chroma of 1 or 2. Texture of the fine-earth fraction is silt loam, loam, very fine sandy loam, or fine sandy loam. Consistence is very friable or friable.

The Bh horizon, where present, has hue of 2.5YR to 7.5YR, value of 2 to 3, and chroma of 1 to 3. The Bhs horizon has hue of 2.5YR or 5YR, with value and chroma of 2 to 3. The Bs horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 4 to 8. Texture in the fine-earth fraction of the B horizons is silt loam, loam, very fine sandy loam, or fine sandy loam. Consistence is very friable or friable.

The BC horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 2 to 4. Texture in the fine-earth fraction is silt loam, loam, very fine sandy loam, or fine sandy loam. Consistence is friable or firm.

The E' horizon, where present, has hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 2. Texture in the fine-earth fraction is silt loam, loam, very fine sandy loam, or fine sandy loam. Consistence is friable or firm.

The Cd layer has hue of 2.5Y or 5Y, value of 3 to 5, and chroma of 2 to 6. It is massive or has platy or prismatic geogenic structural units.Texture in the fine earth fraction is silt loam or loam. Any soil structural units in the Cd horizon are considered to be geogenic. Consistence is firm or very firm.

COMPETING SERIES: These are the Crary, Dixfield, Dixmont, Howland, Peru, Skerry, Sunapee, and Worden series. Crary soils have a thin aeolian or water deposited mantle. Dixfield, Howland, Peru, and Skerry soils have less than 10 percent clay in the particle-size control section. Dixmont and Sunapee soils lack densic contact. Worden soils have less than 10 percent clay in the particle-size control section and have a Bh horizon more than 4 inches thick.

GEOGRAPHIC SETTING: Chesuncook soils are on upland till plains, hills, ridges and mountains. Slope ranges from 3 to 45 percent. The soils formed in dense glacial till derived mainly from slates and other dark colored sedimentary and metamorphic rocks. The climate is humid and cool temperate. The mean annual temperature ranges from 3 to 7 degrees C, and mean annual precipitation ranges from 864 to 1168 mm. The frost-free season ranges from 80 to 130 days. Elevation ranges from 91 to 762 m above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Burnham, Elliottsville, Monarda, Monson, and Telos soils. Burnham, Monarda and Telos are wetter soils that formed in similar material but are in lower positions on the landscape or are less sloping. Elliottsville soils are moderately deep to bedrock and are in higher positions on the landscape. Monson soils are shallow to bedrock and are on higher knolls on the landscape.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained. Saturated hydraulic conductivity is moderately high or high in the solum, and low to moderately high in the dense substratum.

USE AND VEGETATION: Mostly forest. Common tree species include red maple, sugar maple, American beech, paper birch, yellow birch, red and white spruce, and balsam fir.

DISTRIBUTION AND EXTENT: Maine and Vermont. MLRA's 143, 144B, and 146. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Franklin County Area and Part of Somerset County soil survey, 1992.

REMARKS: Mineral solum thickness was narrowed with revision, 10/08, to ensure single family placement. The competing series section was revised accordingly. It is recognized that in historic correlation, some pedons now have a shallow depth class. This could done through MLRA update.

Diagnostic horizons and features recognized in this pedon include:
1. Ochric epipedon - 0 to 3 centimeters (Oa horizon).
2. Albic horizon - the zone from 3 to 10 centimeters (E horizon).
3. Spodic horizon - the zone from 10 to 27 centimeters (Bhs and Bs1 horizons).
4. Cambic horizon - the zone from 27 to 53 centimeters (Bs and BC horizons).
5. Densic contact - very firm, dense till at a depth of 21 inches.
6. Aquic Conditions - redoximorphic features at 42 centimeters below the mineral soil surface.

ADDITIONAL DATA: Source of data used in establishing taxonomic class and range in characteristics is Maine Agricultural and Forest Experiment Station, Technical Bulletin 155, 1994; NRCS Characterization Data; and composite data from the Field Appraisal of Resource Management Systems compiled by Dr. Paul R. Hepler, Department of Plant and Soil Sciences, University of Maine, Orono, Maine.

National Cooperative Soil Survey
U.S.A.

LOCATION COLONEL ME+VT

Established Series
Rev. NRK-ANA-RFL
06/2016

COLONEL SERIES

The Colonel series consists of somewhat poorly drained soils that formed in loamy lodgment till on hills and mountains in glaciated uplands. They are shallow to a dense substratum and very deep to bedrock. Estimated saturated hydraulic conductivity is moderately high or high in the solum, and low to moderately high in the dense substratum. Slope ranges from 0 to 35 percent. Mean annual precipitation is about 1180 mm, and mean annual temperature is about 6 degrees C.

TAXONOMIC CLASS: Loamy, isotic, frigid, shallow Aquic Haplorthods

TYPICAL PEDON: Colonel fine sandy loam, on a northwest facing 5 percent slope, in a very stony wooded area. (Colors are for moist soil.)

Oa--0 to 3 cm; dark reddish brown (5YR 2.5/2) highly decomposed plant material; weak fine granular structure; very friable; many very fine and fine, and common medium roots; 5 percent gravel and 5 percent cobbles; very strongly acid; abrupt smooth boundary. (O horizon thickness is 0 to 10 cm.)

E--3 to 5 cm; grayish brown (10YR 5/2) fine sandy loam; weak fine granular structure; friable; many very fine and fine, and common medium roots; 5 percent gravel and 5 percent cobbles; very strongly acid; abrupt broken boundary. (0 to 13 cm thick.)

Bhs--5 to 8 cm; dark reddish brown (5YR 3/2) fine sandy loam; weak fine granular structure; friable; many very fine and fine, common medium, and few coarse roots; 5 percent gravel and 5 percent cobbles; strongly acid; abrupt wavy boundary. (0 to 36 cm thick.)

Bs1--8 to 23 cm; brown (7.5YR 4/4) fine sandy loam; weak fine granular structure; friable; many very fine and fine, common medium, and few coarse roots; 5 percent gravel and 5 percent cobbles; strongly acid; abrupt wavy boundary.

Bs2--23 to 30 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak thin platy structure parting to weak fine granular; friable; common very fine and fine roots; common fine prominent olive gray (5Y 5/2) iron depletions and common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation; 5 percent gravel and 5 percent cobbles; strongly acid; clear wavy boundary. (Combined thickness of the Bs horizon is 0 to 38 cm.)

BC--30 to 45 cm; light olive brown (2.5Y 5/4) gravelly fine sandy loam; moderate medium platy structure; friable; few very fine and fine roots; common medium distinct olive gray (5Y 5/2) iron depletions and common medium faint brown (10YR 4/3) masses of iron accumulation; 10 percent gravel and 5 percent cobbles; strongly acid; abrupt wavy boundary. (0 to 41 cm thick.)

Cd--45 to 165 cm; olive (5Y 4/3) gravelly fine sandy loam; strong very coarse prisms parting to strong medium and thick plates; very firm; common fine prominent dark reddish brown (5YR 2/2) oxide coatings on and within prisms and plates; common coarse faint olive gray (5Y 5/2) iron depletions and common fine faint brown (10YR 4/3) masses of iron accumulation; 10 percent gravel and 5 percent cobbles; strongly acid.

TYPE LOCATION: Oxford County, Maine; Town of Dixfield; located about 3.0 km southwest of the confluence of Tucker Valley Brook and Seven Mile Stream, and 450 meters west of the Franklin County line; USGS East Dixfield, ME topographic quadrangle; latitude 44 degrees, 32 minutes, 30.2 seconds N. and longitude 70 degrees, 18 minutes, 36.2 seconds W., NAD 83.

RANGE IN CHARACTERISTICS: The thickness of the mineral solum and depth to densic materials from the mineral surface range from 25 to 50 cm. Depth to bedrock is greater than 165 cm. Texture is typically fine sandy loam in the fine-earth fraction, but includes sandy loam, very fine sandy loam, and loam. Some pedons have an E horizon that is commonly silt loam. The clay content in the particle-size control section averages less than 10 percent. Rock fragments are mostly gravel, channers, and cobbles with a few stones, and range from 5 to 30 percent throughout the mineral solum and 5 to 35 percent in the substratum. Stones and boulders cover from 0 to 15 percent of the surface. Reaction ranges from extremely acid to slightly acid in the solum and from very strongly acid to neutral in the substratum. Iron depletions in the solum are between depths of 18 to 41 cm from the mineral soil surface.

The O horizons, where present, consist of slightly, intermediately, and/or highly decomposed plant material. The Oa horizon is neutral or has hue of 2.5YR to 10YR, value of 2 to 3, and chroma of 0 to 3.

Some pedons have an A or Ap horizon that is neutral or has hue of 7.5YR or 10YR, and value and chroma of 2 or 3. A horizons are 0 to 10 cm thick.

The E horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 1 or 2.

The Bhs horizon has hue of 2.5YR to 10YR, and value and chroma of 3 or less.

The Bs horizon has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 3 to 8.

The BC horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 6.

Some pedons have an E' horizon that has hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 2 or 3.

The Cd layer has hue of 2.5Y or 5Y, value of 3 to 5, and chroma of 2 to 4. Aggregation of material into structural units in the Cd horizon is interpreted as geogenic and is inherited from the parent material. Consistence is firm or very firm.

COMPETING SERIES: The Telos series is in the same family. Telos soils have an average clay content of 10 to 18 percent in the particle-size control section.

The Daigle series is in a related family. Daigle soils have an average clay content of 18 to 27 percent in the particle-size control section, and have mixed mineralogy.

GEOGRAPHIC SETTING: Colonel soils are on nearly level to moderately steep slopes in glaciated uplands. They are typically on slightly convex to concave parts of backslopes, footslopes, and toeslopes, but they also occur on till plains. The soils formed in loamy lodgment till derived mainly from schist, gneiss, phyllite, and granite. Slope ranges from 0 to 35 percent. The mean annual precipitation is 790 to 1640 mm, and the mean annual temperature is 2 to 7 degrees C. The frost-free period ranges from 90 to 160 days. Elevation ranges from about 2 to 800 meters above sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Becket, Berkshire, Brayton, Hermon, Lyman, Marlow, Monadnock, Peru, Pillsbury, Skerry, and Tunbridge series. Berkshire, Becket, Hermon, Marlow, Monadnock, Peru, and Skerry soils are better drained and occur in higher positions on the landscape. Brayton and Pillsbury soils are wetter and are in lower positions on the landscape. Lyman and Tunbridge soils are better drained, shallow and moderately deep to bedrock respectively, and occur in higher positions on the landscape.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Somewhat poorly drained. Estimated saturated hydraulic conductivity is moderately high or high in the solum, and low to moderately high in the dense substratum.

USE AND VEGETATION: Most areas are wooded. The common trees are red maple, sugar maple, eastern white pine, paper birch, yellow birch, red spruce, and balsam fir. Areas cleared of stones are used mainly for hay and pasture and some cultivated crops.

DISTRIBUTION AND EXTENT: Maine and Vermont. MLRAs 143 and 144B. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Oxford County, Maine, 1987.

REMARKS: 1. The Colonel series will replace some soils that are somewhat poorly drained and were included in mapping with the Peru series.

2. Diagnostic horizons and features recognized in this pedon are:

a. Ochric epipedon - the zone from 0 to 5 cm (Oa and E horizons).
b. Albic horizon - the zone from 3 to 5 cm (E horizon).
c. Spodic horizon - the zone from 5 to 23 cm (Bhs and Bs1 horizons).
d. Aquic subgroup feature - redoximorphic features within 75 cm of the mineral soil surface (Bs2 and BC horizons and Cd layer).
e. Densic materials - the zone from 45 to 165 cm (Cd layer).

ADDITIONAL DATA: Characterization data for Colonel and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

National Cooperative Soil Survey
U.S.A.

LOCATION HOGBACK VT+NY

Established Series
Rev. SHG-RFL-CAW
05/2013

HOGBACK SERIES

The Hogback series consists of shallow, well drained soils on glaciated uplands. They formed in loamy till. Estimated saturated hydraulic conductivity is moderately high to high throughout the mineral soil. Slope ranges from 3 to 70 percent. Mean annual precipitation is about 50 inches, and mean annual temperature is about 43 degrees F.

TAXONOMIC CLASS: Loamy, isotic, frigid Lithic Haplohumods

TYPICAL PEDON: Hogback gravelly fine sandy loam, on a 40 percent northeast facing slope in a very rocky wooded area. (Colors are for moist soil.)

Oi -- 0 to 1 inches; slightly decomposed plant material.

Oe -- 1 to 3 inches; very dark gray (5YR 3/1) moderately decomposed plant material; massive; very friable; many very fine, fine, medium and coarse roots; 5 percent rock fragments; extremely acid; abrupt smooth boundary.

Oa -- 3 to 4 inches; black (5YR 2.5/1) highly decomposed plant material; weak fine granular structure; very friable; many very fine, fine, medium and coarse roots; 5 percent rock fragments; extremely acid; abrupt smooth boundary. (Combined thickness of the O horizon is 0 to 6 inches)

E -- 4 to 8 inches; gray (5YR 5/1) gravelly fine sandy loam; weak very fine granular structure; very friable; common fine and medium roots; 15 percent rock fragments; extremely acid; abrupt wavy boundary. (0 to 8 inches thick)

Bhs1 -- 8 to 9 inches; dark reddish brown (5YR 2.5/2) very fine sandy loam; weak very fine subangular blocky structure; very friable; many fine and common medium roots; 10 percent rock fragments; moderately smeary; extremely acid; abrupt wavy boundary.

Bhs2 -- 9 to 19 inches; dark brown (7.5YR 3/2) very fine sandy loam; weak very fine subangular blocky structure; very friable; many fine, medium and coarse roots; 10 percent rock fragments; moderately smeary; very strongly acid; abrupt wavy boundary. (Combined thickness of the Bhs horizons is 4 to 18 inches.)

R -- 19 inches; schist bedrock.

TYPE LOCATION: Orleans County, Vermont; Town of Jay; 735 feet south of State Route 105 on Long Trail, 20 feet east of trail; Jay Peak topographic quadrangle; 44 degrees 59 minutes 13 seconds N. and 72 degrees 30 minutes 10 seconds W., NAD 27.

RANGE IN CHARACTERISTICS: The thickness of the solum and depth to bedrock range from 10 to 20 inches. Reaction typically ranges from extremely acid to strongly acid throughout the soil, but some pedons are moderately acid just above the bedrock. Rock fragments are mostly gravel, channers or cobbles and range from 5 to 34 percent throughout the mineral soil. The spodic horizon is 4 to 18 inches thick.

The O horizon has hue of 2.5YR to 7.5YR or it is neutral, value of 2, 2.5, or 3, and chroma of 1. It ranges from slightly decomposed to highly decomposed plant material.

The A horizon, where present, has hue of 5YR to 10YR, value of 2, 2.5, or 3, and chroma of 1 or 2. It is fine sandy loam, very fine sandy loam or loam in the fine-earth fraction. It is 0 to 7 inches thick.

The E horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 1 or 2. It is loamy coarse sand, loamy sand, loamy fine sand, sandy loam, fine sandy loam, very fine sandy loam or loam in the fine-earth fraction.

The Bhs horizon has hue of 2.5YR to 7.5YR, with value and chroma of 3 or less. Some pedons have Bh horizons that have hue of 2.5YR to 10YR or are neutral and have value and chroma of 2.5 or less. Some pedons have a Bs horizon with hue of 5YR to 10YR, with value of 3 to 5 and chroma of 4 to 6. The B horizon is coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam or loam in the fine-earth fraction. B horizons range from non-smeary to moderately smeary.

Some pedons have a BC horizon that has hue of 2.5Y, value of 4 or 5 and chroma of 4.

Bedrock is slightly weathered schist, gneiss, phyllite, granite, or anorthosite.

COMPETING SERIES: There are currently no other series in this family.

The Creasey(T), Lyman and Rawsonville soils are in related families. Creasey and Lyman soils are Orthods. Rawsonville soils are moderately deep.

GEOGRAPHIC SETTING: Hogback soils are on glaciated uplands. They are on summits, shoulders and backslopes of mountains, ridges and hills. Slope ranges from 3 to 70 percent. The soils formed in loamy till of Wisconsin age. Mean annual precipitation ranges from 34 to 60 inches, and the mean annual temperature ranges from 38 to 45 degrees F. The frost-free season ranges from about 60 to 120 days. Elevation is typically between 1,500 and 3000 feet, but in places ranges as low as 380 feet above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the very deep Houghtonville and the moderately deep Rawsonville soils which are in similar positions on the landscape as Hogback soils.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained. Potential surface runoff is very high. Estimated saturated hydraulic conductivity is moderately high to high throughout the mineral soil.

USE AND VEGETATION: Most areas are wooded. The common trees are American beech, yellow birch, paper birch, sugar maple, red maple, balsam fir, white pine, red spruce, and white spruce. A few areas have been cleared and are used for hay or pasture.

DISTRIBUTION AND EXTENT: MLRA 143 and 144B in Vermont, Maine, New Hampshire, and New York. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Windham County, Vermont, 1984.

REMARKS: 1. The Classification and location of the typical pedon are changed with this revision. The former classification was Loamy, isotic, frigid Lithic Haplorthods. Recent laboratory data from Maine, New Hampshire, Vermont and New York shows that some pedons mapped as Hogback (and some mapped as Lyman) meet the requirements of the Humods suborder.

2. These soils were originally recognized as having some "thixotropic-like" properties, i.e., smeariness, high

organic carbon content, high effective clay percentage, high K value, and fragile nature (easily damaged by use) but have been classified as Orthods based on available laboratory data.

3. The diagnostic horizons and features recognized in this pedon are:
a. Ochric epipedon - the zone from 0 to 8 inches (O and E horizons).
b. Spodic horizon - the zone from 8 to 19 inches (Bhs horizon).
c. Lithic feature - bedrock at 15 inches from the mineral soil surface.

ADDITIONAL DATA: The spodic horizon of this pedon was sampled to determine carbon content for taxonomic placement. The data is available from the National

Soil Survey Laboratory, sample number S99VT-019-013.

National Cooperative Soil Survey
U.S.A.

LOCATION MONARDA ME+NH NY

Established Series
Rev. KJL-LRF-NB
09/2014

MONARDA SERIES

The Monarda series consists of poorly drained soils formed in dense till on lower slopes or in slight depressions on till plains. They are very deep to bedrock and shallow to dense till. Estimated saturated hydraulic conductivity is moderately high to high in the subsurface and upper part of the subsoil and low to moderately high in the lower part of the subsoil and in the substratum. Slope ranges from 0 to 15 percent. Mean annual temperature is about 4 degrees C and mean annual precipitation is about 940 mm at the type location.

TAXONOMIC CLASS: Loamy, mixed, active, acid, frigid, shallow Aeric Endoaquepts

TYPICAL PEDON: Monarda silt loam on a 2 percent north-facing slope in a very stony forested area. (Colors are for moist soil.)

Oe--0 to 8 cm; black (5YR 2/1) mucky peat (hemic material); weak medium granular structure; very friable; many very fine, fine, medium and coarse roots; extremely acid; abrupt wavy boundary. (0 to 15 cm thick)

Eg--8 to 15 cm; light gray (10YR 7/2) silt loam; weak thin platy structure; friable; many fine, medium and coarse roots; 5 percent gravel; extremely acid; clear wavy boundary. (0 to 25 cm thick)

Bg1--15 to 28 cm; light brownish gray (2.5Y 6/2) silt loam; weak thin platy structure; friable; common fine and medium roots; many medium faint pale olive (5Y 6/3) masses of iron accumulation; 10 percent gravel; very strongly acid; clear wavy boundary.

Bg2--28 to 41 cm; light olive gray (5Y 6/2) silt loam; weak thin platy structure; firm, few fine and medium roots; many medium distinct light olive brown (2.5Y 5/4) masses of iron accumulation; 10 percent gravel; strongly acid; clear wavy boundary. (The combined thickness of the Bg horizon is 5 to 41 cm)

BC--41 to 51 cm; olive (5Y 5/4) silt loam; massive; firm; few fine roots; many medium faint light olive brown (2.5Y 5/4) masses of iron accumulation and common fine distinct gray (5Y 6/1) iron depletions; 10 percent gravel; moderately acid; abrupt smooth boundary. (0 to 38 cm thick)

Cd--51 to 165 cm; olive (5Y 4/3) gravelly silt loam; strong very coarse prisms; firm, olive gray (5Y 5/2) faces of prisms which are separated from interiors of prisms by a thin layer of brown (7.5YR 4/4); common fine distinct gray (5Y 6/1) iron depletions and common medium faint light olive brown (2.5Y 5/4) masses of iron accumulation; 15 percent gravel; slightly acid.

TYPE LOCATION: Somerset County, Maine, Brassua Township (T2R2); 7.5 miles north on the Demo Road from Maine Routes 6 and 15 to a gravel pit on the east side of the road, through the pit and 2.5 miles east-southeast on a logging road, the site is 200 feet west of the road; USGS Brassua Lake West topographic quadrangle; lat. 45 degrees 40 minutes 30 seconds N. and long. 69 degrees 55 minutes 35 seconds W., NAD27.

RANGE IN CHARACTERISTICS: Thickness of the mineral solum ranges from 30 to 50 cm. Depth to bedrock is more than 152 cm. The weighted average of clay in the particle-size control section is 10 to 18 percent. Rock fragment content ranges from 5 to 70 percent in the Eg and A horizons, where present, and are

mainly pebble and cobble size. Throughout the remainder of the mineral soil profile, rock fragments are mainly pebble size, the weighted average ranging from 5 to 35 percent. Some pedons have channers. Stones and boulders cover 0 to 35 percent of the surface.

The Oe horizon, and Oa horizon, where present, have hue of 2.5YR to 10YR, value of 2 to 3, and chroma of 1 or 2. They have weak or moderate, very fine to medium granular structure. Consistence is very friable or friable.

The A and Ap horizons, where present, have hues of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 to 3. They are silt loam, loam, very fine sandy loam, or fine sandy loam in the fine-earth fraction. They have weak to strong, fine or medium granular structure and are very friable or friable. Reaction is extremely acid to moderately acid unless limed.

The Eg horizon, where present, has hue of 7.5YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It is silt loam, loam, very fine sandy loam, or fine sandy loam in the fine-earth fraction. It has weak thin or medium platy, weak fine subangular blocky, weak very fine or fine granular or weak very coarse prismatic structure or the horizon is massive. Consistence is very friable to firm. Reaction is extremely acid to moderately acid.

The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4. It is silt loam, loam or very fine sandy loam in the fine-earth fraction. It has weak or moderate, thin to very thick platy structure or very fine to medium subangular blocky, or weak very fine to medium granular or weak coarse prismatic parting to moderate medium platy. Consistence is friable or firm, nonsticky or slightly sticky and nonplastic or slightly plastic. Reaction is extremely acid to moderately acid.

The BC horizon has hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 2 to 4. It is silt loam, loam, or very fine sandy loam in the fine-earth fraction. It has weak or moderate, medium to very thick platy structure, or weak or moderate subangular blocky, or weak to strong, coarse or very coarse prismatic parting to weak or moderate, medium to very thick platy or it is massive. Consistence is firm or very firm, nonsticky or slightly sticky and nonplastic or slightly plastic. Some pedons have an E' horizon that has characteristics similar to those of the BC horizon. Reaction is very strongly acid to moderately acid.

The Cd layer has hue of 2.5Y, 5Y, or 5GY, value of 4 to 6, and chroma of 1 to 4. It is silt loam, loam or very fine sandy loam in the fine-earth fraction. It has weak or moderate, thin to very thick plates or weak to strong, coarse or very coarse prisms that may part to plates, all of which is interpreted as inherited from the parent material, or the horizon is massive. Consistence is firm or very firm, slightly sticky and slightly plastic or plastic. Reaction is strongly acid to neutral.

COMPETING SERIES: There are currently no other series in the same family Pillsbury soils are in a related family. They have less than 10 percent clay in the particle-size control section.

GEOGRAPHIC SETTING: Monarda soils are on lower slopes or in slight depressions on till plains. Slopes range from 0 to 15 percent. The soils formed in dense glacial till derived mainly from slate, metasandstone, phyllite and shale with small amounts of granite, fine grained quartzite and sandstone. The climate is humid and cool temperate. The mean annual temperature ranges from 3 to 7 degrees C, and mean annual precipitation ranges from 864 to 1168 mm. The frost-free season ranges from 80 to 130 days. Elevation ranges from 36 to 762 m above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Bangor, Burnham, Chesuncook, Dixmont, Elliottsville, Howland, Monson, Penquis, Plaisted, Telos, Thorndike and Winnecook soils. The Bangor, Chesuncook, Dixmont, Howland, Plaisted, and Telos soils are better drained and are in higher positions on the landscape. Burnham soils are wetter soils in depressions. Elliottsville, Monson, Penquis, Thorndike and Winnecook soils are better drained, shallower to bedrock and are in higher positions on the landscapes.

DRAINAGE AND PERMEABILITY: Poorly drained. Estimated saturated hydraulic conductivity is moderately high to high in the subsurface and upper part of the subsoil and low to moderately high in the lower

part of the subsoil and in the substratum.Permeability is moderate to moderately rapid in the subsurface, moderate to moderately slow in the upper part of the subsoil and slow or very slow in the lower part of the subsoil and in the substratum.

USE AND VEGETATION: Mostly forest. Common tree species include red spruce, balsam fir, black spruce, northern white cedar, red maple, eastern white pine, eastern hemlock, and paper birch. A few areas are in hay or pastures.

DISTRIBUTION AND EXTENT: Maine, New Hampshire, and New York. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Penobscot County, Maine, 1947.

REMARKS: Mineral solum thickness range narrowed to insure single family placement (rev. 2/2007). It is recognized that historically the series concept included deeper members. Family changed from coarse-loamy to loamy and great group from Epiaquepts to Endoaquepts with revision, 1/2005. The Monarda soils are borderline between acid and nonacid with the majority of pedons tested being acid. The current classification reflects this.

Note the series Typical Pedon needs evaluation as it is not shallow. See historical notes.

Diagnostic horizons and features recognized in this pedon include:

1. Ochric epipedon - the zone from 0 to 15 cm (Oe and Eg horizons).
2. Cambic horizon - the zone from 15 to 51 cm (Bg1, Bg2 and BC horizons).
3. Aquic conditions - redoximorphic features 8 cm below the mineral surface.
4 Endosaturation - classification defaults to Endoaquepts as the densic contact is not applicable to diagnostic horizons and properties.
5 Aeric feature - chroma of 4 in the BC horizon
6 Densic contact - Cd layer at a depth of 51 cm.

ADDITIONAL DATA: Source of data used in establishing taxonomic class and range in characteristics are Technical Bulletin 94, Maine Agricultural Experiment Station, unpublished data, Maine Agricultural Experiment Station and NRCS Characterization Data.

Soil Interpretation Record numbers for the Monarda series are: Monarda, ME0011; Monarda, rubbly, ME0136; and Monarda, stony, ME0012.

National Cooperative Soil Survey
U.S.A.

LOCATION MONSON ME

Established Series
Rev. LRF-THB-WDH
04/2016

MONSON SERIES

The Monson series consists of shallow, somewhat excessively drained soils formed in glacial till on knolls of till plains, and on hills, ridges and mountains. Estimated saturated hydraulic conductivity is moderate or high. Slope ranges from 3 to 60 percent. Mean annual temperature is about 3 degrees C, and mean annual precipitation is about 965 mm at the type location.

TAXONOMIC CLASS: Loamy, isotic, frigid Lithic Haplorthods

TYPICAL PEDON: Monson silt loam, on a 15 percent west-facing slope in a very stony, wooded area. (Colors are for moist soil.)

Oa--0 to 10 cm; dark reddish brown (5YR 2/2) sapric material; moderate fine granular structure; very friable; many very fine, fine, medium and coarse roots; extremely acid; abrupt wavy boundary. (0 to 15 cm thick)

E--10 to 13 cm; light gray (10YR 7/1) channery silt loam; weak fine granular structure; very friable; common very fine, fine, medium and coarse roots; 15 percent channers; extremely acid; abrupt broken boundary. (0 to 13 cm thick)

Bh--13 to 15 cm; dark reddish brown (2.5YR 2/4) silt loam; moderate very fine and fine granular structure; very friable; common very fine, fine, medium and coarse roots; 5 percent channers; extremely acid; abrupt broken boundary. (0 to 10 cm thick)

Bs1--15 to 23 cm; brown (7.5YR 4/4) silt loam; weak very fine granular structure; very friable; common very fine, fine, medium and coarse roots; 5 percent channers; extremely acid; clear smooth boundary.

Bs2--23 to 28 cm; yellowish brown (10YR 5/8) silt loam; weak fine granular structure; very friable; few very fine, fine and medium roots; 10 percent channers; very strongly acid; clear smooth boundary. (The combined thickness of the Bs horizon is 13 to 33 cm.)

BC--28 to 48 cm; light olive brown (2.5Y 5/4) channery silt loam; weak very fine and fine granular structure; friable; few very fine, fine and medium roots; 20 percent channers and 10 percent flagstones; very strongly acid; abrupt irregular boundary. (0 to 20 cm thick)

R--48 cm; slate.

TYPE LOCATION: Somerset County, Maine; Elm Stream Township (T4 R16); 1.7 miles south on #7 road from Great Northern Paper Company's camps in T4 R16, and 150 feet into the woods on the east side of the logging road; USGS Seboomook Lake East topographic quadrangle; lat. 45 degrees 58 minutes 40 seconds N. and long. 69 degrees 45 minutes 02 seconds W.,NAD 27.

RANGE IN CHARACTERISTICS: Depth of mineral soil over bedrock ranges from 25 to 50 cm. Texture is silt loam, loam and very fine sandy loam in the fine-earth fraction. Rock fragment content ranges from 5 to 35 percent by volume. Stones and boulders cover from 0 to 15 percent of the surface. Consistence is very friable or

friable. Reaction ranges from extremely acid to moderately acid.

The Oa horizon has hue of 2.5YR to 10YR, value of 2 to 3 and chroma of 1 or 2. It has weak or moderate, very fine to medium granular structure. Some pedons have an Oe horizon.

Some areas have an Ap horizon with hue of 10YR and with value and chroma of 3 or 4. The A horizon, where present, has hue of 5YR to 10YR, value of 2 or 3 and chroma of 1 to 3. They have weak or moderate, very fine or fine granular structure.

The E horizon is neutral or has hue of 5YR to 10YR, value of 5 to 7 and chroma of 0 to 2. It has weak very fine to medium granular or weak very thin platy structure.

The Bh horizon has hue of 2.5YR to 7.5YR, with value and chroma of 2 to 4. The Bhs horizon, where present, has hue of 2.5YR to 10YR, with value and chroma of 2 or 3.

The Bs horizon has hue of 5YR to 10YR, value of 4 to 6 and chroma of 4 to 8. The value ranges to 3 in some near surface subhorizons in some pedons. The B horizon has weak or moderate, very fine to medium granular, or very fine or fine subangular blocky structure.

The BC horizon has hue of 2.5Y or 5Y, value of 4 to 6 and chroma of 3 to 6. It has weak very fine or fine granular or subangular blocky structure.

The bedrock is typically slate, metasandstone, phyllite or schist.

COMPETING SERIES: These are the Amadon, Creasey, and Lyman series. Amadon soils have more than 50 percent fine sand or coarser throughout the series control section and developed over limestone. Creasey soils have less than 10 percent clay in the particle-size control section and developed over reddish sandstone and conglomerate. Lyman soils have less than 10 percent clay in the particle-size control section.

GEOGRAPHIC SETTING: Monson soils are on knolls of till plains and on hills, ridges and mountains. Slope ranges from 3 to 60 percent. The soils formed in a shallow mantle of glacial till derived principally from slate, metasandstone, phyllite or schist. The climate is humid and cool temperate. The mean annual temperature ranges from 3 to 7 degrees C, and mean annual precipitation ranges from 864 to 1168 mm. The frost-free season ranges from 80 to 135 days. Elevation ranges from 91 to 762 m above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Chesuncook, Elliottsville, Monarda and Telos soils. The moderately well drained Chesuncook, poorly drained Monarda, and somewhat poorly drained Telos soils are all very deep to bedrock soils at lower elevations on the landscape. Elliottsville soils are well drained and moderately deep to bedrock.

DRAINAGE AND PERMEABILITY: Somewhat excessively drained. Estimated saturated hydraulic conductivity is moderate or high.

USE AND VEGETATION: Mainly forest. Common tree species include red spruce, white spruce, balsam fir, sugar maple, paper birch, yellow birch and eastern white pine with some northern white cedar.

DISTRIBUTION AND EXTENT: Maine; MLRAs 143 and 144B. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Franklin County Area and Part of Somerset County, Maine Soil Survey, 1992.

REMARKS: Diagnostic horizons and features recognized in this pedon include:

1. Albic horizon - the zone from 10 to 13 cm (E horizon).
2. Spodic horizon - the zone from 13 to 23 cm (Bh and Bs1 horizons).
3. Lithic Haplorthods - lithic contact within 50 cm of the mineral soil surface.

ADDITIONAL DATA: Source of data used in establishing taxonomic class and range in characteristics is composite data from the Field Appraisal of Resource Management Systems compiled by Dr. Paul R. Hepler, Department of Plant and Soil Sciences, University of Maine, Orono, Maine.

Soil interpretation record numbers for the Monson series are: Monson, ME0087; and Monson, stony, ME0102.

National Cooperative Soil Survey
U.S.A.

LOCATION PEACHAM VT+MA ME NH

Established Series
Rev. SHG-RFL-DHZ
05/2015

PEACHAM SERIES

The Peacham series consists of very deep, very poorly drained soils that formed in organic material over loamy lodgment till in glaciated uplands and lowlands. They are shallow to a dense substratum and very deep to bedrock. Estimated saturated hydraulic conductivity is moderately high or high in the solum and moderately low or low in the dense substratum. Slope ranges from 0 to 8 percent. Mean annual precipitation is about 1180 mm, and mean annual temperature is about 6 degrees C.

TAXONOMIC CLASS: Loamy, mixed, superactive, nonacid, frigid, shallow Histic Humaquepts

TYPICAL PEDON: Peacham mucky peat, on a 3 percent slope in a very stony pasture. (Colors are for moist soil.)

Oe--0 to 5 cm; black (N 2.5/) mucky peat; massive; very friable; many fine roots; neutral (pH 7.3); abrupt wavy boundary.

Oa--5 to 25 cm; black (N 2.5/) muck; massive; very friable; many fine roots; neutral (pH 6.7); abrupt smooth boundary. (O horizon is 20 to 40 cm thick.)

Bg--25 to 38 cm; dark greenish gray (5GY 4/1) fine sandy loam; weak fine and medium subangular blocky structure; friable; many fine roots; common medium prominent yellowish brown (10YR 5/8) masses of iron accumulation; 7 percent rock fragments; neutral (pH 6.8); abrupt wavy boundary. (11 to 50 cm thick)

Cdg1--38 to 79 cm; dark grayish brown (2.5Y 4/2) fine sandy loam; massive; firm; many coarse prominent yellowish brown (10YR 5/8) masses of iron accumulation and many medium faint gray (5Y 5/1) iron depletions; 10 percent rock fragments; slightly acid (pH 6.4); clear wavy boundary.

Cdg2--79 to 165 cm; dark olive gray (5Y 3/2) sandy loam; massive; firm; many medium prominent yellowish brown (10YR 5/8) masses of iron accumulation and many medium faint gray (5Y 5/1) iron depletions; 10 percent rock fragments; neutral (pH 6.8).

TYPE LOCATION: Caledonia County, Vermont; Town of Burke; located about 1.8 km south of the Sutton River, and 430 meters east of the Sutton town line; USGS Burke Mountain, VT topographic quadrangle; latitude 44 degrees, 37 minutes, and 29 seconds N. and longitude 71 degrees 59 minutes, and 02 seconds W., NAD 1983.

RANGE IN CHARACTERISTICS: The thickness of the mineral solum ranges from 11 to 50 cm. Depth to bedrock is greater than 165 cm. Texture is sandy loam, fine sandy loam, very fine sandy loam, loam, or silt loam in the fine-earth fraction. The weighted average of clay in the particle-size control section is 1 to 10 percent. Rock fragments are mostly gravel and cobbles and range from 5 to 30 percent in the mineral horizons. Reaction ranges from very strongly acid to neutral throughout the soil.

The O horizon is neutral or has hue of 5YR to l0YR, value of 2 to 3, and chroma of 0 to 2. It is mucky peat or muck.

Some pedons have an Oi horizon that consists of peat.

Some pedons have an A horizon that has hue of l0YR to 5Y, value of 2 to 4, and chroma of l or 2. Mucky mineral texture modifiers are common.

The Bg horizon, and Eg horizon where present, is neutral or has hue of l0YR to 5GY, value of 4 to 6, and chroma of 0 to 2.

The Cdg horizon is neutral or has hue of 2.5Y to 5B, value of 3 to 6, and chroma of 0 to 2. It is massive or has plates of geogenic origin. Consistence is firm or very firm.

Some pedons have thin sandy lenses in the Bg and Cdg horizons.

Some pedons have a thin, friable Cg horizon above the Cdg horizon.

COMPETING SERIES: The Burnham series is in the same family. Burnham soils have more than 10 percent clay in the particle-size control section.

GEOGRAPHIC SETTING: Peacham soils are on nearly level to gently sloping areas in glaciated uplands and lowlands. They are typically in open and closed depressions on footslopes and toeslopes. The soils formed in organic material 20 to 40 cm thick and the underlying loamy lodgment till. The till is Wisconsin-aged and derived mainly from granite, gneiss, schist, and phyllite. Slope ranges from 0 to 8 percent. The mean annual precipitation is 790 to 1640 mm, and the mean annual temperature is 2 to 7 degrees C. The frost-free period ranges from 70 to 135 days. Elevation ranges from about 100 to 800 meters above sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Brayton, Buckland, Cabot, Colonel, Marlow, Peru, Pillsbury, Tunbridge, Vershire, and Wonsqueak soils. Peacham soils are in a drainage sequence with the well drained Marlow soils, moderately well drained Buckland and Peru soils, somewhat poorly drained Colonel soils, and poorly drained Brayton, Cabot, and Pillsbury soils. Tunbridge and Vershire soils are on higher positions in the landscape and are well drained and moderately deep to bedrock. Wonsqueak soils formed in thicker deposits of organic material over mineral soil material.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Very poorly drained. Estimated saturated hydraulic conductivity is moderately high or high in the solum and moderately low or low in the dense substratum.

USE AND VEGETATION: Most areas are forested. The common trees are balsam fir, red spruce, black spruce, red maple, yellow birch, tamarack, black ash, eastern white pine, and northern white cedar. A few areas cleared of stones are used mainly for hay and pasture.

DISTRIBUTION AND EXTENT: Vermont, Maine, Massachusetts, and New Hampshire; MLRAs 143 and 144B. These soils are extensive with about 160,000 acres of the series mapped.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Franklin County, Vermont, 1948.

REMARKS: Diagnostic horizons and features recognized in this pedon are:
Histic epipedon - the zone from 0 to 25 cm (Oe and Oa horizons).
Cambic horizon - the zone from 25 to 38 cm (Bg horizon).
Aquic conditions- masses of iron accumulation in the matrix and an iron depleted matrix from 25 to 38 cm (Bg horizon).
Densic materials - the zone from 38 to 165 cm (Cdg1 and Cdg2 horizons).

ADDITIONAL DATA: Characterization data for Peacham and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

National Cooperative Soil Survey
U.S.A.

LOCATION PERU NH+MA ME NY VT

Established Series
Rev. HRM-RFL-DHZ
06/2016

PERU SERIES

The Peru series consists of moderately well drained soils that formed in loamy lodgment till on hills and mountains in glaciated uplands. They are moderately deep to a dense substratum and very deep to bedrock. Estimated saturated hydraulic conductivity is moderately high or high in the solum, and moderately low or moderately high in the dense substratum. Slope ranges from 0 to 60 percent. Mean annual precipitation is about 1180 mm, and mean annual temperature is about 6 degrees C.

TAXONOMIC CLASS: Coarse-loamy, isotic, frigid Aquic Haplorthods

TYPICAL PEDON: Peru fine sandy loam, on a north facing, 15 percent slope in a very stony wooded area. (Colors are for moist soil unless otherwise noted.)

Oe--0 to 3 cm; black (10YR 2/1) moderately decomposed plant material; very friable; very strongly acid (pH 4.9); abrupt smooth boundary. (O horizon thickness is 0 to 10 cm.)

A--3 to 13 cm; dark brown (7.5YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; many very fine and fine and few coarse roots; 5 percent rock fragments; very strongly acid (pH 4.8); abrupt wavy boundary. (0 to 10 cm thick)

E--13 to 15 cm; light brownish gray (10YR 6/2) fine sandy loam; weak medium granular structure; friable; common fine roots; 5 percent rock fragments; very strongly acid (pH 4.8); abrupt broken boundary. (0 to 10 cm thick)

Bs1--15 to 18 cm; dark brown (7.5YR 3/4) fine sandy loam; weak fine granular structure; friable; common fine and few coarse roots; 5 percent rock fragments; very strongly acid (pH 5.0); abrupt broken boundary.

Bs2--18 to 33 cm; strong brown (7.5YR 4/6) fine sandy loam; weak fine granular structure; friable; common fine and few coarse roots; 5 percent rock fragments; very strongly acid (pH 5.0); clear wavy boundary.

Bs3--33 to 46 cm; dark yellowish brown (10YR 4/6) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; 5 percent rock fragments; strongly acid (pH 5.2); abrupt wavy boundary. (Combined thickness of the Bs horizon is 7 to 38 cm).

BC--46 to 54 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine subangular blocky structure; friable; few fine roots; common fine faint olive brown (2.5Y 4/3) iron depletions in the matrix; 5 percent rock fragments; strongly acid (pH 5.2); abrupt smooth boundary. (0 to 38 cm thick)

Cd1--54 to 94 cm; olive brown (2.5Y 4/3) fine sandy loam; 85 percent moderate medium plates and 15 percent sandy lenses; firm; common medium faint olive gray (5Y 4/2) iron depletions in the matrix; 5 percent rock fragments; strongly acid (pH 5.2); clear wavy boundary.

Cd2--94 to 165 cm; olive gray (5Y 4/2) fine sandy loam; 95 percent moderate thick plates and 5 percent sandy lenses; firm; common medium faint olive brown (2.5Y 4/3) masses of iron accumulation on faces of peds; 5

percent rock fragments; strongly acid (pH 5.2).

TYPE LOCATION: Merrimack County, New Hampshire; Town of New London; located about 275 meters west of County Road on Northwood Lane, and 35 meters south of the road; USGS Sunapee Lake North, NH topographic quadrangle; latitude 43 degrees 24 minutes 04 seconds N. and longitude 72 degrees 01 minutes 17 seconds W., NAD 83.

RANGE IN CHARACTERISTICS: The thickness of the mineral solum and depth to densic materials from the mineral surface range from 50 to 100 cm. Depth to bedrock is greater than 150 cm. Texture is typically fine sandy loam, sandy loam, or loam in the fine-earth fraction but includes silt loam and very fine sandy loam in the upper part of the solum. The weighted average of clay in the particle-size control section is 10 percent or less. The silt content in the solum and underlying till averages less than 50 percent, but ranges to 50 percent or more in the upper 25 cm of the solum. Rock fragments are dominantly gravel with some cobbles and stones and typically range from 5 to 30 percent throughout the mineral soil. Some pedons have horizons with less than 5 percent rock fragments. Reaction ranges from extremely acid to slightly acid in the solum, and from very strongly acid to slightly acid in the substratum.

The O horizons, where present, consist of slightly, moderately, and/or highly decomposed organic material. The Oe and Oa horizons have hue of 2.5YR to 10YR, value of 2 to 4, and chroma of 1 to 4.

The A, or Ap horizon where present, has hue of 5YR to 10YR and value and chroma of 2 to 4.

The E horizon is neutral or has hue of 5YR to 2.5Y, value of 4 to 7, and chroma of 0 to 2.

The Bhs horizon, where present, is up to 13 cm thick and has hue of 2.5YR to 10YR, a value of 2 to 3, and a chroma of 1 to 3.

The Bs horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 8.

The BC horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 2 to 6.

Some pedons have an E or E' horizon below the B horizon. It has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 or 3. Typically, it has a coarser texture than the overlying horizon.

Some pedons have a friable C horizon up to 20 cm thick that has color and texture similar to the underlying Cd horizon.

The Cd horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 2 to 4. Consistence is firm or very firm. Arrangement of soil particles into plates is considered to be geogenic. Loose or friable segregated sand lenses with a horizontal orientation compose up to 20 percent of the densic materials. The lenses are typically coarse, medium, or fine sand ranging from 2 to 25 mm thick.

COMPETING SERIES: These are the Chesuncook, Crary, Dixmont, Howland, Ragmuff, Skerry, Sunapee, and Worden series. Chesuncook soils have a weighted average of more than 10 percent clay in the particle-size control section. Crary soils have a mantle of eolian or water deposited sediments ranging from 40 to 100 cm thick over till. Dixmont and Sunapee soils are formed in loamy supraglacial till and do not have densic materials within 100 cm of the mineral soil surface. Howland soils have a weighted average of more than 50 percent silt in the particle-size control section. Ragmuff soils are moderately deep to bedrock. Skerry soils have more than 20% sandy lenses in the Cd horizon. Worden soils are somewhat poorly drained.

GEOGRAPHIC SETTING: Peru soils are on nearly level to steep slopes in glaciated uplands. Typically they are on linear or convex areas of backslopes, footslopes, and toeslopes, but they also occur in concave positions. The soils formed in loamy lodgment till derived mainly from schist, gneiss, phyllite, and granite. Slope ranges from 0 to 60 percent. The mean annual precipitation is 790 to 1640 mm, and the mean annual temperature is 2 to

7 degrees C. The frost-free period ranges from 90 to 160 days. Elevation ranges from about 2 to 800 meters above sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Berkshire, Brayton, Cabot, Colonel, Lyman, Marlow, Monadnock, Peacham, Pillsbury, Sunapee, and Tunbridge soils. Berkshire, Lyman, Monadnock, Sunapee, and Tunbridge soils are formed in supraglacial till and do not have densic materials. Additionally, Lyman soils are shallow to bedrockk, and Tunbridge soils are moderately deep to bedrock. Peru soils are in a drainage sequence with the well drained Marlow soils, somewhat poorly drained Colonel soils, poorly drained Brayton, Cabot, and Pillsbury soils, and very poorly drained Peacham soils.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained. Estimated saturated hydraulic conductivity is moderately high or high in the solum, and moderately low or moderately high in the dense substratum.

USE AND VEGETATION: Most areas are wooded. The common trees are sugar maple, eastern white pine, balsam fir, red spruce, white spruce, white ash, yellow birch, paper birch, eastern hemlock, American beech, and red pine. Areas cleared of stones are used mainly for hay and pasture and some cultivated crops.

DISTRIBUTION AND EXTENT: Maine, Massachusetts, New Hampshire, New York, and Vermont. The soils of this series are extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Berkshire County, Massachusetts, 1923.

REMARKS: 1. Dixfield soils were recorrelated to Peru soils as part of the national Soil Data Join Recorrelation initiative. Revisions to the Peru Range in Characteristics incorporate values from the Dixfield Official Series Description. As a result of this revision to Peru, the Dixfield series status has been changed to inactive.

2. Diagnostic horizons and features recognized in this pedon are:

a. Ochric epipedon - the zone from 0 to 15 cm (Oe, A, and E horizons).
b. Spodic horizon - the zone from 15 to 33 cm (Bs1 and Bs2 horizons).
c. Aquic conditions - redoximorphic features at 43 cm below the mineral soil surface (BC, Cd1, and Cd2 horizons).
d. Densic materials - the zone from 54 to 165 cm (Cd1 and Cd2 horizons).

ADDITIONAL DATA: Characterization data for Peru and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

National Cooperative Soil Survey
U.S.A.

LOCATION PILLSBURY NH+MA ME NY

Established Series
Rev. SALP-RAS-SHG-RFL
05/2015

PILLSBURY SERIES

The Pillsbury series consists of poorly drained soils that formed in loamy lodgment till in glaciated uplands and lowlands. They are moderately deep to a dense substratum and very deep to bedrock. Estimated saturated hydraulic conductivity is moderately high or high in the solum and moderately low or moderately high in the dense substratum. Slope ranges from 0 to 15 percent. Mean annual precipitation is about 1180 mm, and mean annual temperature is about 6 degrees C.

TAXONOMIC CLASS: Coarse-loamy, mixed, superactive, acid, frigid Humic Endoaquepts

TYPICAL PEDON: Pillsbury cobbly loam, on a 1 percent slope in a very stony wooded area. (Colors are for moist soil.)

Oe--0 to 3 cm; mucky peat. (O horizon is 0 to 10 cm thick)

A--3 to 15 cm; black (10YR 2/1) cobbly loam; weak fine and medium granular structure; friable; many fine and common medium roots; 5 percent gravel, 10 percent cobbles, and 5 percent stones; very strongly acid (pH 4.8); clear smooth boundary. (0 to 20 cm thick)

Bg1--15 to 33 cm; dark grayish brown (10YR 4/2) cobbly fine sandy loam; weak medium granular structure; friable; few fine roots; few fine distinct dark yellowish brown (10YR 4/4) masses of iron accumulation and few fine prominent olive gray (5Y 5/2), and gray (5Y 5/1) iron depletions; 5 percent gravel, 10 percent cobbles, and 2 percent stones; very strongly acid (pH 4.8); clear smooth boundary.

Bg2--33 to 58 cm; dark grayish brown (2.5Y 4/2) cobbly fine sandy loam; weak medium subangular blocky structure; friable; very few fine roots; common medium prominent dark yellowish brown (10YR 4/4), light olive brown (2.5Y 5/4), and olive (5Y 5/6) masses of iron accumulation; 5 percent gravel, 10 percent cobbles, and 2 percent stones; very strongly acid (pH 5.0); clear smooth boundary. (Combined thickness of the Bg horizon is 10 to 60 cm.)

Cd--58 to 165 cm; olive brown (2.5Y 4/4) cobbly fine sandy loam; massive; firm; common medium faint dark yellowish brown (10YR 4/4), and common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; few widely spaced fracture faces with gray (5Y 5/1) interiors and yellowish brown (10YR 5/6) coatings that extend almost vertically into horizon; 10 percent gravel, 7 percent cobbles, and 3 percent stones; very strongly acid (pH 5.0).

TYPE LOCATION: Sullivan County, New Hampshire; Town of Lempster; located about 4.8 km west of NH Route 10, and 450 meters south of the Unity town line; USGS Newport, NH topographic quadrangle; latitude 43 degrees, 16 minutes, 10.67 seconds N. and longitude 72 degrees, 12 minutes, and 58.22 seconds W., NAD 1983.

RANGE IN CHARACTERISTICS: The thickness of the mineral solum ranges from 50 to 100 cm. Depth to bedrock is greater than 165 cm. Texture is typically loam, fine sandy loam, or sandy loam in the fine-earth fraction. Rock fragments are mostly gravel, cobbles, and stones, and range from 5 to 45 percent in the mineral solum and substratum. Unless limed, reaction is very strongly acid or strongly acid in the solum, and ranges

from very strongly acid to moderately acid in the substratum.

The O horizons, where present, consist of peat, mucky peat, and/or muck.

The A horizon has hue of 7.5YR to 5Y, value of 2 to 3, and chroma of 1 to 3.

Some pedons have an Ap horizon that has hue of 10YR to 5Y, value of 2 to 4, and chroma 1 to 3.

Some pedons have an E horizon that has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2.

The Bg horizon is neutral or has hue of 10YR to 5Y, value of 4 to 6, and chroma of 0 to 2.

Some pedons have a B, BC, and/or BCg horizon that has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 or 2.

The Cd layer has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 to 4. It is massive or has plates or course prisms of geogenic origin. Consistence is firm or very firm.

COMPETING SERIES: There are no other series in the same family. The Brayton, Cabot, and Monarda soils are in related families. These soils are all shallow to a dense substratum.

GEOGRAPHIC SETTING: Pillsbury soils are on nearly level to strongly sloping gradients in glaciated uplands and lowlands. They are typically on slightly convex to concave parts of backslopes, footslopes, and toeslopes. The soils formed in Wisconsin-aged, loamy lodgment till derived mainly from granite, gneiss, and schist. Slope ranges from 0 to 15 percent. The mean annual precipitation is 790 to 1640 mm, and the mean annual temperature is 2 to 7 degrees C. The frost-free period ranges from 90 to 140 days. Elevation ranges from about 100 to 800 meters above sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Berkshire, Colonel, Lyman, Marlow, Peru, Sunapee, and Tunbridge soils. Pillsbury soils are in a drainage sequence with the well drained Marlow soils, moderately well drained Peru soils, and somewhat poorly drained Colonel soils. Berkshire and Sunapee soils are moderately well drained, on higher positions in the landscape, and formed in supraglacial till. Lyman and Tunbridge soils are better drained, shallow and moderately deep to bedrock respectively, and occur on higher positions in the landscape.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Poorly drained. Estimated saturated hydraulic conductivity is moderately high or high in the solum and moderately low or moderately high in the dense substratum.

USE AND VEGETATION: Most areas are wooded. The common trees are red maple, sugar maple, eastern white pine, yellow birch, red spruce, balsam fir, and northern red oak. Areas cleared of stones are used mainly for hay and pasture.

DISTRIBUTION AND EXTENT: New Hampshire, Massachusetts, Maine, and New York. MLRAs 143 and 144B. The series is extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Sullivan County, New Hampshire, 1981.

REMARKS: 1. The Pillsbury series was previously classified as Coarse-loamy, mixed, active, acid, frigid Aeric Endoaquepts.

2. Although the series is represented here as moderately deep to densic materials, Pillsbury soils have also been

correlated as members of the shallow family.

3. With this revision the series is restricted to the poorly drained class. However, Pillsbury soils have also been correlated as members of the somewhat poorly drained class.

4. Diagnostic horizons and features recognized in this pedon are:
a. Ochric epipedon - the zone from 0 to 15 cm (Oe and A horizons).
b. Cambic horizon - the zone from 15 to 58 cm (Bg1 and Bg2 horizons).
c. Redoximorphic features - chroma of 2 and redox concentrations in the zone from 15 to 58 cm (Bg1 and Bg2 horizons).
d. Densic materials - the zone from 58 to 165 cm (Cd layer).

ADDITIONAL DATA: Characterization data for Pillsbury and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

National Cooperative Soil Survey
U.S.A.

LOCATION RAGMUFF ME

Established Series
ABJ-MJK-ANA
02/2012

RAGMUFF SERIES

The Ragmuff series consists of moderately deep to bedrock, moderately deep to densic contact, moderately well drained soils formed in glacial till on till plains, hills, ridges, and mountains. Saturated hydraulic conductivity is moderately high to high in the mineral solum, and moderately high to moderately low in the substratum. Slope ranges from 0 to 15 percent. Mean annual air temperature is about 3.8 degrees C, and mean annual precipitation is about 1000 mm at the type location.

TAXONOMIC CLASS: Coarse-loamy, isotic, frigid Aquic Haplorthods

TYPICAL PEDON: Ragmuff silt loam, on a 3 percent south-facing slope in a very stony wooded area. (Colors are for moist soil.)

Oi -- 0 to 1 cm; dark yellowish brown (10YR 4/4) slightly decomposed leaves and twigs; weak fine granular structure; very friable; many very fine to very coarse roots; strongly acid (pH 5.1); clear wavy boundary.

Oe -- 1 to 3 cm; dark brown (7.5YR 3/3) moderately decomposed plant material; weak fine granular structure; very friable; many very fine to very coarse roots; very strongly acid (pH 4.7); clear wavy boundary.

Oa -- 3 to 5 cm; black (7.5YR 2.5/1) highly decomposed plant material; weak fine granular structure; very friable; many very fine to very coarse roots; extremely acid (pH 4.4), abrupt wavy boundary. (Combined thickness of O horizons is 2 to 15 cm.)

E -- 5 to 10 cm; pinkish gray (7.5YR 6/2) broken face silt loam; weak thin platy structure; very friable; many very fine to very coarse roots; 5 percent gravel; extremely acid (pH 3.9); abrupt irregular boundary. (3 to 15 cm thick)

Bs1 -- 10 to 14 cm; dark brown (7.5YR 3/4) crushed and smoothed silt loam; weak fine and medium granular structure; very friable; many very fine to very coarse roots; 5 percent gravel; extremely acid (pH 4.0); clear wavy boundary.

Bs2 -- 14 to 28 cm; brown (7.5YR 4/4) crushed and smoothed silt loam; weak fine and medium subangular blocky structure; very friable; many very fine and fine roots; 5 percent gravel; very strongly acid (pH 4.8); gradual wavy boundary.

Bs3 -- 28 to 48 cm; dark yellowish brown (10YR 4/6) crushed and smoothed silt loam; weak fine and medium subangular blocky structure; very friable; common very fine and fine roots; 5 percent channers and 5 percent gravel; very strongly acid (pH 4.9); gradual wavy boundary. (Combined thickness of Bs horizons is 20 to 50 cm.)

BC -- 48 to 68 cm; light olive brown (2.5Y 5/3) broken face gravelly loam; weak fine and medium subangular blocky structure; friable; few fine roots; few (1 percent) fine prominent yellowish brown (10YR 5/6) masses of iron accumulation, and few (1 percent) fine faint grayish brown (10YR 5/2) iron depletions; 5 percent channers, 10 percent gravel, and 5 percent cobbles; strongly acid (pH 5.2); clear wavy boundary. (0 to 30 cm thick)

Cd -- 68 to 85 cm; olive (5Y 4/3) broken face channery silt loam; massive; common (3 percent) fine prominent dark brown (7.5YR 3/2) iron-manganese concentrations, few (1 percent) fine prominent yellowish brown (10YR 5/6) masses of iron accumulation, and few (1 percent) fine distinct grayish brown (10YR 5/2) iron depletions; firm; 10 percent channers, 5 percent gravel and 10 percent cobbles; strongly acid (pH 5.1); abrupt irregular boundary. (5 to 30 cm thick)

R -- 85 cm; metasedimentary rock

TYPE LOCATION: Piscataquis County, Maine; (T 5 R15 WELS); 0.473 miles north of the Bean Pot Pond Road, 1.106 miles west of the Ragmuff Road; USGS Ragmuff Stream, ME topographic quadrangle; Latitude 46 degrees, 3 minutes, 32.30 seconds N. and Longitude 69 degrees, 33 minutes, 57.80 seconds W., NAD 1983.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 40 to 115 cm. Depth to bedrock ranges from 50 to 100 cm from the mineral soil surface. Depth to densic contact is greater than 50 cm from the mineral soil surface. Texture is silt loam, loam, fine sandy loam, sandy loam, or very fine sandy loam in the fine-earth fraction. The weighted average of clay in the particle-size control section is 3 to 18 percent. Rock fragment content ranges from 5 to 35 percent by volume in the particle size control section, and may range to 50 percent in some Cd horizons. Stones and boulders cover from 0 to 15 percent of the surface. Reaction ranges from extremely acid to strongly acid in the solum and from very strongly acid to moderately acid in the substratum.

The Oi, Oa, and Oe horizons, where present, have hues of 5YR to 10YR, values of 2.5 to 4, and chromas of 1 to 4.

The E horizon has hue of 5YR to 10YR, value of 4 to 7, and chroma of 1 to 3.

The Bh horizon, when present, has hue of 2.5YR to 10YR, value of 2 to 3, and chroma of 1 to 3.

The Bhs horizon, where present, has hue of 2.5YR or 5YR, with value of 2.5 or 3, and chroma of 2 or 3.

The Bs horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 4 to 8.

The BC horizon, where present, has hue of 10YR to 5Y, value of 4 to 6, and chroma of 3 to 6.

Some pedons have a friable C layer with hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 2 to 4.

The Cd layer has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 2 to 4. It has weak or moderate, thin to thick plates considered to be inherited from the parent material, or the horizon is massive.

The bedrock is generally slate, or strongly to weakly metamorphosed shale or sandstone, or less commonly granite or diorite.

COMPETING SERIES: These are the Chesuncook, Crary, Dixfield, Dixmont, Howland, Peru, Skerry, Sunapee, and Worden series. These series are all greater than 152 cm to bedrock.

GEOGRAPHIC SETTING: Ragmuff soils are on till plains, hills, ridges and mountains. Slope is dominantly 0 to 15 percent. The soils formed in a moderately deep mantle of till derived primarily from slate and other metasediments, phyllite, or schist, and less commonly from granite and diorite. The climate is humid and cool temperate. The mean annual temperature ranges from 3 to 6 degrees C, and mean annual precipitation ranges from 860 to 1170 mm. The frost-free season ranges from 80 to 130 days. Elevation ranges from 91 to 762 meters above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the very deep Chesuncook, Monarda and Telos soils, the moderately deep Elliottsville soils, and the shallow Monson soils. Monarda and Telos soils are wetter

soils occupying lower positions on the landscape. Elliottsville soils are well drained and are found on steeper slopes. Monson soils are on convex positions adjacent to Ragmuff soils.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained. Saturated hydraulic conductivity is moderately high to high in the mineral solum and moderately high to moderately low in the substratum.

USE AND VEGETATION: Mainly forest. Common tree species include American beech, yellow birch, red spruce, white spruce, balsam fir, red maple and sugar maple.

DISTRIBUTION AND EXTENT: Northern Maine. MLRAs 143 and 144B. The series is anticipated to be of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Northern Piscataquis and Northern Somerset County Area, Maine Soil Survey, 2011.

REMARKS:

1. Diagnostic horizons and features recognized in this pedon are:
Albic horizon - the zone from 5 to 10 cm (E horizon).
Spodic horizon - the zone from 10 to 28 cm (Bs1 and Bs2 horizons).
Cambic horizon - the zone from 28 to 68 cm (Bs3 and BC horizons).
Aquic conditions - redoximorphic features at 48 centimeters.
Densic contact - firm lodgment till at 68 centimeters (Cd layer).
Lithic contact - metasedimentary rock at 85 centimeters (R layer).
Other features - frigid temperature regime and udic moisture regime.

2. This series was proposed for use primarily in areas previously mapped as Elliottsville in the north woods of Maine that have seasonally perched water tables over thin layers of densic material.

3. The series name is taken from Ragmuff Stream, which flows into the West Branch of the Penobscot River in the north woods of Maine.

ADDITIONAL DATA: This pedon is characterized by the National Soil Survey Laboratory in Lincoln Nebraska, reference pedon 08NO120. Climate data from Telos dam TAPS station.

National Cooperative Soil Survey
U.S.A.

LOCATION RAWSONVILLE VT+ME NH NY

Established Series
Rev. SHG-RGD-CAW
04/2018

RAWSONVILLE SERIES

The Rawsonville series consists of moderately deep, well drained soils on glaciated uplands. They formed in loamy till. Estimated saturated hydraulic conductivity is moderately high or high in the mineral soil. Slope ranges from 3 to 70 percent. Mean annual precipitation is about 1,270 mm, and mean annual temperature is about 6 degrees C.

TAXONOMIC CLASS: Coarse-loamy, isotic, frigid Typic Haplohumods

TYPICAL PEDON: Rawsonville very fine sandy loam, on an 32 percent southwest facing slope in a very rocky wooded area. (Colors are for moist soil.)

Oe -- 0 to 5 cm; very dark grayish brown (10YR 3/2) rubbed, moderately decomposed plant material; many very fine roots; abrupt wavy boundary.

Oa -- 5 to 15 cm; black (N 2.5/0) highly decomposed plant material; weak fine granular structure; very friable; few coarse and many fine and very fine roots; extremely acid; abrupt wavy boundary. (The combined thickness of the O horizon is 0 to 20 cm.)

E -- 15 to 18 cm; dark gray (5Y 4/1) very fine sandy loam; weak fine and medium subangular blocky structure; friable; common very fine and fine roots; 5 percent rock fragments; very strongly acid; abrupt wavy boundary. (0 to 20 cm thick)

Bhs1 -- 18 to 25 cm; very dusky red (2.5YR 2.5/2) very fine sandy loam; weak fine subangular blocky structure; very friable; few medium and common very fine and fine roots; 7 percent rock fragments; moderately smeary; very strongly acid; gradual wavy boundary.

Bhs2 -- 25 to 38 cm; dark reddish brown (5YR 3/3) very fine sandy loam; weak fine subangular blocky structure; very friable; few medium and common very fine and fine roots; 7 percent rock fragments; moderately smeary; strongly acid; gradual wavy boundary. (The combined thickness of the Bhs horizon is 10 to 61 cm.)

BC -- 38 to 81 cm; dark grayish brown (2.5Y 4/2) very fine sandy loam; weak fine subangular blocky structure; very friable; few very fine and roots; 10 percent rock fragments; weakly smeary; strongly acid; abrupt wavy boundary. (0 to 28 cm thick)

R -- 81 cm; schist bedrock.

TYPE LOCATION: Caledonia County, Vermont; town of Stannard; 2,500 feet northwest of Stannard Pond and 1,200 feet south of the Wheelock Town line; USGS Stannard topographic quadrangle; latitude 44 degrees 32 minutes 09 seconds north, longitude 72 degrees 10 minutes 24 seconds west, NAD 27.

RANGE IN CHARACTERISTICS: The thickness of the mineral solum and depth to bedrock range from 50 to 100 cm. Reaction ranges from extremely acid through strongly acid throughout the mineral soil. Rock fragments are mostly gravel, cobbles channers, or stones and range from 0 to 30 percent throughout.

The O horizons, where present, have hue of 7.5YR, 10YR, or is neutral, value of 2.5 or 3, and chroma of 0 to 2.

Some pedons have an A horizon that is neutral or has hue of 5YR through 10YR, value of 2 through 3, and chroma of 0 through 2. It is fine sandy loam, very fine sandy loam, silt loam, or loam in the fine-earth fraction.

The E horizon has hue of 5YR through 5Y, value of 3 through 6, and chroma of 1 through 3. It is sandy loam, fine sandy loam, loamy sand, very fine sandy loam, loam, or silt loam in the fine-earth fraction. The E horizon may be discontinuous because of tree throw and other disturbances.

The Bhs horizon has hue of 2.5YR through 7.5YR with value and chroma of 3 or less.

Some pedons have a Bh horizon that is neutral with value of 2 or less or has hue of 10YR, value of 3 and chroma of 1.

Some pedons have a Bs horizon with hue of 5YR through 10YR, value of 3 or more and chroma of 4 or more.

The Bhs, Bs, and Bh horizons are sandy loam, fine sandy loam, very fine sandy loam, silt loam, or loam in the fine-earth fraction. They are moderately or weakly smeary.

The BC horizon has hue of 7.5YR through 5Y value of 3 through 5, and chroma of 2 through 4. It is sandy loam, fine sandy loam, loamy sand, or very fine sandy loam in the fine-earth fraction.

Some pedons have a C or Cd horizon with hue of 10YR through 5Y, value of 3 through 5, and chroma of 2 through 4. It is sandy loam, fine sandy loam, loamy sand, or very fine sandy loam in the fine-earth fraction.

Bedrock is slightly weathered schist, gneiss, phyllite, granite, or anorthosite.

COMPETING SERIES: There are no other series in this family.

The Glebe, Hogback and Tunbridge series are in related families. Glebe soils have a cryic temperature regime. Hogback soils are shallow. Tunbridge soils has less organic carbon in the spodic horizon.

GEOGRAPHIC SETTING: Rawsonville soils are on glaciated uplands. They are on mountain tops, mountain side slopes, ridges, hill tops, and hill slopes. Slope ranges from 3 to 70 percent. The soils formed in loamy glacial till of Wisconsin age. Mean annual precipitation ranges from about 790 to 2,420 mm, and the mean annual temperature ranges from -3 to 9 degrees C. The frost-free season ranges from about 60 to 120 days. Elevation is typically between 450 to 950 meters.

GEOGRAPHICALLY ASSOCIATED SOILS: The shallow Hogback and very deep Houghtonville soils are on similar landscapes. The very deep Mundal soils are moderately well drained, have a dense substratum, and are on slightly lower positions on the landscape. The very deep Ampersand soils are somewhat poorly drained, have a dense substratum, and are on nearly level to steep, shallow depressions and drainageways. The very deep Wilmington soils are poorly drained, have a dense substratum, and are on nearly level to sloping, concave, or depressional areas.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained. Estimated saturated hydraulic conductivity is moderately high or high in the mineral soil.

USE AND VEGETATION: Most areas are wooded. The common trees are white ash, American beech, yellow birch, paper birch, red maple, sugar maple, balsam fir, red spruce, white spruce, and eastern hemlock.

DISTRIBUTION AND EXTENT: Vermont, New Hampshire, Maine, and New York. MLRAs 143 and 144B. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Windham County, Vermont, 1984.

REMARKS: The diagnostic horizons and features recognized in this pedon are:
Folistic epipedon - the zone from 0 through 15 cm (Oe and Oa horizons).
Spodic horizon - the zone from 18 to 38 cm (Bhs horizon).
Lithic contact - bedrock at 81 cm from the soil surface.

ADDITIONAL DATA: Characterization data for Rawsonville and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

National Cooperative Soil Survey
U.S.A.

LOCATION TELOS ME

Established Series
Rev. KJL-LRF-MJK
07/2014

TELOS SERIES

The Telos series consists of somewhat poorly drained soils on till plains, hills, and ridges. They are shallow to dense lodgement till and very deep to bedrock. These soils formed in till. Saturated hydraulic conductivity is moderately high or high in the solum and low to moderately high in the substratum. Slope ranges from 0 to 25 percent. Mean annual temperature is about 4.4 degrees C, and mean annual precipitation is about 97 centimeters at the type location.

TAXONOMIC CLASS: Loamy, isotic, frigid, shallow Aquic Haplorthods

TYPICAL PEDON: Telos silt loam, on a 3 percent slope in a very stony forested area, at an elevation of about 500 meters. (Colors are for moist soil.)

Oi -- 0 to 5 centimeters; dark brown (7.5YR 3/4) slightly decomposed plant material; weak medium granular structure; very friable; common very fine and fine roots throughout; extremely acid; abrupt wavy boundary.

Oe -- 5 to 8 centimeters; black (10YR 2/1) moderately decomposed plant material; weak medium granular structure; very friable; few very fine roots throughout; extremely acid; abrupt wavy boundary. (Combined thickness of the O horizons is 5 to 18 centimeters.)

E -- 8 to 13 centimeters; light brownish gray (10YR 6/2) silt loam; weak medium subangular blocky structure; friable, common fine roots throughout; 5 percent gravel; extremely acid; abrupt wavy boundary. (0 to 15 centimeters thick.)

Bs -- 13 to 33 centimeters; brown (7.5YR 5/4) loam; weak medium subangular blocky structure; friable; common very fine to medium roots throughout; 5 percent gravels and 5 percent channers; very strongly acid; clear wavy boundary. (10 to 30 centimeters thick.)

BC -- 33 to 48 centimeters; light olive brown (2.5Y 5/4) loam; weak fine subangular blocky structure; friable; few very fine and fine roots throughout; 1 percent fine faint light yellowish brown (2.5Y 6/3), moist, areas of iron depletion throughout and 10 percent fine prominent strong brown (7.5YR 5/6), moist, masses of oxidized iron throughout; 5 percent gravels; strongly acid; clear wavy boundary. (0 to 18 centimeters thick.)

Cd -- 48 to 152 centimeters; olive (5Y 5/3) loam; structureless massive; firm; 1 percent fine prominent brownish yellow (10YR 6/8), moist, masses of oxidized iron throughout and 10 percent fine distinct light brownish gray (10YR 6/2), moist, areas of iron depletion throughout; 5 percent gravels and 5 percent channers; strongly acid.

TYPE LOCATION: Somerset County, Maine; Township 5, Range 15; 6.0 miles east of Ragmuff Road on the Bean Pot Road; USGS Bean Pot Pond, ME topographic quadrangle; Latitude 46 degrees, 5 minutes, 37.2 seconds N. and Longitude 69 degrees, 39 minutes, 30.9 seconds W., NAD 1927.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 33 to 50 centimeters. Thickness of the mineral soil over the dense till ranges from 25 to 50 centimeters. Depth to bedrock is more than 152 centimeters. Texture of the fine-earth fraction in the solum is silt loam, loam, very fine sandy loam, and fine

sandy loam. The weighted average of clay in the particle-size control section is 10 to 18 percent. Texture in the Cd layer is silt loam and loam in the fine-earth fraction. Rock fragment content ranges from 5 to 35 percent in the E or A horizons where present, and from 5 to 25 percent in the underlying material. Rock fragments are mainly channers and pebbles, but in the A and E horizons of some pedons they are mainly cobbles. Stones and boulders cover from 0 to 25 percent of the surface. Reaction ranges from extremely acid to moderately acid in the solum, and from strongly acid to slightly acid in the substratum.

The O horizon has a hue of 2.5YR to 10YR, value of 2 to 3, and chroma of 1 or 4.

Some areas have an Ap horizon with hue of 10YR and value and chroma of 3 or 4.

The E horizon has hue of 5YR to 10YR, value of 5 to 7, and chroma of 1 or 2. Consistence is very friable or friable.

The Bhs horizon has hue of 2.5YR or 5YR, with value and chroma of 2.5 or 3. The Bh horizon, where present, has hue of 7.5YR to 10YR, value of 2 to 3, and chroma of 2 or 3.

The Bs horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 4 to 8. Consistence is very friable or friable.

The BC horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 3 or 4. Consistence is friable or firm.

Some pedons ahave an E' horizon with hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 2. Consistence is friable or firm.

The Cd layer has hue of 2.5Y or 5Y, value of 3 to 5, and chroma of 1 to 4. It is massive or it has strong very coarse prisms which may part to weak to strong, thin to very thick plates, or moderate or strong, fine to coarse angular blocks. Arrangement of soil particles into structural aggregates is considered to be inherited from the parent material. Consistence is firm or very firm.

COMPETING SERIES: Colonel is the only other series in the same family. Colonel soils have less than 10 percent clay content in the particle-size control section.

Chesuncook, Daigle, Dixfield, Dixmont, Howland, Peru, Skerry, and Sunapee series are in related families. Chesuncook soils are moderately deep to dense till, moderately well drained, and do not have redox depletions within 16 inches from the mineral soil surface. Daigle soils from 18 to 27 percent clay content in the particle-size control section. Dixfield, Dixmont, Howland, Peru, Skerry, and Sunapee soils have less than 10 percent clay in the particle-size control section.

GEOGRAPHIC SETTING: Telos soils are on upland till plains, hills, and ridges. Slope ranges from 0 to 25 percent. The soils formed in dense glacial till derived mainly from slate and other dark colored sedimentary and metamorphic rocks. The climate is humid and cool temperate. The mean annual temperature ranges from 2 to 7 degrees C and mean annual precipitation ranges from 86 to 117 centimeters. The frost-free season ranges from 80 to 130 days. Elevation ranges from 100 to 840 meters above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Burnham, Chesuncook, Elliottsville, Monarda, Monson, Ragmuff, and Thorndike soils. The Burnham and Monarda soils occur in lower positions on the landscape and are wetter. Chesuncook soils are better drained and are in higher positions on the landscape. Elliottsville, Monson, Ragmuff, and Thorndike soils are shallower to bedrock and occur in higher positions on the landscape.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Somewhat poorly drained. Saturated hydraulic conductivity is moderately high or high in the mineral solum and low to moderately high in the substratum.

USE AND VEGETATION: Mostly forest. Common tree species include red spruce, white spruce, balsam fir, yellow birch, paper birch, and red maple.

DISTRIBUTION AND EXTENT: Maine. MLRA 143, 144B, and 146. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Soil survey of Franklin County Area and Part of Somerset County, Maine, 1992.

REMARKS: Series classification was revised 11/05 from Coarse-loamy, isotic, frigid, shallow Aquic Haplorthods to Loamy, isotic, frigid, shallow Aquic Haplorthods to reflect shallow characteristic. Competing series section revised 5/06 to reflect classification.

Diagnostic horizons and features recognized in this pedon include:

a. Albic horizon - the zone from 8 to 13 centimeters (E horizon).
b. Spodic horizon - the zone from 13 to 33 centimeters (Bhs and Bs1 horizons).
c. Cambic horizon - the zone from 33 to 48 centimeters (BC horizon).
c. Densic materials - firm, dense lodgement till at a depth of 48 centimeters.
d. Aquic conditions - redoximorphic features at 25 centimeters below the mineral soil surface.

Additional Data: This pedon is characterized by the National Soil Survey Laboratory in Lincoln Nebraska, reference pedon 09N0166. Climate data are from US official station #171472 Clayton Lake, Maine. Source of data used in establishing taxonomic class and range in characteristics is Maine Agricultural and Forest Experiment Station, Technical Bulletin 155, 1994; NRCS Characterization Data; and composite data from the Field Appraisal of Resource Management Systems compiled by Dr. Paul R. Hepler, of the Department of Plant and Soil Sciences, University of Maine, Orono, Maine.

National Cooperative Soil Survey
U.S.A.

Appendix C

Test Pit Logs

Appendix C

Test Pit Logs

Western Maine Renewables Project

TP-1

0”-3” 10YR 4/5 sandy loam; friable, little f-m roots; moist

3”-14” 2.5Y 4/2; friable; nickel-sized pieces of silty clay; likely fill; moist; common redox concentrations of 7.5YR 5/6 at 12” bgs

14”-28” 10YR4/3 sandy loam; dense; platey structure; 10% c.f.’s as f-c gravel; moist

28”-48” 10YR4/4 sandy loam; dense; 10% c.f.’s as f-c gravel, stones, cobbles and boulders; moist

TP-2

0”-15” 10YR 4/2 loamy m-c sand; v. friable; 15% c.f.’s as f-c gravel, stones, and cobbles; moist

15”-48” 10YR 4/3 sandy loam; dense; 15% c.f.’s as f-c gravel, stones, and cobbles; moist; Fe+ and Mg+ staining on grains at 26” bgs

TP-3

0”-3” 10YR 2/2 fine sandy loam; friable; increased organic matter content; many f-m roots; moist

3”-16” 2.5Y 5/1 silt loam; firm weak blocky structure; moist; common redox concentrations of 7.5YR 5/6 at 9’ bgs

16”-21” 2.5Y 5/3 sandy loam; friable; 5% c.f.s as f-c gravel; moist

21”-48” 10YR 5/1 silt loam; v. firm; moist; common redox concentrations throughout of 7.5YR 5/6; lenses of Gley 1 5/N in small discontinuous lenses about 1” thick

TP-4

0”-5” 10YR 3/2 loam; friable; some f-m roots; moist

5”-16” 2.5Y 4/2 silt loam; friable; 5% c.f.s as f-c gravel; moist

16”-24” 2.5Y 5/3 silt loam; firm; 5% c.f.s as f-c gravel; moist; common redox concentration of 7.5YR 5/6 at 16”

24”-48” 2.5Y 5/1 silt loam; v. firm; 5% c.f.s as f-c gravel; moist; common redox concentrations of 7.5YR 5/6

TP-5

0”-3” 10YR 3/2 sandy loam; friable; many f-m roots; moist

3”-15” 10YR 4/3 sandy loam; friable; few f. roots; 5% c.f.s as f-c gravel and stones; weak granular structure; moist

Abbreviations are defined at the end of this appendix

TP-5 (continued)

15”-32” 2.5Y 5/3 silt loam; v. firm; 5% c.f.s as f-c gravel and stones; weak platy structure; moist; common redox concentrations of 7.5YR 5/6 at 15” bgs

32”-48” Gley 1 6/N silt loam; v. firm; weak platy structure; moist; common redox concentrations of 7.5YR 5/6 throughout

TP-6

0”-2” Slightly decomposed organic matter; various colors

2”-8” 10YR 5/4 loam; many f-m roots; moist

8”-21” 10YR 5/2 silt loam; firm; 5% c.f.s as f-c gravel; moist; common redox concentrations of 7.5YR 5/6 and depletions of 10YR 7/1 at 11” bgs

21”-48” 2.5Y 4/3 silt loam; v. firm; weak blocky structure; moist; common redox concentrations of 7.5YR 5/6

TP-7

0”-2” Slightly decomposed organic matter; various colors

2”-19” 10YR 4/4 sandy loam; little f-m roots; 15% c.f.s as f-c gravel, stones, and cobbles; moist

19”-25” 10YR 4/3 silt loam; friable; 15% c.f.s as f-c gravel, stone, and cobbles; moist; common redox concentrations of 7.5YR 5/6 at 21” bgs

25”-48” Gley1 5/10N silt loam; firm; 10% c.f.s as f-c gravel, stone, cobbles, and boulders; moist; common redox concentrations of 7.5YR 5/6

TP-8

0”-5” 10YR 3/2 C. loamy sand; v. friable; some f. roots; 10% c.f.s as f-c gravel and stones; moist

5”-14” Salt/pepper c. sand; loose-single grained; trace f. roots; 15% c.f.s as f-c gravel and stones; moist; Fe+ staining on stones, gravel and ped faces at 12” bgs

14”-27” 2.5Y 3/3 loamy sand; friable; 15% c.f.s as f-c gravel and stones; moist

27”-48” 10YR 3/3 loamy sand; friable; singled grain-massive structure; moist

TP-9

0”-8” 10YR 3/2 sandy loam; friable; some f. roots; moist

8”-17” 2.5Y 4/3 loam; friable; 10% c.f.s as f-c gravel and stones; moist; common redox concentrations were present at 12” bgs with a color of 7.5YR 6/6

17”-24” 2.5Y 5/3; silt loam; v. firm; 10% c.f.s as f-c gravel and stones; moist

24”-48” Gley 15/N; silt loam; v. firm; blocky structure; 10% c.f.s as f-c gravel and stones; moist

Abbreviations are defined at the end of this appendix

TP-10

0”-1” 10YR 4/3 loamy sand; v. friable; many f. roots; moist

1”-23” Salt/pepper coarse sand; v. friable; filter fabric at 23” bgs; Fe+ staining on grains at 17” bgs; moist; fill

23”-48” 2.5Y 4/2 silty clay; soft; moist; common redox depletions of 10YR 7/1

TP-11

0”-12” 2.5Y 4/1 silt loam; soft; 10% c.f.s as f-c gravel, and stones; moist; common redox concentrations of 7.5YR 5/6 at 10” bgs

12”-17” 2.5Y 4/3 silt loam; friable; 10% c.f.s as f-c gravel, and stones; moist

17”-38” Channery; fractured bedrock

38” Refusal on bedrock

TP-12

0”-1” Slightly decomposed organic matter; various colors

1”-10” 10YR 5/2 silt loam; friable, 10% c.f.s as f-c gravel, and stones; some f-m roots; moist; common redox concentrations of 7.5YR 5/6 at 8” bgs; fill

10”-17” 10YR 4/4; sandy loam; friable; 10% c.f.s as f-c gravel, and stones; moist

17”-48” 10YR4/4 sandy loam; dense; platey structure; 15% c.f.’s as f-c gravel, stone, cobbles and boulders; moist

TP-13

0”-1” Slightly decomposed organic matter; various colors

1”-4” 10YR 3/3 loam; friable; some f-m roots; moist

4”-19” 2.5Y 6/2 silt loam; friable below 10”-top of horizon compacted; 5% c.f.s as f-c gravel and stones; moist; common redox concentrations of 7.5YR 5/6 at 8” bgs; fill

19”-48” 2.5Y 5/3 silt loam; firm; 5% c.f.s as f-c gravel; moist; common redox concentrations of 7.5YR 5/6 and depletions of 10YR 7/1

Water in pit at 44” bgs after logging

TP-14

0”-1” Slightly decomposed organic matter; various colors

1”-4” 10YR 3/2 sandy loam; friable; some f-m roots; moist

4”-16” 7.5YR 4/6 sandy loam; friable; some f. roots; 10% c.f.s as f-c gravel and stones; moist

Abbreviations are defined at the end of this appendix

TP-14 (continued)

16-21” 7.5YR 4/6 sandy loam; dense; weak platey structure; 10% c.f.s as f-c gravel and stones; partially cemented from 19” bgs to 21” bgs; moist

21”-31” 2.5Y 5/3 silt loam; firm; 15% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6 and depletions of 10YR 7/1 throughout

31” Likely Bedrock

TP-15

0”-1” Slightly decomposed organic matter; various colors

1”-3” 10YR 2/2 moderately decomposed organic matter; many f. roots; moist

3”-15” 2.5Y 3/3 sandy loam; friable; some f. roots; 10% c.f.s as f-c gravel, stones; moist

15”-19” 2.5Y 5/4 sandy loam; friable; 5% c.f.s as f-c gravel and stones; moist; common redox concentrations of 7.5YR 5/6 at 17”

19”-31” 2.5Y 5/3 loam; firm; 5% c.f.s as f-c gravel; moist; common redox concentrations of 7.5YR 5/6 at 17”

31”-48” 2.5Y 5/1 silt loam; v. firm; 5% c.f.s as f-c gravel; moist; common redox concentrations of 7.5YR 5/6 and depletions of 10YR 7/1

TP-16

0”-1” Slightly decomposed organic matter; various colors

1”-4” 10YR 3/2 sandy loam; friable; many f-m roots; 5% c.f.s as f-c gravel, and stones; moist

4”-9” 5YR 4/6 sandy loam; v. friable; 5% c.f.s as f-c gravel and stones; moist

9”-21” 7.5YR 3/4 sandy loam; friable; 5% c.f.s as f-c gravel; partially cemented from 18” to 21” bgs; moist

21”-28” 2.5Y 5/4 sandy loam; dense; 5% c.f.s as f-c gravel; moist; common redox concentrations of 7.5YR 6/6

28”-44” 10YR 5/3 sandy loam; v. dense; 5% c.f.s as f-c gravel; moist; common redox concentrations of 7.5YR 6/6 and depletions of 10YR 7/1

TP-17

0”-14” Salt and pepper c. sand; v. friable; 15% c.f.s as f-c gravel, and stones; moist

14”-27” 2.5Y 4/2 silt loam; firm; 10% c.f.s as f-c gravel; platey structure from 14”-17”; friable below 17” bgs; moist; common redox concentrations of 7.5YR 5/6 at 16” bgs

27”-48” Gley 1 5/N silty clay; v. firm; subangular blocky structure; common redox concentrations of 7.5YR 5/6 and depletions of 10YR 7/1

Abbreviations are defined at the end of this appendix

TP-18

0”-1” Slightly decomposed organic matter; various colors

1”-8” 10YR 3/2 sandy loam; v. friable; many f. roots and some m. roots; moist

8”-11” 2.5Y 5/4 sandy loam; friable; moist

11”-23” 2.5Y 5/2 silt loam; firm; 10% c.f.s as f-c gravel, and stones; dry

23” Likely bedrock

TP-19

0”-1” Slightly decomposed organic matter; various colors

1”-6” 10YR 4/4 sandy loam; v. friable; many f. roots; 5% c.f.s as f-c gravel, and stones; moist

6”-9” 7.5YR 6/6 sandy loam; friable; 5% c.f.s as f-c gravel and stones; few f-m roots; moist

9”-12” 10YR 5/6 sandy loam; partially cemented; weak platey structure; 5% c.f.s as f-c gravel; moist

12”-29” 2.5Y 6/3 silt loam; firm; 5% c.f.s as f-c gravel; weak platey structure; moist; common redox concentrations of 7.5YR 6/6

29”-48” 2.5 Y 4/2 silt loam; v. firm; 5% c.f.s as f-c gravel; moist; few redox depletions of 10YR 7/1

TP-20

0”-1” Slightly decomposed organic matter; various colors

1”-4.5” 10YR 3/3 sandy loam; friable; many f. roots; 5% c.f.s as f-c gravel, and stones; moist

4.5”-10” 2.5Y 4/2 silt loam; friable; 5% c.f.s as f-c gravel and stones; subangular blocky structure; moist; common redox concentrations of 7.5YR 6/6 at 9” bgs

10”-16” 10YR 5/6 silt loam; partially cemented; weak platey structure; 5% c.f.s as f-c gravel; moist

16”-49” Gley 2 5/5BG silt loam; v. firm; 5% c.f.s as f-c gravel, stones, and cobbles; weak platey structure; moist; common redox concentrations of 7.5YR 6/6

TP-21

0”-1” Slightly decomposed organic matter; various colors

1”-21 10YR 4/4 sandy loam; friable; 0many f. roots; 15% c.f.s as f-c gravel, and stones; moist; fill

21”-31” 10YR 5/2 silt loam; firm; 20% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; common redox concentrations of 7.5YR 6/6 throughout; fill

31”-36” 10YR 3/2 silt loam; friable; moist

36”-42” 10YR 4/4 silt loam; friable; few fine roots; moist

Abbreviations are defined at the end of this appendix

TP-21 (continued)

42”-48” Gley 2 5/5BG silty clay; v. firm; 5% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 6/6 throughout

TP-30

0”-2” Slightly decomposed organic matter; various colors

2”-4” 10YR 2/2 moderately decomposed organic matter; some f-m roots; moist

4”-7” 10YR 3/3 gravelly sandy loam; friable; few f-m roots; blocky structure; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; saturated

7”-17” 10YR 4/3 loam; friable; few f-m roots; blocky structure; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; saturated

17”-23” 2.5Y 4/3 sandy loam; dense; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; saturated; common redox concentrations of 7.5YR 5/6

23”-48” Gley 1 5/10Ysilt loam; v. dense; common redox concentrations of 7.5YR 5/6

TP-31

0”-2” Slightly decomposed organic matter; various colors

2”-4” 10YR 2/2 moderately decomposed organic matter; some f-m roots; moist

4”-8” 10YR 3/3 loam; friable; some f-m roots; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; saturated

8”-18” 10YR 4/3 gravelly sandy loam; friable; 25% c.f.s as f-c gravel, stones, cobbles, and boulders; saturated

18”-29” 2.5Y 5/4 silt loam; firm; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; saturated common depletions at 18” of 10YR 7/1

29”-48” Gley 1 5/10Y silt loam; v. dense; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; common redox concentrations of 7.5YR 5/6; moist

TP-32

0”-2” Slightly decomposed organic matter; various colors

2”-3” 10YR 2/2 moderately decomposed organic matter; some f-m roots; moist

3”-18” 10YR 3/3 sandy loam; friable; some f-m roots; 10% c.f.s as f-c gravel, stones, and cobbles; saturated; weak cementation from 16”-18” bgs

18”-29” 2.5Y 5/3 sandy loam; friable; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; saturated common depletions of 10YR 7/1 and concentrations of 7.5YR 5/6 throughout

Abbreviations are defined at the end of this appendix

TP-32 (continued)

29”-48” 2.5Y 5/1 silt loam; v. firm; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; common redox concentrations of 7.5YR 5/6; moist

TP-33

0”-2” Slightly decomposed organic matter; various colors

2”-4” 10YR 2/2 moderately decomposed organic matter; many f. roots; moist

4”-7” 10YR 3/2 fine sandy loam; friable; some f. roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist

7”-16” 2.5Y 4/3 gravelly sandy loam; friable; 15% c.f.s as f-c gravel, stones, and cobbles; saturated; common redox concentrations of 7.5YR 5/6

16”-23” 10YR 3/3 gravelly loamy sand; v. friable; 10% c.f.s as f-c gravel, stones, and cobbles; saturated; common depletions of 10YR 7/1 at 18”

23”-48” 2.5Y 4/3 sandy loam; dense; 15% c.f.s as f-c gravel, stones, cobbles, and boulders; moist

Seeps on pit wall at 15” bgs and free water at 34” bgs after logging pit

TP-34

0”-1” Slightly decomposed organic matter; various colors

1”-4” 10YR 4/3 sandy loam; friable; some f-m roots; 15% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; fill

4”-33” 2.5Y 5/2 loamy sand; friable; 15% c.f.s as f-c gravel, stones, cobbles, and boulders; 5% woody debris; moist; Fe+ staining on grains and c.f.s at 14” bgs; filter fabric at 33” bgs

33”-36” 10YR 4/4 sandy loam; friable; moist

36”-44” 2.5Y 4/4 sandy loam; dense; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; moist

44”-50” 5Y 5/2 sandy loam; v. dense; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; common redox concentrations of 7.5YR 5/6

TP-35

0”-2” Slightly decomposed organic matter; various colors

2”-4” 10YR 2/2 moderately decomposed organic matter; many f. roots; moist

4”-11” 2.5YR 3/3 loam; friable; some f-m roots; 15% c.f.s as f-c gravel, stones, cobbles, and boulders; saturated

11”-22” 10YR 3/3 loamy c. sand; friable; 20% c.f.s as f-c gravel, and stones; saturated; common redox depletions of 10YR 6/1 and Fe+ stains on grains

22”-33” 2.5Y 6/3 sandy loam; dense; 15% c.f.s as f-c gravel, stones, and cobbles; saturated

Abbreviations are defined at the end of this appendix

TP-35 (continued)

33”-48” 2.5Y 4/3 sandy loam; dense; 15% c.f.s as f-c gravel, stones, cobbles, and boulders; moist

Groundwater seep at 18” bgs

TP-35A

0”-2” Slightly decomposed organic matter; various colors; many f. roots

2”-17” 7.5YR 3/2 sandy loam; friable; few f-m roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6 at 9” bgs; soft silt masses of 2.5Y 7/1 at 11” bgs

17”-48” 2.5Y 5/2 silt loam; firm; 15% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; common redox concentrations of 7.5YR 5/6

TP-36

0”-2” Slightly decomposed organic matter; various colors

2”-4” 10YR 3/2 moderately decomposed organic matter; many f. roots; moist

4”-15” 2.5YR 5/2 sandy loam; friable; some f-m roots; 15% c.f.s as f-c gravel, stones, cobbles, and boulders; saturated; common redox concentrations of 7.5YR 5/6 at 6” bgs

Pit collapsing and underwater; gleyed silty clay seen in bucket from around 32” bgs

Groundwater seeps at 15” bgs; water fills pit to within 6” bgs by end of logging.

TP-37

0”-2” Slightly decomposed organic matter; various colors

2”-6” 10YR 2/2 moderately decomposed organic matter; many f. roots; saturated

6”-9” 10YR 2/2 sandy loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; saturated

9”-22” Gley 1 5/10Y silt loam; friable turning firm at 20” bgs; 10% c.f.s as f-c gravel, and stones; saturated; co common redox concentrations of 7.5YR 5/6

From 22” to about 44” bgs, firm silt loam was observed; water seeping into pit rapidly; pit collapses when about 44” bgs is reached.

TP-38

0”-2” Slightly decomposed organic matter; various colors

2”-3” 10YR 2/2 moderately decomposed organic matter; many f. roots; moist

3”-9” 2.5Y 5/2 sandy loam; friable; moist; common redox depletions of 10YR 7/1 at 8” bgs

9”-23” 7.5YR 2.5/2 sandy loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; moist

TP-38 (continued)

23”-34” 2.5Y 5/3 loamy sand; dense; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 6/6 throughout

34”-48” 5Y 5/3 sandy loam; dense; 15% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; many redox concentrations of 7.5YR 6/6 throughout

TP-39

0”-1” Slightly decomposed organic matter; various colors

1”-3” 10YR 2/2 moderately decomposed organic matter; many f. roots; moist

3”-21” 10YR 4/3 sandy loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 6/6 at 11” bgs; fill

21”-31” 7.5YR 2.5/2 sandy loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 6/6

31”-50” 2.5Y 4/3 silt loam; firm; 10% c.f.s as f-c gravel, stones, and cobbles; moist

TP-40

0”-2” Slightly decomposed organic matter; various colors

2”-4” 10YR 2/2 moderately decomposed organic matter; many f. roots; moist

4”-10” 10YR 4/4 sandy loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; many f. roots and some m. roots; saturated

10”-17” 10YR 4/3 sandy loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; saturated; common redox concentrations of 7.5YR 6/6 at 15” bgs

17”-28” 2.5Y 5/3 sandy loam; dense; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 6/6 throughout

28”-50” 2.5Y 5/3 loamy sand; v. dense; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 6/6 throughout

Seep of groundwater at 17” bgs

TP-41

0”-2” Slightly decomposed organic matter; various colors

2”-4” 10YR 2/2 moderately decomposed organic matter; many f. roots; moist

4”-7” 7.5YR 3/3 silt loam; some f-m roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist

7”-15” 7.5YR 5/2 silt loam; firm; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6 at 14” bgs

15”-19” 7.5YR 3/3 c. loamy sand; friable; moist

Abbreviations are defined at the end of this appendix

TP-41 (continued)

19”-29” 2.5Y 6/3 silt loam; firm; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6

29”-52” 2.5Y 5/2 silt loam; v. firm; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; common redox concentrations of 7.5YR 5/6

TP-42

0”-29” 2.5Y 3/2 c. loamy sand; v. friable; 20% c.f.s as f-c gravel, stones, cobbles, and boulders; moist

29”-34” 2.5Y 5/3 silt loam; firm; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; common redox concentrations of 7.5YR 5/6 throughout

34”-45” 10YR 4/3 gravelly loamy sand; friable; 15% c.f.s as f-c gravel, stones, and cobbles; moist

45”-50” 2.5Y 5/1 loamy sand; friable; 15% c.f.s as f-c gravel, stones, cobbles, and boulders; moist

TP-43

0”-18” 10YR 5/3 c. loamy sand; v. friable; 15% c.f.s as f-c gravel, and stones; moist

18” filter fabric

18”-31” 2.5Y 5/3 sandy loam; dense; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; common redox concentrations of 7.5YR 5/6 and depletions of 10YR 7/1 throughout

31”-48” 5Y 4/2 sandy loam; dense; 15% c.f.s as f-c gravel, stones, and cobbles; moist; communication wire in hole at 32” bgs

TP-44

0”-13.5” 10YR 5/3 c. loamy sand; friable; 15% c.f.s as f-c gravel, stones, and cobbles; moist; slightly cemented at 4: bgs with Fe+

13.4”-29” 5Y 4/2 silt loam; firm; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; common redox depletions of 10YR 7/1 at 16”

29”-34” 7.5YR 6/6 silt loam; friable; 10% c.f.s as f-c gravel, and stones; moist

34”-48” 5Y 4/2 silt loam; v. firm; 15% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; subangular blocky structure; Mg+ staining on ped faces

TP-45

0”-14” 10YR 5/3 c. loamy sand; friable; 15% c.f.s as f-c gravel, and stones; moist

14”-27” 2.5Y 4/2 silt loam; firm; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; common redox concentrations of 7.5YR 5/6 throughout

27”-48” Gley 15/10Y silt loam; v. firm; 10% c.f.s as f-c gravel, stones, and cobbles; moist; Mg+ and Fe+ staining on ped faces

Abbreviations are defined at the end of this appendix

TP-46

0”-34” 10YR 4/3 c. loamy sand; friable; 20% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; common redox concentrations of 7.5YR 5/6 at 12”

34” Filter fabric

24”-48” 2.5Y 4/2 silt loam; firm; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; common redox depletions of 10YR 7/1 throughout and Fe+ staining on ped faces

TP-100

0”-1” Slightly decomposed organic matter; various colors

1”-3” 10YR 4/3 sandy loam; friable; few f. roots; moist

3”-5” 10YR 4/4 sandy loam; friable; moist

5” Bedrock

TP-101

0”-1” Slightly decomposed organic matter; various colors

1”-3” 10YR 4/3 sandy loam; friable; few f. roots; moist

3”-9” 10YR 4/4 sandy loam; friable; moist

9” Bedrock

TP-102

0”-1” Slightly decomposed organic matter; various colors

1”-8” 5YR 3/4 sandy loam; friable; some f-m roots; moist

8” Bedrock

TP-103

0”-1” Slightly decomposed organic matter; various colors

1”-6” 10YR 3/2 sandy loam; friable; some f-m roots; moist

6” Bedrock

TP-104

0”-1” Slightly decomposed organic matter; various colors

1”-6” 10YR 4/4 sandy loam; friable; few f. roots; moist

6”-17” 2.5Y 5/3 fine sandy loam; friable; few f. roots; dry

17”-28” 2.5Y 5/3 fine sandy loam; friable; few f. roots; dry

Abbreviations are defined at the end of this appendix

TP-104 (continued)

28” Bedrock

TP-105

0”-1” Slightly decomposed organic matter; various colors

1”-15” 2.5Y 5/4 fine sandy loam; friable; few f. roots; 5% c.f.s as f-c gravel, and stones; moist

15”-33” 2.5Y 5/3 sandy loam; dense; 15% c.f.s as f-c gravel, stones, and cobbles; dry

33” Bedrock

TP-106

0”-1” Slightly decomposed organic matter; various colors

1”-7” 7.5YR 6/6 fine sandy loam; friable; some f. roots; moist

7”-9” 10YR 4/4 fine sandy loam; friable; dry

9” Bedrock

TP-107

0”-1” Slightly decomposed organic matter; various colors

1”-7” 10YR 2/2 sandy loam; friable; many f-m roots; 5% c.f.s as f-c gravel, and stones; moist

7”-17” 10YR 4/4 fine sandy loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; few f. roots; dry

17”-26” 2.5Y 5/4 fine sandy loam; dense and partially cemented at 19” bgs; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6 at 17”bgs

26”-48” 10YR 5/2 fine sandy loam; dense; 10% c.f.s as f-c gravel, stones, and cobbles; Fe+ staining on grains and gravel; dry

TP-108

0”-1” Slightly decomposed organic matter; various colors

1”-7” 10YR 4/4 fine sandy loam; v. friable; some f-m roots; 5% c.f.s as f-c gravel, stones, and cobbles; moist

7”-17” 2.5Y 5/3 fine sandy loam; friable; few f. roots; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; dry

17”-19” Fractured rock

19” Bedrock

TP-109

0”-1” Slightly decomposed organic matter; various colors

Abbreviations are defined at the end of this appendix

TP-109 (continued)

1”-5”	10YR 2/2 sandy loam; v. friable; some f-m roots; 5% c.f.s as f-c gravel, and stones; moist
5”-8”	10YR 4/4 fine sandy loam; friable; 5% c.f.s as f-c gravel, and stones; few f. roots; dry
8”-23”	2.5Y 5/3 fine sandy loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; moist
23”-32”	2.5Y 5/2 fine sandy loam; dense; 10% c.f.s as f-c gravel, stones, and cobbles; dry; common redox concentrations of 7.5YR 5/6 at 23”
32”	Bedrock

TP-110

0”-2”	Slightly decomposed organic matter; various colors
2”-7”	10YR 4/4 sandy loam; friable; some f-m roots; 5% c.f.s as f-c gravel, and stones; moist
7”-16”	2.5Y 5/3 fine sandy loam; friable; 5% c.f.s as f-c gravel, and stones; few f. roots; dry
16”-37”	2.5Y 5/2 fine sandy loam; dense; weak platey structure; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6 at 17”
37”	Fractured bedrock
38”	Bedrock

TP-111

0”-2”	Slightly decomposed organic matter; various colors
2”-8”	7.5YR 5/8 fine sandy loam; v. friable; some f-m roots; 5% c.f.s as f-c gravel, and stones; moist
8”-21”	2.5Y 5/6 fine sandy loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; few f. roots; dry
21”-33”	2.5Y 5/4 fine sandy loam; dense; 15% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6 at 21”
33”-48”	10YR 5/2 fine sandy loam; dense; 20% c.f.s as f-c gravel, stones, and cobbles; dry; common redox concentrations of 7.5YR 5/6 at 23”

TP-112

0”-1”	Slightly decomposed organic matter; various colors
1”-3”	10YR 4/2 moderately decomposed organic matter; many f. roots; moist
3”-16”	10YR 4/4 fine sandy loam; friable; some f-m roots; 5% c.f.s as f-c gravel, and stones; moist
16”-27”	2.5Y 5/4 fine sandy loam; dense; 5% c.f.s as f-c gravel, and stones increasing with depth; few f. roots; dry; common redox concentrations of 7.5YR 4/6 at 17”
27”-48”	2.5Y 5/2 fine sandy loam; dense; 15% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6

Abbreviations are defined at the end of this appendix

TP-113

0”-1” Slightly decomposed organic matter; various colors

1”-4” 10YR 4/4 sandy loam; friable; few f. roots; 5% c.f.s as f-c gravel, and stones; dry

4”-15” 2.5Y 5/3 fine sandy loam; friable; few f. roots; 5% c.f.s as f-c gravel, and stones; dry

15”-17” Fractured rock

17” Bedrock

TP-114

0”-2” Slightly decomposed organic matter; various colors

2”-3” 10YR 4/2 moderately decomposed organic matter; many f. roots; moist

3”-14” 10YR 4/4 fine sandy loam; v. friable; some f-m roots; 15% c.f.s as f-c gravel, and stones; moist

14”-30” 2.5Y 5/3 fine sandy loam; dense; 15% c.f.s as f-c gravel, stones, and cobbles increasing with depth; moist; common redox concentrations of 7.5YR 5/6 at 16”

30”-48” 2.5Y 5/2 fine sandy loam; v. dense; 20% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6

TP-115

0”-1” Slightly decomposed organic matter; various colors

1”-14” 10YR 4/4 sandy loam; friable; some f-m roots; 5% c.f.s as f-c gravel, and stones; moist

14”-17” 2.5Y 4/3 fine sandy loam; dense; 10% c.f.s as f-c gravel, and stones; weak platey structure; moist

17”-24” 2.5Y 5/2 fine sandy loam; dense; weak platey structure; 15% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6 at 18”

24” Fractured bedrock

29” Bedrock

TP-116

0”-2” Slightly decomposed organic matter; various colors

2”-5” 7.5YR 3/4 sandy loam; v. friable; some f-m roots; 5% c.f.s as f-c gravel, and stones; moist

5”-16” 10YR 4/4 fine sandy loam; friable; 10% c.f.s as f-c gravel, and stones; few f. roots; moist

16”-27” 2.5Y 5/3 fine sandy loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; moist

27” Bedrock

Abbreviations are defined at the end of this appendix

TP-117

0”-2” Slightly decomposed organic matter; various colors

2”-6” 7.5YR 4/4 sandy loam; friable; some f-m roots; 5% c.f.s as f-c gravel, and stones; moist

6”-13” 10YR 4/3 fine sandy loam; dense; 10% c.f.s as f-c gravel, and stones; moist

13”-24” 2.5Y 4/2 fine sandy loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 4/6 at 22”

24”-41” 2.5Y 4/3 fine sandy loam; v. dense; 15% c.f.s as f-c gravel, stones, and cobbles; moist

41” Bedrock

TP-118

0”-2” Slightly decomposed organic matter; various colors

2”-7” 7.5YR 3/2 fine sandy loam; v. friable; some f-m roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist

7”-18” 2.5Y 5/4 fine sandy loam; friable; 10% c.f.s as f-c gravel, and stones increasing with depth; few f. roots; dry; common redox concentrations of 7.5YR 4/6 and depletions of 10YR 7/1 at 17”; Fe+ staining on grains

18”-29” 2.5Y 5/4 fine sandy loam; dense; 5% c.f.s as f-c gravel, stones, and cobbles; moist

27”-48” 2.5Y 4/2 fine sandy loam; v. dense; 15% c.f.s as f-c gravel, stones, and cobbles; moist

TP-119

0”-2” Slightly decomposed organic matter; various colors

2”-5” 10YR 3/2 sandy loam; friable; some f-m roots; moist

5”-7” Fractured rock

7” Bedrock

TP-120

0”-2” Slightly decomposed organic matter; various colors

2”-3” 7.5YR 3/2 fine sandy loam; v. friable; many f roots; moist

3”-9” 7.5YR 4/4 fine sandy loam; friable; 10% c.f.s as f-c gravel, and stones increasing with depth; some f-m roots; dry

9”-16” 2.5Y 5/4 fine sandy loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; moist

16”-29” 2.5Y 6/3 fine sandy loam; dense; weak platey structure; 15% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 4/6 and depletions of 10YR 7/1 at 16.5” bgs

Abbreviations are defined at the end of this appendix

TP-120 (continued)

29”-50” 2.5Y 4/2 fine sandy loam; v. dense; 15% c.f.s as f-c gravel, stones, and cobbles; moist

50” Bedrock

TP-121

0”-2” Slightly decomposed organic matter; various colors

2”-4” 10YR 2/2 moderately decomposed organic matter; many f. roots; moist

4”-15” 2.5Y 4/3 silt loam; friable; few f. roots; 15% c.f.s as f-c gravel, stones, cobbles, boulders; moist

15”-21” 7.5YR 5/2 silt loam; firm; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 4/6 and depletions of 10YR 7/1 at 17” bgs

19”-29” 2.5Y 6/3 silt loam; firm; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6

29”-48” 2.5Y 5/2 silt loam; v. firm; 15% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; common redox concentrations of 7.5YR 6/6

48” Likely bedrock

TP-122

0”-2” Slightly decomposed organic matter; various colors

2”-4” 10YR 4/2 moderately decomposed organic matter; many f. roots; moist

4”-17” 7.5YR 4/4 fine sandy loam; friable; few f. roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist

17”-22” 2.5Y 4/4 fine sandy loam; dense; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 4/6 at 16”

22”-29” 2.5Y 6/2 fine sandy loam; v. dense; 15% c.f.s as f-c gravel, stones, and cobbles; moist

29” Bedrock

TP-123

0”-2” Slightly decomposed organic matter; various colors

2”-4” 10YR 4/2 moderately decomposed organic matter; many f. roots; moist

4”-20” 10YR 3/3 loam; friable; some f-m roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist

20”-27” 2.5Y 4/4 silt loam; firm; 10% c.f.s as f-c gravel, stones, and cobbles; platey structure; moist; common redox concentrations of 7.5YR 4/6 at 15”

22”-29” 2.5Y 6/2 fine sandy loam; v. dense; 15% c.f.s as f-c gravel, stones, and cobbles; moist

29” Bedrock

Abbreviations are defined at the end of this appendix

TP-124

0”-19” 2.5Y 5/1 c. loamy sand; v. friable; 20% c.f.s as f-c gravel, stones, cobbles, and boulders; few m. roots; moist; fill

19”-29” 2`.5Y 4/2 silt loam; firm; 15% c.f.s as f-c gravel, stones, cobbles, and boulders; moist; common redox concentrations of 7.5YR 5/6 at 20”

29”-48” 2.5Y 5/1 silt loam; v. firm; friable; 15% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 4/6 and depletions of 10YR 7/1

TP-125

0”-2” Slightly decomposed organic matter; various colors

2”-3” 10YR 2/2 moderately decomposed organic matter; many f. roots; moist

3”-6” 10YR 2/2 loam; some f. roots; moist

6”-12” 2.5Y 5/2 silt loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; moist

12”-28” 2.5Y 5/1 silt loam; firm; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6 at 12” bgs

28”-48” 2.5Y 6/3 silt loam; v. firm; 15% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6 and depletions of 10YR 7/1

TP-126

0”-2” Slightly decomposed organic matter; various colors

2”-3” 10YR 2/2 moderately decomposed organic matter; some f-m roots; moist

3”-6” 10YR 3/2 fine sandy loam; friable; many f-m roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist

6”-19” 7.5YR 5/3 sandy loam; v. friable; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; moist

19”-25” 2.5Y 5/3 sandy loam; friable; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; moist common depletions of 10YR 7/1 and concentrations of 7.5YR 5/6 throughout

25”-48” 5Y 4/2 silt loam; firm; 15% c.f.s as f-c gravel, stones, cobbles, and boulders; moist

TP-127

0”-2” Slightly decomposed organic matter; various colors

2”-12” 2.5Y 5/2 fine sandy loam; friable; some f. roots; 5% c.f.s as f-c gravel, stones, and cobbles; weak platey structure; moist; common redox concentrations of 7.5YR 5/6 at 9” bgs

12”-21” 5YR 4/3 gravelly c. sand; partially cemented; platey structure; 15% c.f.s as f-c gravel, stones, and cobbles; moist; Fe+ staining on grains

Abbreviations are defined at the end of this appendix

TP-127 (continued)

21”-29” 7.5YR 4/3 gravelly loamy sand; v. dense and cemented; 10% c.f.s as f-c gravel, stones, and cobbles; moist

29”-48” 2.5Y 5/2 silt loam; v. firm; 20% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 5/6 throughout

TP-128

0”-1” Slightly decomposed organic matter; various colors

1”-2” 10YR 2/2 moderately decomposed organic matter; some f-m roots; moist

2”-7” 10YR 4/4 loam; friable; some f roots; 5% c.f.s as f-c gravel, stones, and cobbles; moist

7”-17” 2.5Y 5/3 sandy loam; friable; 5% c.f.s as f-c gravel, stones, cobbles, and boulders; weak platey structure; moist; common depletions of 10YR 7/1 at 17”

17”-22” 2.5Y 5/3 gravelly loam; friable; 5% c.f.s as stones, and cobbles; moist

22”-27” 2.5Y 5/4 silt loam; firm; 5% c.f.s as f-c gravel, stones, cobbles, and boulders; weak platey structure; moist; Fe+ staining on c.f.s

27”-38” 5Y 5/4 silt loam; firm; 10% c.f.s as f-c gravel, stones, cobbles, and boulders; weak platey structure; moist; Mg+ staining on ped faces

38” Bedrock

TP-129

0”-2” Slightly decomposed organic matter; various colors

2”-3” 10YR 2/2 moderately decomposed organic matter; some f. roots; moist

2”-6” 10YR 4/4 loam; friable; some f-m roots; 15% c.f.s as f-c gravel, and stones; moist

6”-23” 2.5Y 4/2 silt loam; friable; 15% c.f.s as f-c gravel, stones, and cobbles; weak platey structure from 12” to 23” bgs; moist; common redox concentrations of 7.5YR 5/6 at 12” bgs

23” Bedrock

TP-130

0”-2” Slightly decomposed organic matter; various colors

2”-3” 10YR 2/2 moderately decomposed organic matter; some f. roots; moist

3”-6” 10YR 4/4 loam; friable; some f-m roots; 10% c.f.s as f-c gravel, stones, cobbles; moist

6”-14” 2.5Y 5/2 loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; weak platey structure from 12” to 23” bgs; moist; common redox concentrations of 7.5YR 5/6 at 9” bgs

14” Bedrock

Abbreviations are defined at the end of this appendix

TP-131

0”-2”	Slightly decomposed organic matter; various colors
2”-3”	10YR 2/2 moderately decomposed organic matter; some f. roots; moist
3”-8”	10YR 4/4 loam; friable; some f. roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist
8”-15”	10YR 6/6 loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 6/8 at 12” bgs
15”-24”	10YR 3/3 loam; friable; some f-m roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist
24”	Bedrock

TP-132

0”-1”	Slightly decomposed organic matter; various colors
1”-2”	10YR 2/2 moderately decomposed organic matter; some f. roots; moist
2”-5”	7.5YR 4/4 loam; friable; some f. roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist
5”-11”	10YR 4/4 loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; some f. roots; moist
11”-18”	2.5Y 4/3 sandy loam; friable; some f-m roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist
18”	Bedrock

TP-133

0”-2”	Slightly decomposed organic matter; various colors
2”-3”	10YR 2/2 moderately decomposed organic matter; some f. roots; moist
3”-7”	7.5YR 4/4 loam; friable; some f. roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist
7”-16”	10YR 4/4 loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; some f. roots; moist
16”-24”	2.5Y 4/3 sandy loam; friable; some f-m roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 6/8 at 16.5” bgs
24”	Bedrock

TP-134

0”-2”	Slightly decomposed organic matter; various colors
2”-3”	10YR 2/2 moderately decomposed organic matter; some f. roots; moist
3”-6”	7.5YR 4/4 loam; friable; some f. roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist
6”-15”	10YR 4/4 loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; some f. roots; moist
15”-19”	2.5Y 4/3 loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; moist; common redox concentrations of 7.5YR 6/8 at 15” bgs

Abbreviations are defined at the end of this appendix

TP-134 (continued)

19” Bedrock

TP-135

0”-2” Slightly decomposed organic matter; various colors

2”-3” 10YR 2/2 moderately decomposed organic matter; some f. roots; moist

3”-10” 10YR 4/3 loam; friable; some f. roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist

10”-12” 2.5Y 4/3 loam; friable; 15% c.f.s as f-c gravel, stones, and cobbles; moist; few redox concentrations of 7.5YR 6/6

12” Bedrock

TP-136

0”-1” Slightly decomposed organic matter; various colors

1”-2” 10YR 2/2 moderately decomposed organic matter; some f. roots; moist

2”-8” 10YR 4/4 loam; friable; some f. roots; 10% c.f.s as f-c gravel, stones, and cobbles; moist

8”-13” 10YR 4/3 loam; friable; 15% c.f.s as f-c gravel, stones, and cobbles; moist

13” Fractured bedrock

14” Bedrock

TP-137

0”-1” Slightly decomposed organic matter; various colors

1”-2” 10YR 2/2 moderately decomposed organic matter; some f. roots; moist

2”-6” 7.5YR 4/4 loam; friable; some f. roots; 5% c.f.s as f-c gravel, stones, and cobbles; moist

6”-17” 10YR 4/3 loam; friable; 10% c.f.s as f-c gravel, stones, and cobbles; moist

17” Bedrock

Note: All soil structures are granular unless otherwise noted.

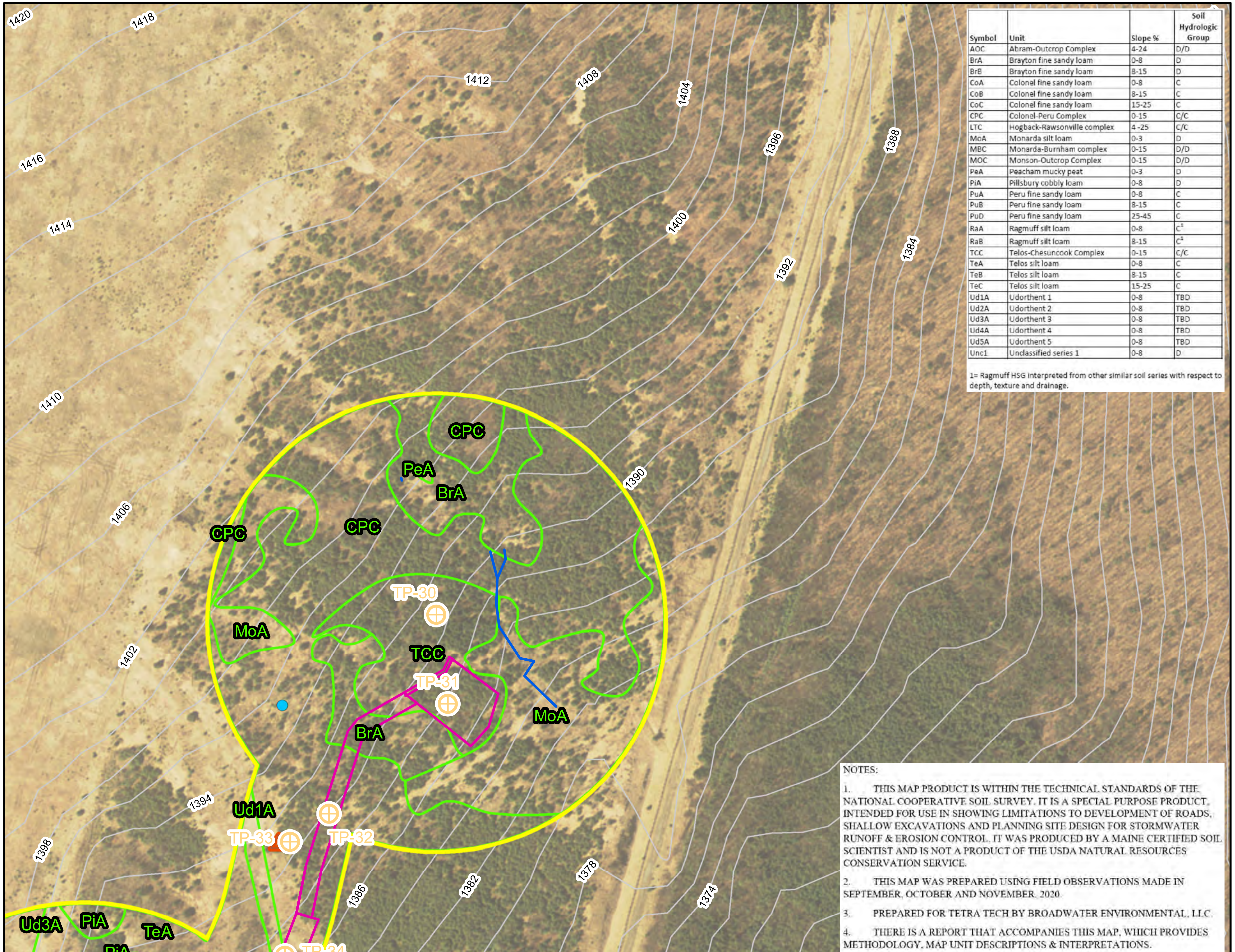
Abbreviations

v.=very
f-m=fine to medium
f.=fine
m.= medium
c. =coarse
f-c=fine to coarse
c.f.s=coarse fragments
bgs=below ground surface

Abbreviations are defined at the end of this appendix

Appendix D

Class B Soil Map



Symbol	Unit	Slope %	Soil Hydrologic Group
AOC	Abram-Outcrop Complex	4-24	D/D
BrA	Brayton fine sandy loam	0-8	D
BrB	Brayton fine sandy loam	8-15	D
CoA	Colonel fine sandy loam	0-8	C
CoB	Colonel fine sandy loam	8-15	C
CoC	Colonel fine sandy loam	15-25	C
CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru fine sandy loam	0-8	C
PuB	Peru fine sandy loam	8-15	C
PuD	Peru fine sandy loam	25-45	C
RaA	Ragmuff silt loam	0-8	C[1]
RaB	Ragmuff silt loam	8-15	C[1]
TCC	Telos-Chesuncook Complex	0-15	C/C
TeA	Telos silt loam	0-8	C
TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
Unc1	Unclassified series 1	0-8	D

1= Ragmuff HSG interpreted from other similar soil series with respect to depth, texture and drainage.

NOTES:

1. THIS MAP PRODUCT IS WITHIN THE TECHNICAL STANDARDS OF THE NATIONAL COOPERATIVE SOIL SURVEY. IT IS A SPECIAL PURPOSE PRODUCT, INTENDED FOR USE IN SHOWING LIMITATIONS TO DEVELOPMENT OF ROADS, SHALLOW EXCAVATIONS AND PLANNING SITE DESIGN FOR STORMWATER RUNOFF & EROSION CONTROL. IT WAS PRODUCED BY A MAINE CERTIFIED SOIL SCIENTIST AND IS NOT A PRODUCT OF THE USDA NATURAL RESOURCES CONSERVATION SERVICE.

2. THIS MAP WAS PREPARED USING FIELD OBSERVATIONS MADE IN SEPTEMBER, OCTOBER AND NOVEMBER, 2020.

3. PREPARED FOR TETRA TECH BY BROADWATER ENVIRONMENTAL, LLC.

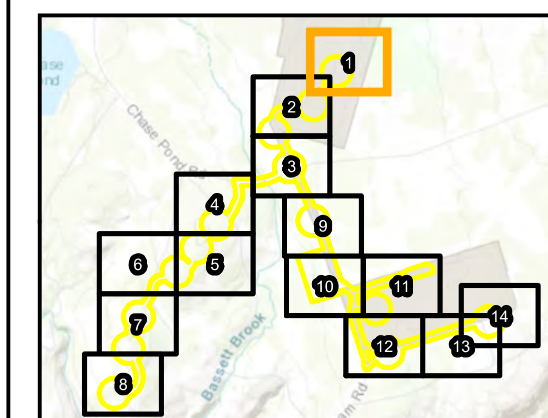
4. THERE IS A REPORT THAT ACCOMPANIES THIS MAP, WHICH PROVIDES METHODOLOGY, MAP UNIT DESCRIPTIONS & INTERPRETATIONS.

Legend

- Study
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Potential Outcrop
- Wet Spot



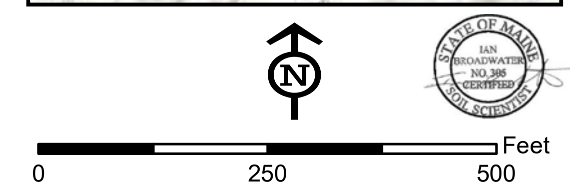


Figure 2
Class B Soil Map
Plate 1 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Not for Construction

Symbol	Unit	Slope %	Soil Hydrologic Group
AOC	Abram-Outcrop Complex	4-24	D/D
BrA	Brayton fine sandy loam	0-8	D
BrB	Brayton fine sandy loam	8-15	D
CoA	Colonel fine sandy loam	0-8	C
CoB	Colonel fine sandy loam	8-15	C
CoC	Colonel fine sandy loam	15-25	C
CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru fine sandy loam	0-8	C
PuB	Peru fine sandy loam	8-15	C
PuD	Peru fine sandy loam	25-45	C
RaA	Ragmuff silt loam	0-8	C[1]
RaB	Ragmuff silt loam	8-15	C[1]
TCC	Telos-Chesuncook Complex	0-15	C/C
TeA	Telos silt loam	0-8	C
TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
Unc1	Unclassified series 1	0-8	D

1= Ragmuff HSG interpreted from other similar soil series with respect to depth, texture and drainage.

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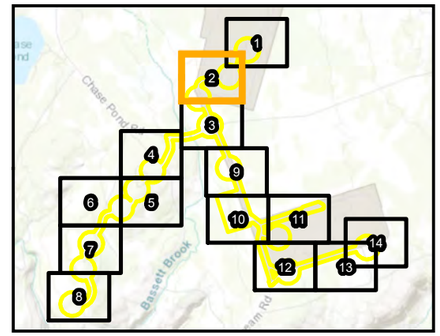
4. THERE IS A REPORT THAT ACCOMPANIES THIS MAP, WHICH PROVIDES METHODOLOGY, MAP UNIT DESCRIPTIONS & INTERPRETATIONS.

Legend

- Study
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Potential Outcrop
- Wet Spot



0 250 500 Feet

Figure 2
Class B Soil Map
Plate 2 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Not for Construction

Symbol	Unit	Slope %	Soil Hydrologic Group
AOC	Abram-Outcrop Complex	4-24	D/D
BrA	Brayton fine sandy loam	0-8	D
BrB	Brayton fine sandy loam	8-15	D
CoA	Colonel fine sandy loam	0-8	C
CoB	Colonel fine sandy loam	8-15	C
CoC	Colonel fine sandy loam	15-25	C
CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru fine sandy loam	0-8	C
PuB	Peru fine sandy loam	8-15	C
PuD	Peru fine sandy loam	25-45	C
RaA	Ragmuff silt loam	0-8	C[1]
RaB	Ragmuff silt loam	8-15	C[1]
TCC	Telos-Chesuncook Complex	0-15	C/C
TeA	Telos silt loam	0-8	C
TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
Unc1	Unclassified series 1	0-8	D

1= Ragmuff HSG interpreted from other similar soil series with respect to depth, texture and drainage.

NOTES:

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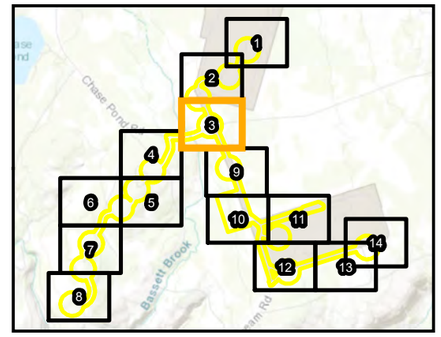
2. THIS MAP WAS PREPARED USING FIELD OBSERVATIONS MADE IN SEPTEMBER, OCTOBER AND NOVEMBER, 2020.
3. PREPARED FOR TETRA TECH BY BROADWATER ENVIRONMENTAL, LLC.
4. THERE IS A REPORT THAT ACCOMPANIES THIS MAP, WHICH PROVIDES METHODOLOGY, MAP UNIT DESCRIPTIONS & INTERPRETATIONS.

Legend

- Study
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Recent Alluvium
- Wet Spot



N

STATE OF MAINE IAN BROADWATER NO. 395 CERTIFIED SOIL SCIENTIST

0 250 500 Feet

Figure 2
Class B Soil Map
Plate 3 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Not for Construction

Symbol	Unit	Slope %	Soil Hydrologic Group
AOC	Abram-Outcrop Complex	4-24	D/D
BrA	Brayton fine sandy loam	0-8	D
BrB	Brayton fine sandy loam	8-15	D
CoA	Colonel fine sandy loam	0-8	C
CoB	Colonel fine sandy loam	8-15	C
CoC	Colonel fine sandy loam	15-25	C
CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru fine sandy loam	0-8	C
PuB	Peru fine sandy loam	8-15	C
PuD	Peru fine sandy loam	25-45	C
RaA	Ragmuff silt loam	0-8	C[1]
RaB	Ragmuff silt loam	8-15	C[1]
TCC	Telos-Chesuncook Complex	0-15	C/C
TeA	Telos silt loam	0-8	C
TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
Unc1	Unclassified series 1	0-8	D

1= Ragmuff HSG interpreted from other similar soil series with respect to depth, texture and drainage.

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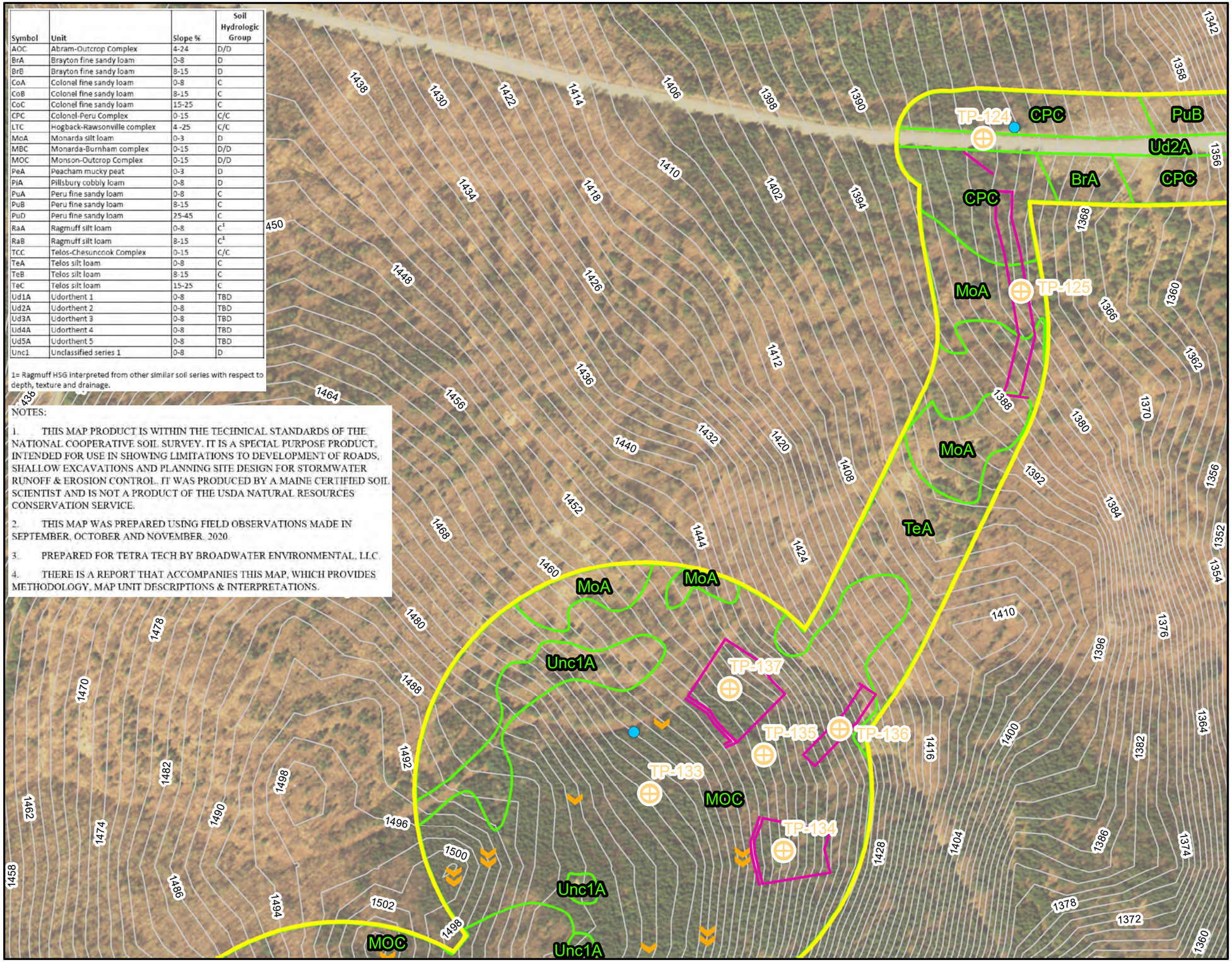
4. THERE IS A REPORT THAT ACCOMPANIES THIS MAP, WHICH PROVIDES METHODOLOGY, MAP UNIT DESCRIPTIONS & INTERPRETATIONS.

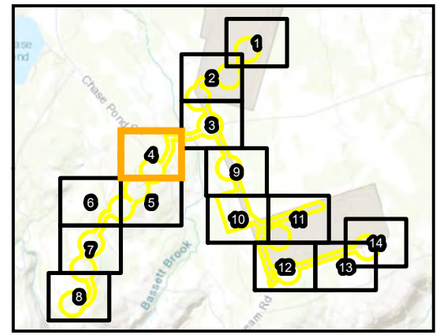


Legend

- Study Area
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Outcrop
- Outcrops
- Wet Spot



Feet
0 250 500

Figure 2
Class B Soil Map
Plate 4 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Not for Construction

Symbol	Unit	Slope %	Soil Hydrologic Group
AOC	Abram-Outcrop Complex	4-24	D/D
BrA	Brayton fine sandy loam	0-8	D
BrB	Brayton fine sandy loam	8-15	D
CoA	Colonel fine sandy loam	0-8	C
CoB	Colonel fine sandy loam	8-15	C
CoC	Colonel fine sandy loam	15-25	C
CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru fine sandy loam	0-8	C
PuB	Peru fine sandy loam	8-15	C
PuD	Peru fine sandy loam	25-45	C
RaA	Ragmuff silt loam	0-8	C[1]
RaB	Ragmuff silt loam	8-15	C[1]
TCC	Telos-Chesuncook Complex	0-15	C/C
TeA	Telos silt loam	0-8	C
TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
Unc1	Unclassified series 1	0-8	D

1= Ragmuff HSG interpreted from other similar soil series with respect to depth, texture and drainage.

NOTES:

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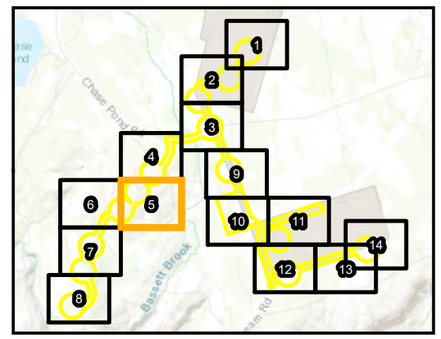
3. PREPARED FOR TETRA TECH BY BROADWATER ENVIRONMENTAL, LLC.
4. THERE IS A REPORT THAT ACCOMPANIES THIS MAP, WHICH PROVIDES METHODOLOGY, MAP UNIT DESCRIPTIONS & INTERPRETATIONS.

Legend

- Study Area
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Outcrop
- Outcrops
- Potential Outcrop



N

STATE OF MAINE IAN BROADWATER NO. 205 CERTIFIED SOIL SCIENTIST

0 250 500 Feet

Figure 2
Class B Soil Map
Plate 5 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Not for Construction

Symbol	Unit	Slope %	Soil Hydrologic Group
AOC	Abram-Outcrop Complex	4-24	D/D
BrA	Brayton fine sandy loam	0-8	D
BrB	Brayton fine sandy loam	8-15	D
CoA	Colonel fine sandy loam	0-8	C
CoB	Colonel fine sandy loam	8-15	C
CoC	Colonel fine sandy loam	15-25	C
CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru fine sandy loam	0-8	C
PuB	Peru fine sandy loam	8-15	C
PuD	Peru fine sandy loam	25-45	C
RaA	Ragmuff silt loam	0-8	C[1]
RaB	Ragmuff silt loam	8-15	C[1]
TCC	Telos-Chesuncook Complex	0-15	C/C
TeA	Telos silt loam	0-8	C
TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
Unc1	Unclassified series 1	0-8	D

1= Ragmuff HSG interpreted from other similar soil series with respect to depth, texture and drainage.

NOTES:

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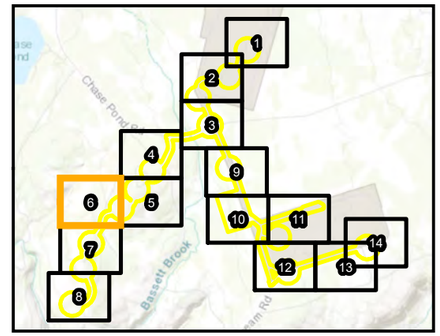
Legend

- Study
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Outcrop
- Potential Outcrop



N

Feet
0 250 500

Figure 2
Class B Soil Map
Plate 6 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

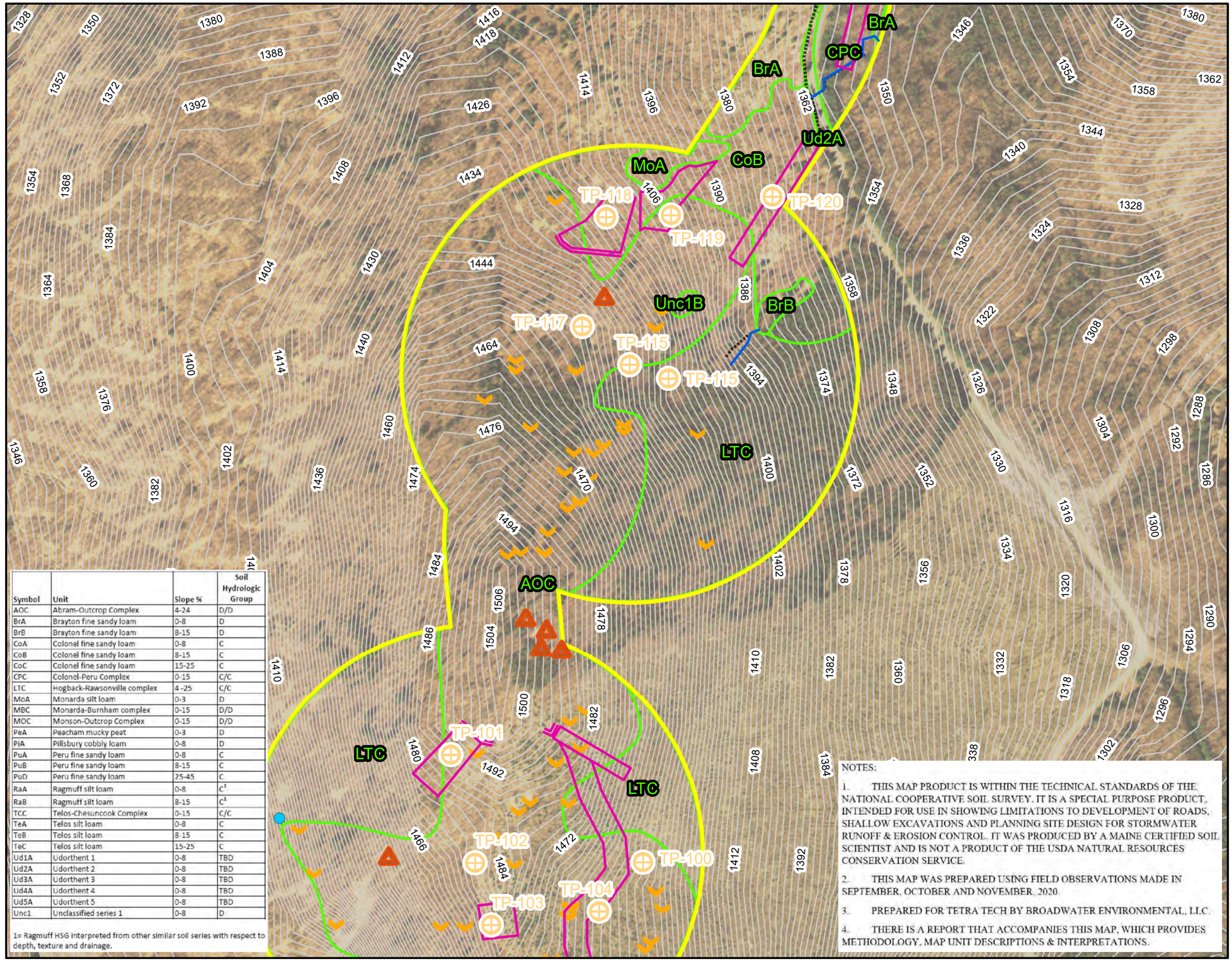
Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Not for Construction



Symbol	Unit	Slope %	Soil Hydrologic Group
AOC	Abram-Outcrop Complex	4-24	D/D
BrA	Brayton fine sandy loam	0-8	D
BrB	Brayton fine sandy loam	8-15	D
CoA	Colonel fine sandy loam	0-8	C
CoB	Colonel fine sandy loam	8-15	C
CoC	Colonel fine sandy loam	15-25	C
CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru fine sandy loam	0-8	C
PuB	Peru fine sandy loam	8-15	C
PuD	Peru fine sandy loam	25-45	C
RaA	Ragmuff silt loam	0-8	C[1]
RaB	Ragmuff silt loam	8-15	C[1]
TCC	Telos-Chesuncook Complex	0-15	C/C
TeA	Telos silt loam	0-8	C
TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
Unc1	Unclassified series 1	0-8	D

1= Ragmuff HSG interpreted from other similar soil series with respect to depth, texture and drainage.

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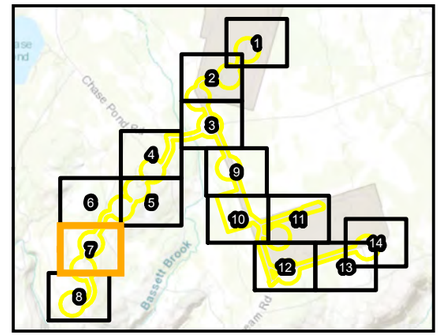
Legend

- Study
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Outcrop
- Outcrops
- Potential Outcrop
- Wet Spot



N

IAN BROADWATER NO. 395 CERTIFIED SOIL SCIENTIST

0 250 500 Feet

Figure 2
Class B Soil Map
Plate 7 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Not for Construction

Symbol	Unit	Slope %	Soil Hydrologic Group
AOC	Abram-Outcrop Complex	4-24	D/D
BrA	Brayton fine sandy loam	0-8	D
BrB	Brayton fine sandy loam	8-15	D
CoA	Colonel fine sandy loam	0-8	C
CoB	Colonel fine sandy loam	8-15	C
CoC	Colonel fine sandy loam	15-25	C
CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru fine sandy loam	0-8	C
PuB	Peru fine sandy loam	8-15	C
PuD	Peru fine sandy loam	25-45	C
RaA	Ragmuff silt loam	0-8	C[1]
RaB	Ragmuff silt loam	8-15	C[1]
TCC	Telos-Chesuncook Complex	0-15	C/C
TeA	Telos silt loam	0-8	C
TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
Unc1	Unclassified series 1	0-8	D

1= Ragmuff HSG interpreted from other similar soil series with respect to depth, texture and drainage.

TP-103 TP-105 TP-106 TP-107 TP-108 TP-109 TP-110 TP-111 TP-112 TP-113

LTC CPC AOC

NOTES:

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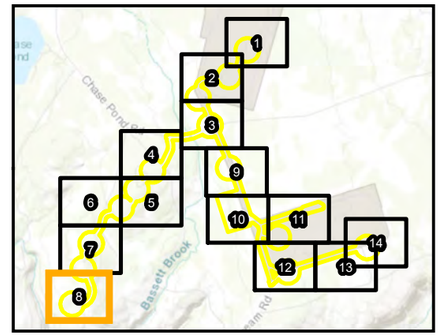
Legend

- Study Area
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Outcrop
- Outcrops
- Potential Outcrop
- Wet Spot



N

STATE OF MAINE IAN BROADWATER NO. 395 CERTIFIED SOIL SCIENTIST

0 250 500 Feet

Figure 2
Class B Soil Map
Plate 8 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Not for Construction

Symbol	Unit	Slope %	Soil Hydrologic Group
AOC	Abram-Outcrop Complex	4-24	D/D
BrA	Brayton fine sandy loam	0-8	D
BrB	Brayton fine sandy loam	8-15	D
CoA	Colonel fine sandy loam	0-8	C
CoB	Colonel fine sandy loam	8-15	C
CoC	Colonel fine sandy loam	15-25	C
CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru fine sandy loam	0-8	C
PuB	Peru fine sandy loam	8-15	C
PuD	Peru fine sandy loam	25-45	C
RaA	Ragmuff silt loam	0-8	C[1]
RaB	Ragmuff silt loam	8-15	C[1]
TCC	Telos-Chesuncook Complex	0-15	C/C
TeA	Telos silt loam	0-8	C
TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
Unc1	Unclassified series 1	0-8	D

1= Ragmuff HSG interpreted from other similar soil series with respect to depth, texture and drainage.

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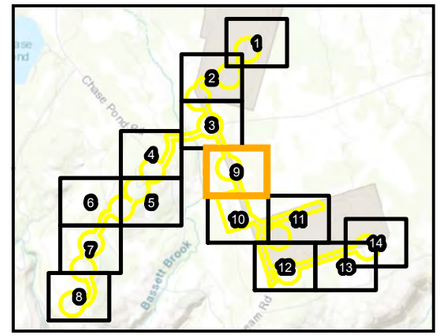
Legend

- Study Area
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Wet Spot



N

IAN BROADWATER NO. 395 CERTIFIED SOIL SCIENTIST

0 250 500 Feet

Figure 2
Class B Soil Map
Plate 9 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Not for Construction

Symbol	Unit	Slope %	Soil Hydrologic Group
AOC	Abram-Outcrop Complex	4-24	D/D
BrA	Brayton fine sandy loam	0-8	D
BrB	Brayton fine sandy loam	8-15	D
CoA	Colonel fine sandy loam	0-8	C
CoB	Colonel fine sandy loam	8-15	C
CoC	Colonel fine sandy loam	15-25	C
CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru fine sandy loam	0-8	C
PuB	Peru fine sandy loam	8-15	C
PuD	Peru fine sandy loam	25-45	C
RaA	Ragmuff silt loam	0-8	C[1]
RaB	Ragmuff silt loam	8-15	C[1]
TCC	Telos-Chesuncook Complex	0-15	C/C
TeA	Telos silt loam	0-8	C
TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
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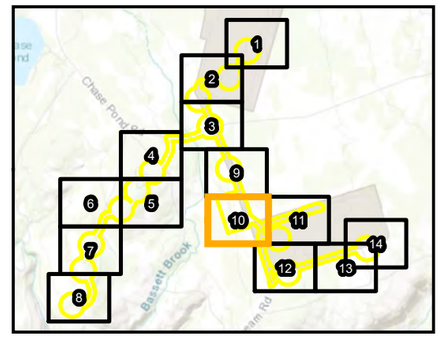
Legend

- Study Area
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Outcrop
- Waste Rock
- Wet Spot



N

IAN BROADWATER NO. 388 CERTIFIED SOIL SCIENTIST

Feet

0 250 500

Figure 2
Class B Soil Map
Plate 10 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

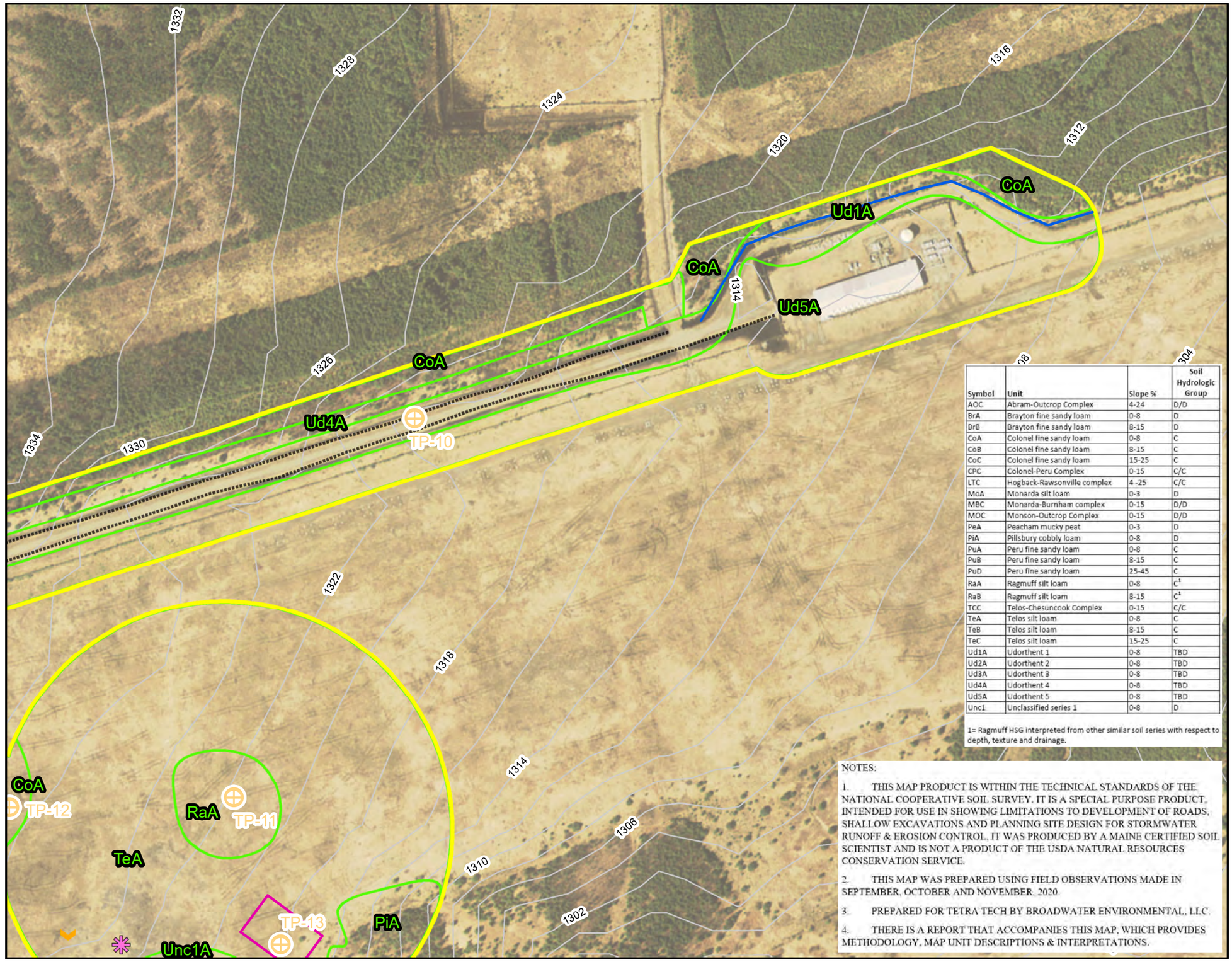
Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Not for Construction



Symbol	Unit	Slope %	Soil Hydrologic Group
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CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru fine sandy loam	0-8	C
PuB	Peru fine sandy loam	8-15	C
PuD	Peru fine sandy loam	25-45	C
RaA	Ragmuff silt loam	0-8	C[1]
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TCC	Telos-Chesuncook Complex	0-15	C/C
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TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
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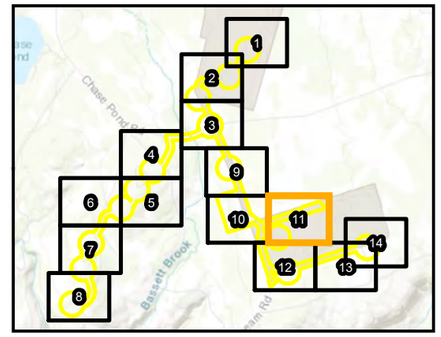
Legend

- Study Area
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Outcrop
- Waste Rock



N

STATE OF MAINE IAN BROADWATER NO. 395 CERTIFIED SOIL SCIENTIST

0 250 500 Feet

Figure 2
Class B Soil Map
Plate 11 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Not for Construction

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Symbol	Unit	Slope %	Soil Hydrologic Group
AOC	Abram-Outcrop Complex	4-24	D/D
BrA	Brayton fine sandy loam	0-8	D
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CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru fine sandy loam	0-8	C
PuB	Peru fine sandy loam	8-15	C
PuD	Peru fine sandy loam	25-45	C
RaA	Ragmuff silt loam	0-8	C[1]
RaB	Ragmuff silt loam	8-15	C[1]
TCC	Telos-Chesuncook Complex	0-15	C/C
TeA	Telos silt loam	0-8	C
TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
Unc1	Unclassified series 1	0-8	D

1= Ragmuff HSG interpreted from other similar soil series with respect to depth, texture and drainage.

Legend

- Study
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Outcrop
- Waste Rock
- Wet Spot

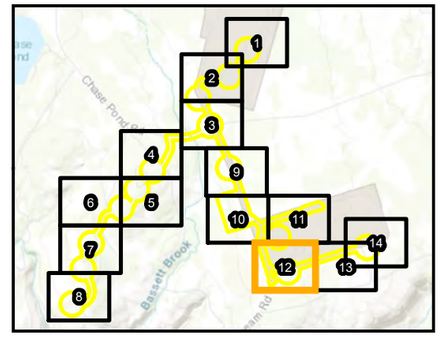

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Figure 2
Class B Soil Map
Plate 12 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Symbol	Unit	Slope %	Soil Hydrologic Group
AOC	Abram-Outcrop Complex	4-24	D/D
BrA	Brayton fine sandy loam	0-8	D
BrB	Brayton fine sandy loam	8-15	D
CoA	Colonel fine sandy loam	0-8	C
CoB	Colonel fine sandy loam	8-15	C
CoC	Colonel fine sandy loam	15-25	C
CPC	Colonel-Peru Complex	0-15	C/C
LTC	Hogback-Rawsonville complex	4 -25	C/C
MoA	Monarda silt loam	0-3	D
MBC	Monarda-Burnham complex	0-15	D/D
MOC	Monson-Outcrop Complex	0-15	D/D
PeA	Peacham mucky peat	0-3	D
PiA	Pillsbury cobbly loam	0-8	D
PuA	Peru fine sandy loam	0-8	C
PuB	Peru fine sandy loam	8-15	C
PuD	Peru fine sandy loam	25-45	C
RaA	Ragmuff silt loam	0-8	C[1]
RaB	Ragmuff silt loam	8-15	C[1]
TCC	Telos-Chesuncook Complex	0-15	C/C
TeA	Telos silt loam	0-8	C
TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
Ud1A	Udorthent 1	0-8	TBD
Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
Unc1	Unclassified series 1	0-8	D

1= Ragmuff HSG interpreted from other similar soil series with respect to depth, texture and drainage.

NOTES:

1. THIS MAP PRODUCT IS WITHIN THE TECHNICAL STANDARDS OF THE NATIONAL COOPERATIVE SOIL SURVEY. IT IS A SPECIAL PURPOSE PRODUCT, INTENDED FOR USE IN SHOWING LIMITATIONS TO DEVELOPMENT OF ROADS, SHALLOW EXCAVATIONS AND PLANNING SITE DESIGN FOR STORMWATER RUNOFF & EROSION CONTROL. IT WAS PRODUCED BY A MAINE CERTIFIED SOIL SCIENTIST AND IS NOT A PRODUCT OF THE USDA NATURAL RESOURCES CONSERVATION SERVICE.
2. THIS MAP WAS PREPARED USING FIELD OBSERVATIONS MADE IN SEPTEMBER, OCTOBER AND NOVEMBER, 2020.
3. PREPARED FOR TETRA TECH BY BROADWATER ENVIRONMENTAL, LLC.
4. THERE IS A REPORT THAT ACCOMPANIES THIS MAP, WHICH PROVIDES METHODOLOGY, MAP UNIT DESCRIPTIONS & INTERPRETATIONS.

Legend

- Study
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Wet Spot

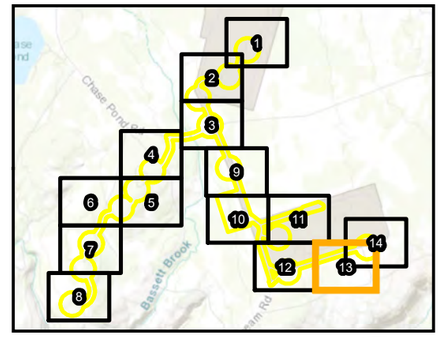

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Figure 2
Class B Soil Map
Plate 13 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

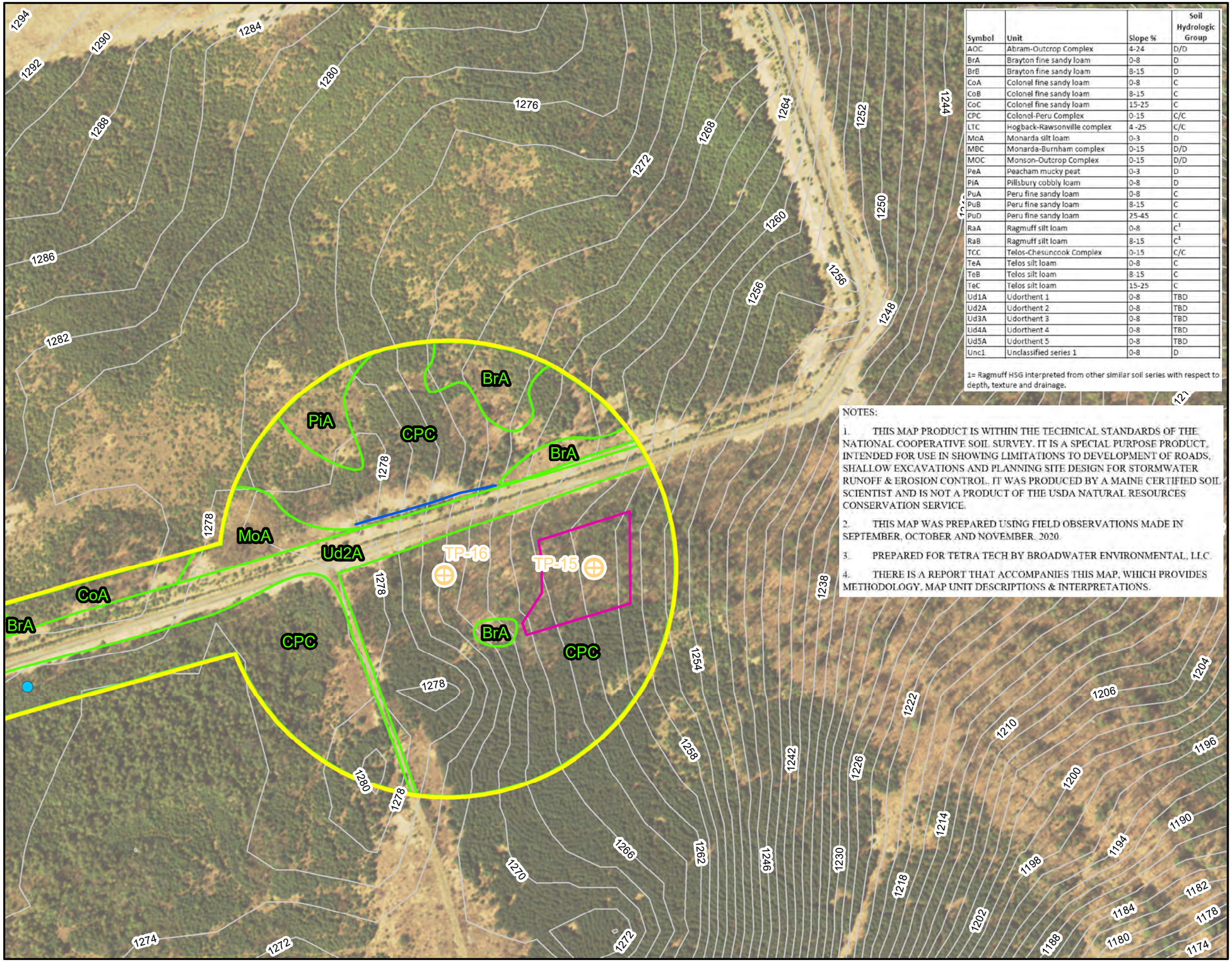
Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Not for Construction



Symbol	Unit	Slope %	Soil Hydrologic Group
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TeB	Telos silt loam	8-15	C
TeC	Telos silt loam	15-25	C
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Ud2A	Udorthent 2	0-8	TBD
Ud3A	Udorthent 3	0-8	TBD
Ud4A	Udorthent 4	0-8	TBD
Ud5A	Udorthent 5	0-8	TBD
Unc1	Unclassified series 1	0-8	D

1= Ragmuff HSG interpreted from other similar soil series with respect to depth, texture and drainage.

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1. THIS MAP PRODUCT IS WITHIN THE TECHNICAL STANDARDS OF THE NATIONAL COOPERATIVE SOIL SURVEY. IT IS A SPECIAL PURPOSE PRODUCT, INTENDED FOR USE IN SHOWING LIMITATIONS TO DEVELOPMENT OF ROADS, SHALLOW EXCAVATIONS AND PLANNING SITE DESIGN FOR STORMWATER RUNOFF & EROSION CONTROL. IT WAS PRODUCED BY A MAINE CERTIFIED SOIL SCIENTIST AND IS NOT A PRODUCT OF THE USDA NATURAL RESOURCES CONSERVATION SERVICE.
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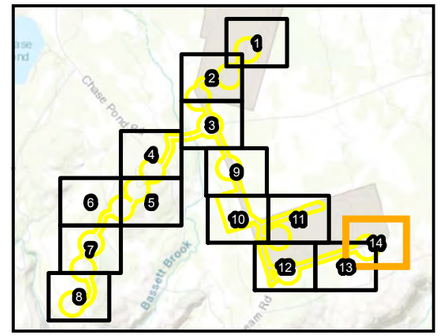
Legend

- Study
- 2 Foot Contour
- Stormwater Basin
- Stream
- Ditch
- Test Pit
- Soil Unit

Point of Interest

- Wet Spot



N

IAN BROADWATER NO. 395 CERTIFIED SOIL SCIENTIST

0 250 500 Feet

Figure 2
Class B Soil Map
Plate 14 of 14
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 12/2020

Source: Esri, et. al., 2020; Maine Office of GIS, 2019; Patriot Renewables, 2020; Tetra Tech, 2020

Coordinate System: World Geodetic System, 1984 Universal Transverse Mercator, Zone 19 North

Not for Construction

Broadwater Environmental, LLC
18 Grand St., South Portland, ME 04106

February 11, 2021

Mr. Jim Cassida, Senior Program Director
Tetra Tech
451 Presumpscot Street
Portland, ME 04103

Dear Jim,

Subject: Review of Existing Soil Data for the Radar Assisted Lighting Towers and Revised Locations of Turbine 6, 7, and 8; Western Maine Renewable Energy Project; Moscow, Maine

Tetra Tech has been retained by Western Maine Renewable Energy, LLC to assist in obtaining permits to construct and operate the proposed Western Maine Renewable Energy Project, a 58.5 MW wind farm on a former U.S. Air Force radar station site and some of the surrounding land in Moscow, Maine. As part of the permitting process, Tetra Tech identified the need for a Class B soil map soil in areas within the footprint of the project. The designed project includes 14 wind turbines and associated infrastructure including a new electrical substation.

Results of the soil survey will be used to support the stormwater analysis, construction planning, and erosion and sedimentation control plans, and to meet regulatory requirements. Accordingly, soil map units delineated in the field emphasized soil drainage condition and documented Hydrologic Soil Group (HSG) of the soil series observed.

In the fall of 2020, Class B mapping was completed on the layout of the project at the time and a report containing data and soil maps was issued by BE-LLC in December 2020. In winter of 2020-2021, the need for radar-assisted lighting towers was identified and they were sited on the western side of the original project area. Figure 1 shows the relationship of the fall 2020 project layout to the radar-assisted lighting towers.

In addition to the new study area for the towers, the proposed locations of Turbines 6 through 8 needed to be revised in winter 2020-2021 to meet required setbacks from existing power lines. The new location of these turbines is shown on Figure 1.

Winter weather conditions prevented fieldwork required to complete a Class B soil survey in the new study area, therefore, this letter has been completed to summarize the existing data and discuss the soil series expected to occur in these areas. A preliminary wetland survey of the new study area was completed by others in early winter of 2020.

1.0 Methodology

Data from the Natural Resource Conservation Service (NRCS) soil survey and a preliminary wetland delineation completed in early winter of 2020 was used as the basis

for this letter. Using this data, a discussion of soil series and conditions expected to occur in the new and unmapped study area is provided. In spring of 2021, when conditions allow, fieldwork will be completed in the new study area to support development of Class B soil map (MAPSS, 2009). The report issued by BE-LLC, in December of 2020 (BE-LLC, 2020), will then be amended for the Site Location of Development Application for the facility.

It should be noted that NRCS mapping in this area of Maine used associations and complexes as map units. This is a widely accepted practice in soil mapping. The Maine Association of Professional Soil Scientists describes an association as "two or more dissimilar components (series) occurring in a regularly repeating pattern. The major components of an association can be shown separately at the scale used for making the soil map but there is no need to separate them for the purpose of the soil survey."

A complex is defined as "two or more dissimilar components occurring in a regularly repeating pattern. The major components of a complex cannot be shown separately at the scale of mapping" (MAPSS, 2009).

Consociations, which are comprised of single soil series, were not used in the NRCS mapping of this area. However, use of consociations is preferred, when possible, for additional detail and precision. Table 1 shows the map units used by the NRCS in the new parts of the project area. It also includes drainage class and HSGs for each series.

2.0 Summary of Findings

The following summarizes the results this evaluation. Attachment A contains official NRCS soil series descriptions for the soil series mapped by NRCS within the new study area.

During work completed at the site in 2020 in support of the Class B soil mapping, five types of Udorthents or man-made soils were found (BE-LLC, 2020). Two of them are expected in the new study area. This first had a symbol of Ud2A. The 2020 Soil Map Report used this unit to describe timber company woods roads. This unit consists of roadbed with adjacent ditches. Roadbed granular fill is < than 15" and no filter fabric is present at the fill/soil interface.

The second Udorthent expected is Ud3A. The 2020 Soil Report describes this unit occurring in the former radar station grounding fields (BE-LLC, 2020). At each of the two buildings associated with the former radar site, a large area was cleared and used to bury wire fencing for the purpose of grounding the radars. Both areas show signs of disturbance. Characteristics range from gleyed subsoil on the surface to developing soil.

The following subsections describe expected soils by new areas of the project site. Figures 1-1 through 1-5 show the existing NRCS mapping superimposed over the study area features. An index map is also provided on each map.

2.1 Radar-Assisted Lighting Towers Area

This area consists of three proposed radar-assisted lighting towers (R-ALTs) that will be installed as part of the project. The location of the three towers is shown on Figure 1.

Figure 1-1 shows the NRCS mapping at the southwestern most tower. Each of the soil map units in this area have at least one soil series with a soil depth that is less than deep. Deep soils are defined as soil equal to or greater than 40 inches.

The primary soils mapped around the proposed tower is Hogback-Rawsonville complex (e.g., LTC and LTE). Both of these soil series are not deep soils with bedrock occurring between 10 and 20 inches in Hogback and 20 to 40 inches in Rawsonville. It should be noted that LTE can also have extreme slopes up to 60% that may need consideration during design.

Along the western most road to the tower, deeper soil units were mapped including Peru-Colonel-Rawsonville association (DTC) and Colonel-Peru-Pillsbury association (CNC). In these two map units, Rawsonville is the only soil that is not deep (e.g., 40 inches or more to bedrock).

Each of the soil series in the map units on Figure 1-1 are formed in sandy loam soils and associated with lodgement till parent material. One small inclusion of wetland was identified in the study area shown on Figure 1-1. Soil expected in that area would be a Pillsbury cobbly loam or a Brayton fine sandy loam, both poorly drained soils. The existing woods road that runs north to south west of the proposed tower, is likely Ud2A, a Udorthent. In addition, each of the wood roads within this new study area will likely be classified as Ud2A.

Moving north along the tower access road, NRCS mapping shows a reversion back to mostly bedrock-controlled soils that are moderately deep to shallow. Hogback-Rawsonville complex dominated this portion of the study area as shown on Figure 1-2. Peru-Colonel-Rawsonville association (DTC) was also mapped on the northern portion of this figure indicating a potential deepening of soils. Two relatively extensive wetland areas were preliminarily identified along the road on Figure 1-2. In these areas, expected soils would be Pillsbury cobbly loam or a Brayton fine sandy loam, both poorly drained soils.

Moving further to the north (Figure 1-3), along the woods road, NRCS mapping shows soil getting shallower again with a stretch of Hogback-Rawsonville complex. As the road turns to the east, an area of Telos-Chesuncook-Elliottsville association (TEC) is mapped. This map unit indicates a change from sandy loam parent material to a silt loam parent material. Elliotsville is a moderately deep soil (e.g., 20 to 40 inches) while Telos and Chesuncook are both deep soils (=/> 40 inches).

Near the intersection with a larger wood road, NRCS mapping shows a change to Telos-Chesuncook association (TCC). These are both deep soils former in a silty lodgement till parent material. This unit is mapped south to the second R-ALT buffer.

After the woods road intersects with a larger woods road, and the study area goes to the south, an area of wetland was preliminarily identified. In this wetland area, Monarda silt loam would be expected to occur.

Small inclusions of wetland were also identified on the east side of the woods road in the second R-ALT buffer (Figure 1-4). The southern half of the second R-ALT buffer is mapped as Colonel-Pillsbury-Peru association (CPB). These are all deep soil with a sandy lodgement till parent material.

Telos-Chesuncook association (TCC) is mapped south of this inclusion of CPB, indicating a change back to soils from a silty lodgment till parent material. This map unit continues south into the third R-ALT buffer area. The southern two thirds of the buffer is mapped as Telos-Chesuncook-Elliottsville association (TEC) and Chesuncook-Elliottsville-Telos association (CHC). The presence of Elliotsville in these associations indicates that a portion of these units is only moderately deep (e.g., 20 to 40 inches to bedrock). No wetlands were preliminarily identified in this tower buffer.

2.2 Turbines 6, 7, and 8 Revised Locations Area

This area consists of revised locations for Turbines 6 through 8. These turbine locations were modified from the 2020 layout due to required setbacks from existing power lines to the west. Each of these turbines is located inside a fenced in portion of the former radar facility, southeast of an existing building in the southeast portion of the project area.

NRCS mapping indicates that a majority of this area is Telos-Chesuncook association (TCC), both deep soils of a silty lodgement till origin. A smaller portion is also mapped as Monarda-Telos complex (MTB). Monarda is a hydric soil series. On the east side of this area, more than half of the Turbine 8 buffer was mapped Peru-Colonel-Rawsonville association (DTC). This indicates the presence of moderately deep soils (e.g., 20 to 40 inches) in a portion of this unit.

Wetlands were preliminarily identified in all three turbine buffers. It is expected that those areas will be Monarda silt loam, a poorly drained hydric soil.

Based on knowledge of the site, it is likely that the cleared field portion of this area is Udorthent 3 (Ud3A). This map unit was encountered in other portions of the field to the west. The field portion of this area was used as a grounding area for the former radar station. Livestock fencing with a 1/8 -inch to ¼-inch gauge was buried in the cleared area. In this area of the site, Udorthent 3 (Ud3A) consisted of silt loam under development. The approximate area expected to be UD3A is shown on Figure 1-5.

3.0 Summary

NRCS data implies that many of the soil series observed during the extensive 2020 mapping effort are also present in the two newly identified portions of the study area. A majority of non-hydric soils at the site are in Hydrologic Soil Group C while hydric soils occurring on the site have been exclusively rated D.

In spring of 2021, when weather conditions allow, fieldwork will be undertaken including the completion of test pits, to develop Class B soil mapping for these portions of the project. Once complete, the information will be appended to the 2020 report and submitted with the Site Location of Development application for the project.

I hope this evaluation covers your needs for the moment. I look forward to working with you to complete the Class B survey in the spring. If you have any questions about the contents of this letter, please call me at 207-653-8737.

Sincerely,

Ian Broadwater
Owner; Broadwater Environmental, LLC
NHCWS, MECSS

Attachment A-NRCS Soil Series Descriptions

References

BE-LLC, 2020. ”Soil Report for the Western Maine Renewable Energy Project”, Broadwater Environmental, LLC, December, 2020.

MAPSS, 2009.” Guidelines for Maine Certified Soil Scientists for Soil Identification and Mapping”, Maine Association of Professional Soil Scientists, 2004, revised 2009.

NRCS, 2017. “National Soil Survey Handbook”, Natural Resource Conservation Service, 2017.

Society of Soil Scientists of Northern New England (SSSNNE), 2009. “Ksat Values for New Hampshire Soils.” SSSNNE Special Publication No. 5. September, 2009. Durham, NH.

Figures

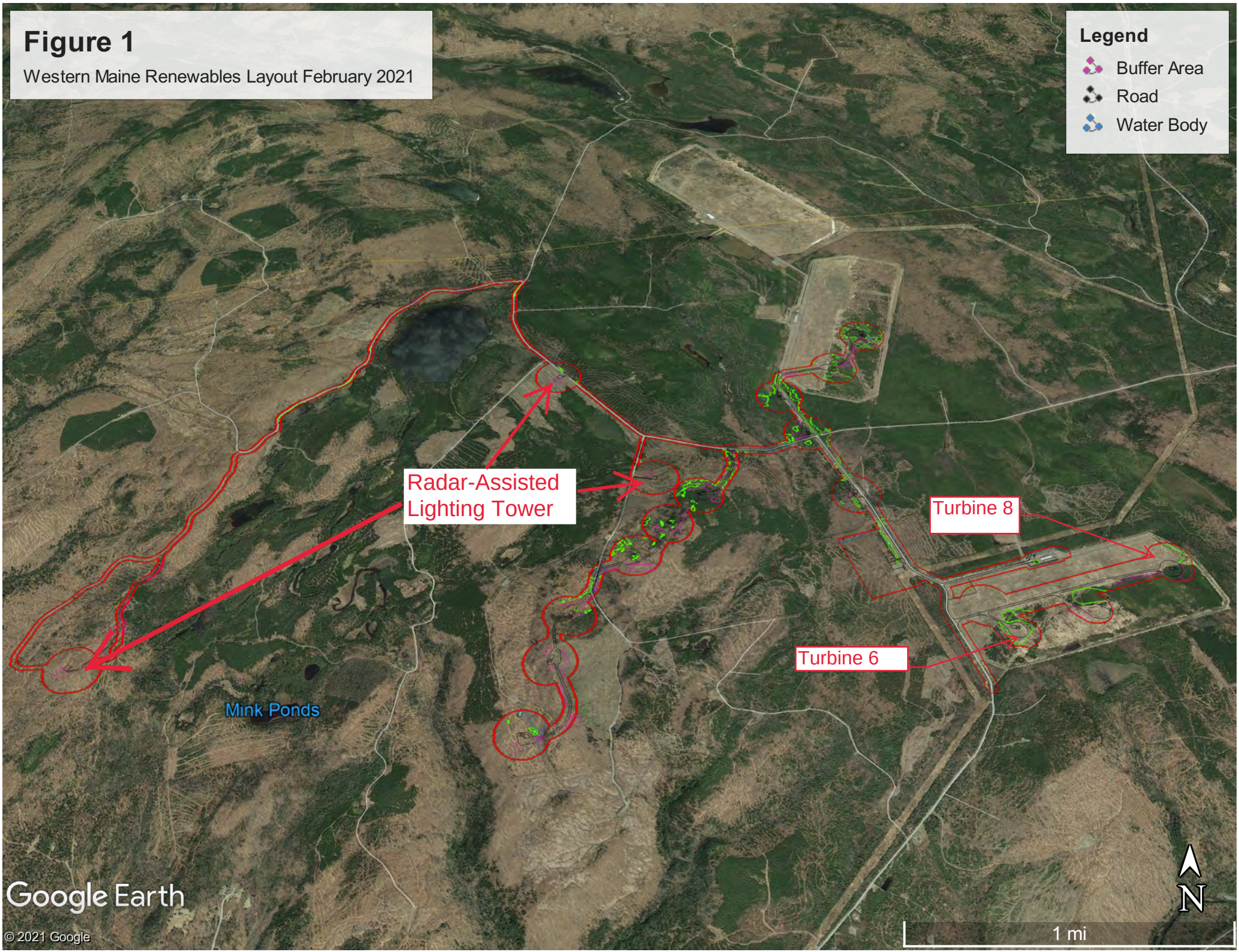


Figure 1
Western Maine Renewables Layout February 2021
Legend
Buffer Area
Road
Water Body
Radar-Assisted Lighting Tower
Turbine 8
Turbine 6
Mink Ponds
Google Earth
© 2021 Google
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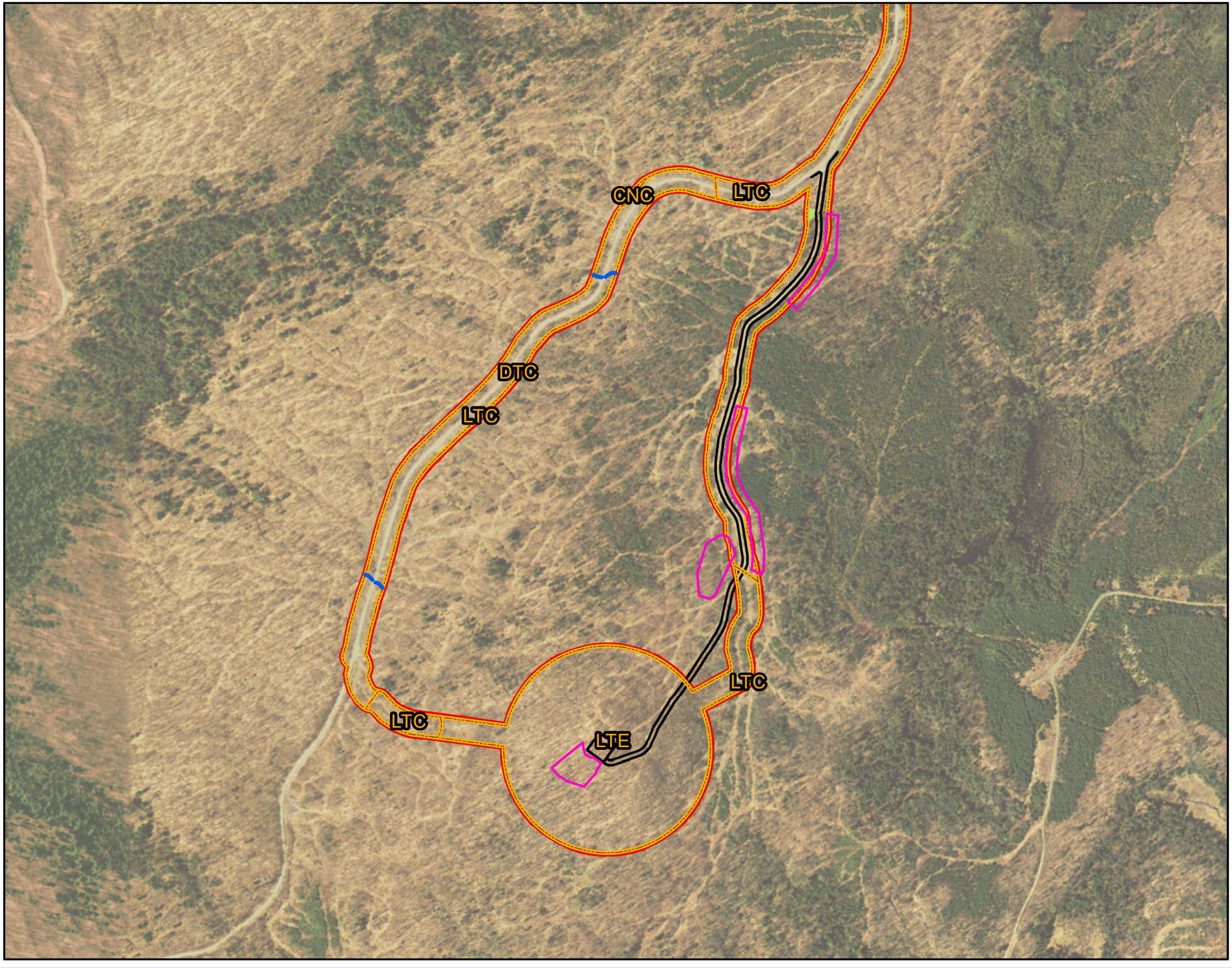
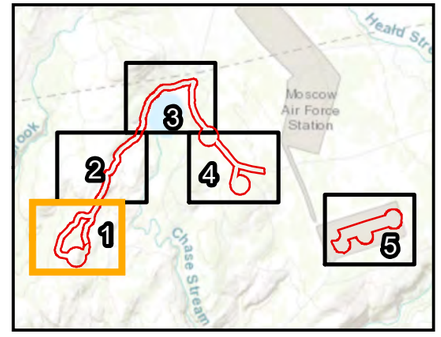


Legend

- Study Area
- Mapped Soil Unit
- BMP Zone
- Delineated Wetland
- Delineated Stream



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0 500 1,000 Feet

Figure 1-1
Soil Map Study Area
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 02/2021

Source: Esri, et. al., 2020; NRCS, 2019

Coordinate System: World Geodetic System, 1984
Universal Transverse Mercator, Zone 19 North

Legend

- Study Area
- Mapped Soil Unit
- BMP Zone
- Delineated Wetland
- Delineated Stream

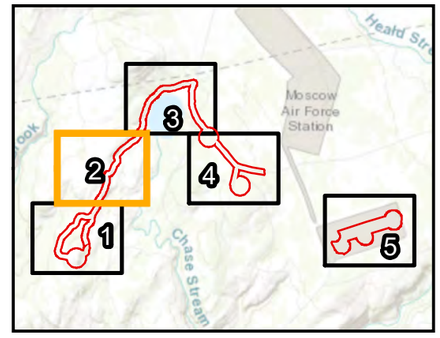


Figure 1-2
Soil Map Study Area
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 02/2021

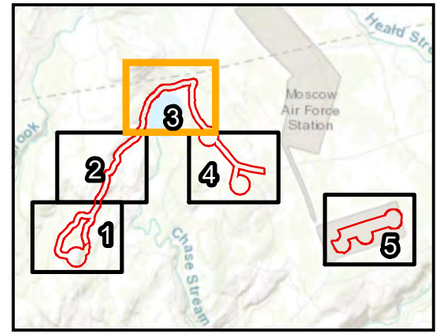
Source: Esri, et. al., 2020; NRCS, 2019

Coordinate System: World Geodetic System, 1984
Universal Transverse Mercator, Zone 19 North

Not for Construction

Legend

- Study Area
- Mapped Soil Unit
- BMP Zone
- Delineated Wetland
- Delineated Stream



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0 500 1,000 Feet

Figure 1-3
Soil Map Study Area
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

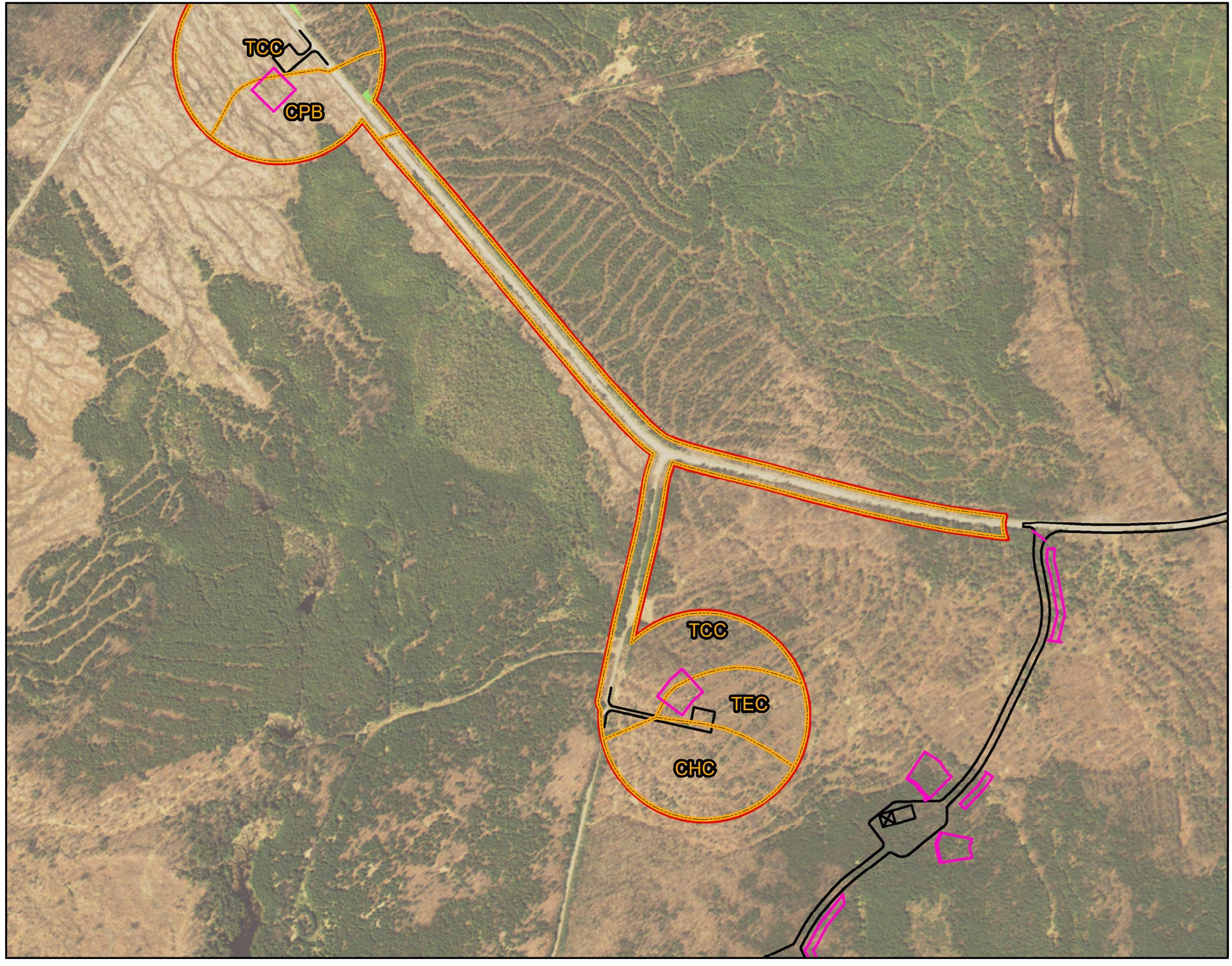
Prepared By: TETRA TECH

Date: 02/2021

Source: Esri, et. al., 2020; NRCS, 2019

Coordinate System: World Geodetic System, 1984
Universal Transverse Mercator, Zone 19 North

Not for Construction



Legend

- Study Area
- Mapped Soil Unit
- BMP Zone
- Delineated Wetland
- Delineated Stream

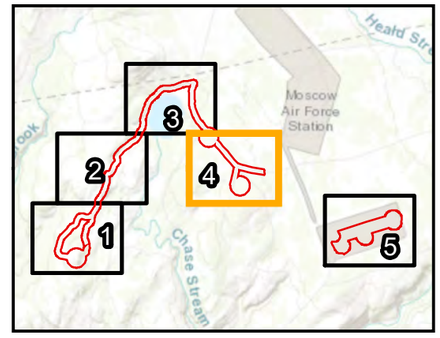


Figure 1-4
Soil Map Study Area
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

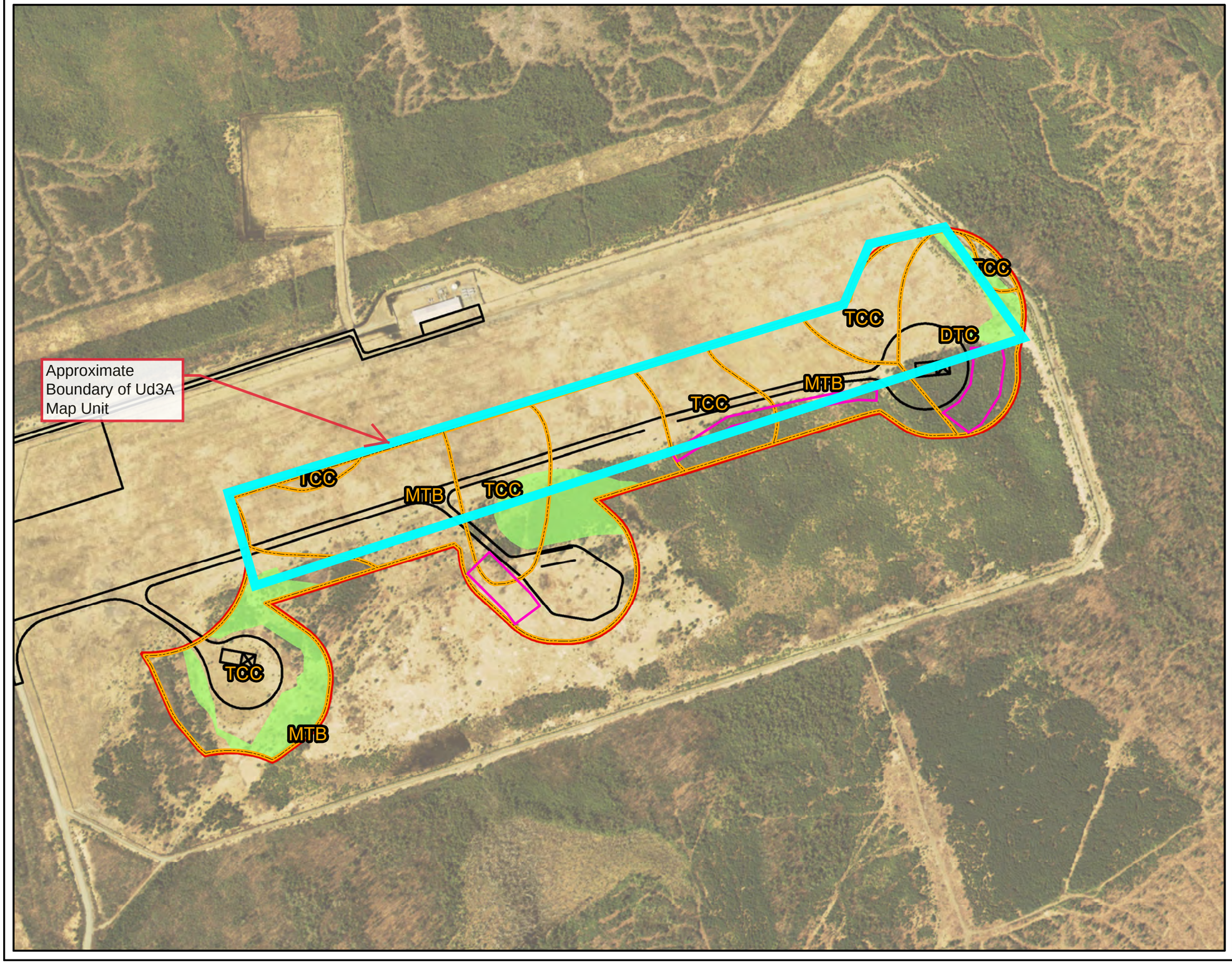
Prepared By: TETRA TECH

Date: 02/2021

Source: Esri, et. al., 2020; NRCS, 2019

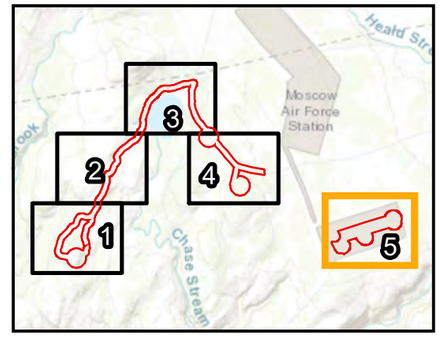
Coordinate System: World Geodetic System, 1984
Universal Transverse Mercator, Zone 19 North

Not for Construction



Legend

- Study Area
- Mapped Soil Unit
- BMP Zone
- Delineated Wetland
- Delineated Stream



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0 500 1,000 Feet

Figure 1-5
Soil Map Study Area
Western Maine Renewable Energy Project

Prepared For: Western Maine Renewables

Prepared By: TETRA TECH

Date: 02/2021

Source: Esri, et. al., 2020; NRCS, 2019

Coordinate System: World Geodetic System, 1984
Universal Transverse Mercator, Zone 19 North

Not for Construction

Table

Table 1
Soil Series Mapped by NRCS in the New Study Area
Western Maine Renewables Project
Moscow, Maine

Map Symbol	Description	Soil Drainage Class	Soil Hydrologic Group (HSG)
CHC	Chesuncook-Elliottsville-Telos association, 3 to 15 percent slopes, very stony	MW/W/SWP	C/C/C
CNC	Colonel-Peru-Pillsbury association, 3 to 15 percent slopes, very stony	SWP-MW/W/P	C/C/D
CPB	Colonel-Pillsbury-Peru association, 0 to 8 percent slopes, very stony	SWP-MW/P/W	C/D/C
DTC	Peru-Colonel-Rawsonville association, 3 to 15 percent slopes	W/MW-SWP/W	C/C/C
LTC	Hogback-Rawsonville complex, 4 to 25 percent slopes	W/W	C/C
LTE	Hogback-Rawsonville complex, 20 to 60 percent slopes	W/W	C/C
MTB	Monarda-Telos complex, 0 to 8 percent slopes, very stony	P/SWP	D/C
TCC	Telos-Chesuncook association, 3 to 15 percent slopes, very stony	SWP/MW	C/C
TEC	Telos-Chesuncook-Elliottsville association, 3 to 15 percent slopes, very stony	SWP/MW/W	C/C/B

Notes:

1. HSGs listed are from Society of Soil Scientists of Northern New England (SSSNNE), 2009. "Ksat Values for New Hampshire Soils." SSSNNE Special Publication No. 5. September, 2009. Durham, NH.
2. Drainage class and HSG presented for each soil series in the unit in the order it is listed in the description.

Drainage Class

W=well drained

MW=moderately well drained

SWP=somewhat poorly drained

MW-SWP=moderately well to somewhat poorly drained

P=poorly drained

Attachment A- NRCS Soil Series Descriptions

LOCATION BRAYTON ME+CT MA NY VT

Established Series
Rev. KJL-DEW-ANA
06/2018

BRAYTON SERIES

The Brayton series consists of very deep, poorly drained soils on toeslopes and depressions of glaciated uplands. These soils formed in dense till. Saturated hydraulic conductivity is moderately high or high in the solum and moderately low or moderately high in the dense substratum. Slope ranges from 0 to 25 percent. Mean annual temperature is about 7 degrees C, and mean annual precipitation is about 1092 mm.

TAXONOMIC CLASS: Loamy, mixed, active, nonacid, frigid, shallow Aeric Endoaquepts

TYPICAL PEDON: Brayton fine sandy loam, in a gently sloping, very stony forested area. (Colors are for moist soil unless otherwise stated.)

Oi--0 to 2 cm; slightly decomposed leaves, needles and twigs.

Oa--2 to 13 cm; black (5YR 2/1) highly decomposed organic material; weak very fine granular structure; very friable, many very fine, fine and medium, and common coarse roots; extremely acid; abrupt wavy boundary. (Combined thickness of the O horizons is 0 to 15 cm.)

A--13 to 18 cm; very dark gray (10YR 3/1) fine sandy loam, gray (10YR 6/1) dry; weak fine and medium granular structure; very friable; many very fine, fine and medium, and common coarse roots; 10 percent rock fragments; extremely acid; abrupt wavy boundary. (0 to 15 cm thick)

Eg--18 to 25 cm; gray (10YR 5/1) gravelly fine sandy loam; few medium distinct pinkish gray (5YR 6/2) masses of iron accumulation and few fine faint gray (10YR 6/1) iron depletions; weak very fine subangular blocky structure; friable; many very fine and fine, and common medium roots; 20 percent rock fragments; extremely acid; abrupt wavy boundary. (0 to 10 cm thick)

Bg--25 to 41 cm; grayish brown (2.5Y 5/2) fine sandy loam; weak very fine and fine subangular blocky structure; friable; common very fine and fine roots; many medium prominent dark yellowish brown (10YR 4/6) masses of iron accumulation and few fine faint gray (10YR 6/1) iron depletions; 10 percent rock fragments; strongly acid; clear wavy boundary. (13 to 51 cm thick)

BC--41 to 58 cm; light olive brown (2.5Y 5/4) fine sandy loam; weak thin platy structure; firm; many medium faint dark yellowish brown (10YR 4/4) masses of iron accumulation and few fine prominent gray (10YR 6/1) iron depletions; 10 percent rock fragments; moderately acid; clear wavy boundary. (0 to 25 cm thick)

Cd1--58 to 74 cm; olive (5Y 5/3) fine sandy loam; moderate thin and medium platy; very firm; many medium prominent yellowish brown (10YR 5/6) and common medium prominent dark yellowish brown masses of iron accumulation, few fine prominent gray (10YR 6/1) iron depletions; 10 percent rock fragments; slightly acid; clear wavy boundary.

Cd2--74 to 165 cm; olive (5Y 4/3) fine sandy loam; massive; very firm; common medium distinct dark yellowish brown (10YR 4/4) masses of iron accumulation, few fine prominent gray (10YR 6/1) iron depletions; 10 percent rock fragments; slightly acid.

TYPE LOCATION: Hancock County, Maine; town of Mariaville; off Maine Route 181, about 1.3 miles north of the bridge spanning the West Branch of Union River, about 500 feet southeast of highway; USGS Amherst topographic quadrangle; lat. 44 degrees 46 minutes 47 seconds N. and long. 68 degrees 22 minutes 15 seconds W., NAD 27.

RANGE IN CHARACTERISTICS: The combined thickness of the A, E, B and BC horizons is 25 to 50 cm. Depth to bedrock from the mineral soil surface is more than 152 cm. Reaction ranges from extremely acid to moderately acid in the A and Eg horizons and from strongly acid to slightly acid in the B and BC horizons. One or more subhorizons in the subsoil below a depth of 25 cm have pH greater than 5.5. The Cd layer ranges from moderately acid to neutral. Rock fragments in the mineral soil range from 5 to 35 percent by volume. The proportions of rock fragments are about 80 percent gravel, 15 percent cobbles, and 5 percent stones. Some pedons have channers and flagstones. Stones and boulders cover from 0 to 25 percent of the surface. Textures of the solum are silt loam, loam, very fine sandy loam, fine sandy loam, or sandy loam in the fine-earth fraction with less than 10 percent clay. The substratum textures are loam, very fine sandy loam, fine sandy loam, or sandy loam in the fine-earth fraction with less than 10 percent clay. Consistence is very friable to firm in the solum and firm or very firm in the dense substratum.

The O horizon, where present, is fibric, hemic and/or sapric material.

The A or Ap horizon, where present, has hue of 10YR to 5Y, value of 2 to 4, and chroma of 1 to 4. Structure is granular.

The Eg horizon, where present, has hue of 10YR to 5Y, value of 5 or 6, and chroma of 1 or 2.

The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4. It has subangular blocky, granular or platy structure.

The BC horizon, where present, has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 4. It has subangular blocky or platy structure.

One or more subhorizon in the subsoil has matrix chroma of 2 or less. The combined thickness of the B and BC horizons is at least 6 inches.

The Cd layer has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 to 4. It is prismatic parting to platy, platy or it is massive. Aggregations bounded by planes or zones of weakness are considered inherent in the parent material.

COMPETING SERIES: This is the Aurelie series. Aurelie soils have 18 to 27 percent clay throughout the particle size control section. Monarda and Pillsbury are in closely related families. They have pH less than 5.5 in the subsoil below a depth of 25 cm and Monarda soils have 10 to 18 percent clay in the particle-size control section.

GEOGRAPHIC SETTING: Brayton soils are in depressions and on toeslopes of glaciated uplands. Slopes range from 0 to 25 percent. The soils formed in dense till derived mainly from granite, phyllite, schist, slate, and shale of Wisconsin age. The climate is humid and cool temperate. Mean annual temperature ranges from 3 to 8 degrees C, and mean annual precipitation commonly ranges from 864 to 1219 mm but includes up to 1524 mm in the coastal area of Mt. Desert Island, Maine. The frost-free season ranges from 90 to 160 days. Elevations range from about 2 to 762 m above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Colonel, Dummerston, Fullam, Hubbardton, Lyman, Macomber, Marlow, Peru, Skerry, Taconic, Tunbridge, and Peacham soils. The Colonel, Lyman, Marlow, Peru, Skerry, and Tunbridge soils have spodic horizons, are better drained, and are on higher topographic positions. Peacham soils have a histic epipedon and are in lower topographic positions. The

Dummerston, Fullam, Hubbardton, Macomber, and Taconic soils are better drained and are on higher topographic positions.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Poorly drained. A perched water table is above the dense substratum from autumn through spring. Estimated saturated hydraulic conductivity is moderately high or high in the solum and moderately low or moderately high in the dense substratum.

USE AND VEGETATION: Most areas of this soil are forested. Some areas are cleared and used for hay and pasture. Forest vegetation is mainly red spruce, white spruce, black spruce, balsam fir, eastern white pine, red maple, northern white cedar, and paper birch, yellow birch and hemlock.

DISTRIBUTION AND EXTENT: Connecticut, Maine, Massachusetts, New York, and Vermont. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Essex County, New York, 1954.

REMARKS: After reviewing location, geographic coordiantes changed from USGS Amherst topographic quadrangle; lat. 44 degrees 46 minutes 48 seconds N. and long. 68 degrees 22 minutes 19 seconds W., NAD 27.

Diagnostic horizons and features recognized in this pedon include:
1. Ochric epipedon - the zone from 0 to 18 cm (Oi, Oa and A horizons).
2. Cambic horizon - the zone from 25 to 58 cm (Bg and BC horizons).
3. Densic contact - very firm, dense basal till at a depth of 58 cm.
4. Aeric Feature - both value and chroma of 3 or more in the zone from 41 to 58 (BC horizon).
5. Aquic conditions - redox depletions throughout the subsoil. (Eg, Bg and BC horizons).

The Aurelie series is included in the competing soils section with a previous revision.

Previous remarks June, 2004 revision:
The type location is changed with this revision based on consensus that placement in the shallow family is reflective of the dominant characteristics of the series. It is acknowledged that historically the series exceeded 50 cm to densic contact in some places. The series is re-classified from Epiaquepts to Endoaquepts in accordance with Soil Taxonomy which, in reference to applying keys, stipulates that diagnostic horizons and properties below a densic contact are excluded. It is assumed the depth to bedrock from the mineral surface of this pedon exceeds 152 cm. This soil was previously type located in New York and classified as Coarse-loamy, mixed, nonacid, frigid Aeric Fragiaquepts. The classification was changed as a result of the Northeast Fragipan Study. This series also included somewhat poorly drained soils but has since been restricted to poorly drained.

ADDITIONAL DATA: Source of the data used in establishing taxonomic class and range in characteristics is Maine Agricultural Experiment Station Technical Bulletin 94, September 1979.
Soil Interpretation Record Numbers for the Brayton Series are: Brayton, ME0100; Brayton, stony, ME0101; Brayton bouldery, ME0123; Brayton, variant ME0090.

National Cooperative Soil Survey
U.S.A.

LOCATION CHESUNCOOK ME+VT

Established Series
Rev. KJL-LRF-WDH
09/2014

CHESUNCOOK SERIES

The Chesuncook series consists of very deep, moderately well drained soils on till plains, hills, ridges, and mountains. These soils formed in dense glacial till. Saturated hydraulic conductivity is moderately high or high in the solum, and low to moderately high in the dense substratum. Slope ranges from 3 to 45 percent. Mean annual temperature is about 4 degrees C, and mean annual precipitation is about 1092 mm at the type location.

TAXONOMIC CLASS: Coarse-loamy, isotic, frigid Aquic Haplorthods

TYPICAL PEDON: Chesuncook silt loam, on a 9 percent northeast-facing slope in a very stony forested area. (Colors are for moist soil.)

Oa--0 to 3 centimeters; black (5YR 2/1) highly decomposed plant material; weak fine granular structure; many very fine and few medium and coarse roots; extremely acid; abrupt wavy boundary. (0 to 10 centimeters thick.)

E--3 to 10 centimeters; pinkish gray (7.5YR 6/2) silt loam; weak very fine granular structure; very friable; many very fine and few fine, medium and coarse roots; 10 percent gravel and channers, 2 percent cobbles and 1 percent stones; extremely acid; abrupt broken boundary. (0 to 10 centimeters thick.)

Bhs--10 to 13 centimeters; dark reddish brown (5YR 3/3) silt loam; moderate very fine granular structure; very friable; many very fine and fine, and few medium and coarse roots; 10 percent gravel and channers, 3 percent cobbles and 1 percent stones; very strongly acid; abrupt broken boundary. (0 to 10 centimeters thick.)

Bs1--13 to 27 centimeters; reddish brown (5YR 4/4) silt loam; moderate very fine granular structure; very friable; many very fine and fine, and few medium and coarse roots; 10 percent gravel and channers, 3 percent cobbles and 1 percent stones; very strongly acid; clear wavy boundary.

Bs2--27 to 45 centimeters; dark yellowish brown (10YR 4/4) gravelly silt loam; weak fine granular structure; very friable; common very fine and fine, and few medium roots; 15 percent gravel and channers, 3 percent cobbles and 1 percent stones; strongly acid; clear wavy boundary. (Combined thickness of the Bs horizon is 10 to 45 centimeters.)

BC--45 to 53 centimeters; light olive brown (2.5Y 5/4) gravelly loam; weak medium platy structure; friable; few very fine and fine roots; common medium distinct dark yellowish brown (10YR 4/6) masses of iron accumulation and few medium distinct grayish brown (2.5Y 5/2) iron depletions; 20 percent gravel and channers, 3 percent cobbles and 1 percent stones; strongly acid; clear wavy boundary. (0 to 20 centimeters thick.)

Cd--53 to 165 centimeters; light olive brown (2.5Y 5/3) gravelly loam; strong very coarse prisms parting to weak very thick plates; very firm; light brownish gray (2.5Y 6/2) faces of prisms which are separated by a thin layer of strong brown (7.5YR 5/6); common medium prominent strong brown (7.5YR 4/6) masses of iron accumulation and common coarse faint light olive gray (5Y 6/2) iron depletions; 25 percent gravel and channers, 3 percent cobbles and 1 percent stones; moderately acid.

TYPE LOCATION: Piscataquis County, Maine; Township of Shirley; 2.1 miles northwest of West Shirley Bog outlet; USGS Bald Mtn Pond, ME topographic quadrangle; Latitude 45 degrees, 22 minutes, 27 seconds N. and Longitude 69 degrees, 43 minutes, 16 seconds W., NAD 1927.

RANGE IN CHARACTERISTICS: Thickness of the mineral solum ranges from 50 to 70 centimeters. Depth to bedrock is more than 165 centimeters. The weighted average of clay in the particle-size control section is 10 to 18 percent. Rock fragment content ranges from 5 to 25 percent in the A, E and B horizons, from 10 to 35 percent in the BC horizon, and from 10 to 35 percent in the Cd layer. Rock fragments are mainly gravel, with stones and cobbles ranging from 0 to 20 percent throughout the mineral soil. Stones and boulders cover from 0 to 15 percent of the surface. Reaction ranges from extremely acid to moderately acid in the solum and from very strongly acid to neutral in the substratum. Redoximorphic features are deeper than 41 centimeters from the mineral soil surface.

The Oa horizon has hue of 10YR to 5YR, value of 2 to 3, and chroma of 1 or 2. Some pedons have Oi and/or Oe horizons.

Some pedons have an Ap or A horizon with hue of 10YR, and value and chroma of 3 or 4. Texture of the fine-earth fraction is silt loam, loam, very fine sandy loam, or fine sandy loam. Consistence is very friable or friable.

The E horizon has hue of 5YR to 10YR, value of 6 or 7, and chroma of 1 or 2. Texture of the fine-earth fraction is silt loam, loam, very fine sandy loam, or fine sandy loam. Consistence is very friable or friable.

The Bh horizon, where present, has hue of 2.5YR to 7.5YR, value of 2 to 3, and chroma of 1 to 3. The Bhs horizon has hue of 2.5YR or 5YR, with value and chroma of 2 to 3. The Bs horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 4 to 8. Texture in the fine-earth fraction of the B horizons is silt loam, loam, very fine sandy loam, or fine sandy loam. Consistence is very friable or friable.

The BC horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 2 to 4. Texture in the fine-earth fraction is silt loam, loam, very fine sandy loam, or fine sandy loam. Consistence is friable or firm.

The E' horizon, where present, has hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 2. Texture in the fine-earth fraction is silt loam, loam, very fine sandy loam, or fine sandy loam. Consistence is friable or firm.

The Cd layer has hue of 2.5Y or 5Y, value of 3 to 5, and chroma of 2 to 6. It is massive or has platy or prismatic geogenic structural units.Texture in the fine earth fraction is silt loam or loam. Any soil structural units in the Cd horizon are considered to be geogenic. Consistence is firm or very firm.

COMPETING SERIES: These are the Crary, Dixfield, Dixmont, Howland, Peru, Skerry, Sunapee, and Worden series. Crary soils have a thin aeolian or water deposited mantle. Dixfield, Howland, Peru, and Skerry soils have less than 10 percent clay in the particle-size control section. Dixmont and Sunapee soils lack densic contact. Worden soils have less than 10 percent clay in the particle-size control section and have a Bh horizon more than 4 inches thick.

GEOGRAPHIC SETTING: Chesuncook soils are on upland till plains, hills, ridges and mountains. Slope ranges from 3 to 45 percent. The soils formed in dense glacial till derived mainly from slates and other dark colored sedimentary and metamorphic rocks. The climate is humid and cool temperate. The mean annual temperature ranges from 3 to 7 degrees C, and mean annual precipitation ranges from 864 to 1168 mm. The frost-free season ranges from 80 to 130 days. Elevation ranges from 91 to 762 m above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Burnham, Elliottsville, Monarda, Monson, and Telos soils. Burnham, Monarda and Telos are wetter soils that formed in similar material but are in lower positions on the landscape or are less sloping. Elliottsville soils are moderately deep to bedrock and are in higher positions on the landscape. Monson soils are shallow to bedrock and are on higher knolls on the landscape.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained. Saturated hydraulic conductivity is moderately high or high in the solum, and low to moderately high in the dense substratum.

USE AND VEGETATION: Mostly forest. Common tree species include red maple, sugar maple, American beech, paper birch, yellow birch, red and white spruce, and balsam fir.

DISTRIBUTION AND EXTENT: Maine and Vermont. MLRA's 143, 144B, and 146. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Franklin County Area and Part of Somerset County soil survey, 1992.

REMARKS: Mineral solum thickness was narrowed with revision, 10/08, to ensure single family placement. The competing series section was revised accordingly. It is recognized that in historic correlation, some pedons now have a shallow depth class. This could done through MLRA update.

Diagnostic horizons and features recognized in this pedon include:
1. Ochric epipedon - 0 to 3 centimeters (Oa horizon).
2. Albic horizon - the zone from 3 to 10 centimeters (E horizon).
3. Spodic horizon - the zone from 10 to 27 centimeters (Bhs and Bs1 horizons).
4. Cambic horizon - the zone from 27 to 53 centimeters (Bs and BC horizons).
5. Densic contact - very firm, dense till at a depth of 21 inches.
6. Aquic Conditions - redoximorphic features at 42 centimeters below the mineral soil surface.

ADDITIONAL DATA: Source of data used in establishing taxonomic class and range in characteristics is Maine Agricultural and Forest Experiment Station, Technical Bulletin 155, 1994; NRCS Characterization Data; and composite data from the Field Appraisal of Resource Management Systems compiled by Dr. Paul R. Hepler, Department of Plant and Soil Sciences, University of Maine, Orono, Maine.

National Cooperative Soil Survey
U.S.A.

LOCATION COLONEL ME+VT

Established Series
Rev. NRK-ANA-RFL
06/2016

COLONEL SERIES

The Colonel series consists of somewhat poorly drained soils that formed in loamy lodgment till on hills and mountains in glaciated uplands. They are shallow to a dense substratum and very deep to bedrock. Estimated saturated hydraulic conductivity is moderately high or high in the solum, and low to moderately high in the dense substratum. Slope ranges from 0 to 35 percent. Mean annual precipitation is about 1180 mm, and mean annual temperature is about 6 degrees C.

TAXONOMIC CLASS: Loamy, isotic, frigid, shallow Aquic Haplorthods

TYPICAL PEDON: Colonel fine sandy loam, on a northwest facing 5 percent slope, in a very stony wooded area. (Colors are for moist soil.)

Oa--0 to 3 cm; dark reddish brown (5YR 2.5/2) highly decomposed plant material; weak fine granular structure; very friable; many very fine and fine, and common medium roots; 5 percent gravel and 5 percent cobbles; very strongly acid; abrupt smooth boundary. (O horizon thickness is 0 to 10 cm.)

E--3 to 5 cm; grayish brown (10YR 5/2) fine sandy loam; weak fine granular structure; friable; many very fine and fine, and common medium roots; 5 percent gravel and 5 percent cobbles; very strongly acid; abrupt broken boundary. (0 to 13 cm thick.)

Bhs--5 to 8 cm; dark reddish brown (5YR 3/2) fine sandy loam; weak fine granular structure; friable; many very fine and fine, common medium, and few coarse roots; 5 percent gravel and 5 percent cobbles; strongly acid; abrupt wavy boundary. (0 to 36 cm thick.)

Bs1--8 to 23 cm; brown (7.5YR 4/4) fine sandy loam; weak fine granular structure; friable; many very fine and fine, common medium, and few coarse roots; 5 percent gravel and 5 percent cobbles; strongly acid; abrupt wavy boundary.

Bs2--23 to 30 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak thin platy structure parting to weak fine granular; friable; common very fine and fine roots; common fine prominent olive gray (5Y 5/2) iron depletions and common fine distinct yellowish brown (10YR 5/6) masses of iron accumulation; 5 percent gravel and 5 percent cobbles; strongly acid; clear wavy boundary. (Combined thickness of the Bs horizon is 0 to 38 cm.)

BC--30 to 45 cm; light olive brown (2.5Y 5/4) gravelly fine sandy loam; moderate medium platy structure; friable; few very fine and fine roots; common medium distinct olive gray (5Y 5/2) iron depletions and common medium faint brown (10YR 4/3) masses of iron accumulation; 10 percent gravel and 5 percent cobbles; strongly acid; abrupt wavy boundary. (0 to 41 cm thick.)

Cd--45 to 165 cm; olive (5Y 4/3) gravelly fine sandy loam; strong very coarse prisms parting to strong medium and thick plates; very firm; common fine prominent dark reddish brown (5YR 2/2) oxide coatings on and within prisms and plates; common coarse faint olive gray (5Y 5/2) iron depletions and common fine faint brown (10YR 4/3) masses of iron accumulation; 10 percent gravel and 5 percent cobbles; strongly acid.

TYPE LOCATION: Oxford County, Maine; Town of Dixfield; located about 3.0 km southwest of the confluence of Tucker Valley Brook and Seven Mile Stream, and 450 meters west of the Franklin County line; USGS East Dixfield, ME topographic quadrangle; latitude 44 degrees, 32 minutes, 30.2 seconds N. and longitude 70 degrees, 18 minutes, 36.2 seconds W., NAD 83.

RANGE IN CHARACTERISTICS: The thickness of the mineral solum and depth to densic materials from the mineral surface range from 25 to 50 cm. Depth to bedrock is greater than 165 cm. Texture is typically fine sandy loam in the fine-earth fraction, but includes sandy loam, very fine sandy loam, and loam. Some pedons have an E horizon that is commonly silt loam. The clay content in the particle-size control section averages less than 10 percent. Rock fragments are mostly gravel, channers, and cobbles with a few stones, and range from 5 to 30 percent throughout the mineral solum and 5 to 35 percent in the substratum. Stones and boulders cover from 0 to 15 percent of the surface. Reaction ranges from extremely acid to slightly acid in the solum and from very strongly acid to neutral in the substratum. Iron depletions in the solum are between depths of 18 to 41 cm from the mineral soil surface.

The O horizons, where present, consist of slightly, intermediately, and/or highly decomposed plant material. The Oa horizon is neutral or has hue of 2.5YR to 10YR, value of 2 to 3, and chroma of 0 to 3.

Some pedons have an A or Ap horizon that is neutral or has hue of 7.5YR or 10YR, and value and chroma of 2 or 3. A horizons are 0 to 10 cm thick.

The E horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 1 or 2.

The Bhs horizon has hue of 2.5YR to 10YR, and value and chroma of 3 or less.

The Bs horizon has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 3 to 8.

The BC horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 to 6.

Some pedons have an E' horizon that has hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 2 or 3.

The Cd layer has hue of 2.5Y or 5Y, value of 3 to 5, and chroma of 2 to 4. Aggregation of material into structural units in the Cd horizon is interpreted as geogenic and is inherited from the parent material. Consistence is firm or very firm.

COMPETING SERIES: The Telos series is in the same family. Telos soils have an average clay content of 10 to 18 percent in the particle-size control section.

The Daigle series is in a related family. Daigle soils have an average clay content of 18 to 27 percent in the particle-size control section, and have mixed mineralogy.

GEOGRAPHIC SETTING: Colonel soils are on nearly level to moderately steep slopes in glaciated uplands. They are typically on slightly convex to concave parts of backslopes, footslopes, and toeslopes, but they also occur on till plains. The soils formed in loamy lodgment till derived mainly from schist, gneiss, phyllite, and granite. Slope ranges from 0 to 35 percent. The mean annual precipitation is 790 to 1640 mm, and the mean annual temperature is 2 to 7 degrees C. The frost-free period ranges from 90 to 160 days. Elevation ranges from about 2 to 800 meters above sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Becket, Berkshire, Brayton, Hermon, Lyman, Marlow, Monadnock, Peru, Pillsbury, Skerry, and Tunbridge series. Berkshire, Becket, Hermon, Marlow, Monadnock, Peru, and Skerry soils are better drained and occur in higher positions on the landscape. Brayton and Pillsbury soils are wetter and are in lower positions on the landscape. Lyman and Tunbridge soils are better drained, shallow and moderately deep to bedrock respectively, and occur in higher positions on the landscape.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Somewhat poorly drained. Estimated saturated hydraulic conductivity is moderately high or high in the solum, and low to moderately high in the dense substratum.

USE AND VEGETATION: Most areas are wooded. The common trees are red maple, sugar maple, eastern white pine, paper birch, yellow birch, red spruce, and balsam fir. Areas cleared of stones are used mainly for hay and pasture and some cultivated crops.

DISTRIBUTION AND EXTENT: Maine and Vermont. MLRAs 143 and 144B. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Oxford County, Maine, 1987.

REMARKS: 1. The Colonel series will replace some soils that are somewhat poorly drained and were included in mapping with the Peru series.

2. Diagnostic horizons and features recognized in this pedon are:

a. Ochric epipedon - the zone from 0 to 5 cm (Oa and E horizons).
b. Albic horizon - the zone from 3 to 5 cm (E horizon).
c. Spodic horizon - the zone from 5 to 23 cm (Bhs and Bs1 horizons).
d. Aquic subgroup feature - redoximorphic features within 75 cm of the mineral soil surface (Bs2 and BC horizons and Cd layer).
e. Densic materials - the zone from 45 to 165 cm (Cd layer).

ADDITIONAL DATA: Characterization data for Colonel and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

National Cooperative Soil Survey
U.S.A.

LOCATION ELLIOTTSVILLE ME

Established Series
REV. KJL-LRF-NB
09/2014

ELLIOTTSVILLE SERIES

The Elliottsville series consists of moderately deep, well drained soils formed in glacial till on till plains, hills, ridges and mountains. Permeability is moderate. Slope ranges from 3 to 65 percent. Mean annual temperature is about 3 degrees C, and mean annual precipitation is about 970 mm at the type location.

TAXONOMIC CLASS: Coarse-loamy, isotic, frigid Typic Haplorthods

TYPICAL PEDON: Elliottsville silt loam, on a 10 percent south-facing slope in a very stony wooded area. (Colors are for moist soil.)

Oa--0 to 3 cm; dark reddish brown (5YR 2.5/2) sapric material; moderate fine granular structure; very friable; many very fine and fine, common medium and few coarse roots; extremely acid; abrupt wavy boundary. (0 to 10 cm thick)

E--3 to 5 cm; pinkish gray (7.5YR 7/2) silt loam; weak fine granular structure; friable; common very fine and fine and few medium and coarse roots; 10 percent channers; extremely acid; abrupt wavy boundary. (0 to 8 cm thick)

Bh--5 to 10 cm; dark reddish brown (5YR 3/4) silt loam; weak very fine and fine granular structure; very friable; common very fine, fine and medium and few coarse roots; 10 percent channers; extremely acid; abrupt wavy boundary. (0 to 15 cm thick)

Bs--10 to 28 cm; strong brown (7.5YR 5/6) flaggy loam; weak fine granular structure; very friable; common very fine and fine and few medium and coarse roots; 15 percent channers and 10 percent flagstones; very strongly acid; clear wavy boundary. (10 to 41 cm thick)

BC--28 to 43 cm; light olive brown (2.5Y 5/6) channery loam; weak fine and medium granular structure; friable; few very fine, fine, medium and coarse roots; 10 percent channers and 5 percent flagstones; strongly acid; gradual wavy boundary. (0 to 36 cm thick)

C--43 to 66 cm; olive (5Y 5/4) channery loam; weak medium platy structure; friable; few very fine roots; 10 percent channers and 5 percent flagstones; moderately acid; abrupt irregular boundary.

R--66 cm; slate.

TYPE LOCATION: Somerset County, Maine; Sandwich Academy Grant (T2 R1); 1.1 miles west of the Misery Stream bridge on Maine Route 15, 0.8 mile southwest of Maine Route 15 on a logging road, about 100 feet north of the Misery Gore township line; USGS Misery Knob topographic quadrangle; lat. 45 degrees 35 minutes 37 seconds N. and long. 69 degrees 55 minutes 12 seconds W.,NAD 27.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 36 to 74 cm. Depth to bedrock ranges from 50 to 100 cm. Texture is silt loam, very fine sandy loam or loam in the fine-earth fraction. The weighted average of clay in the particle-size control section is 10 to 18 percent. Rock fragment content ranges from 5 to

35 percent by volume. Stones and boulders cover from 0 to 15 percent of the surface. Consistence is very friable or friable but ranges to firm in the C horizon. Reaction ranges from extremely acid to strongly acid in the solum and from very strongly acid to moderately acid in the substratum.

The Oa horizon, or the Oe horizon, where present, has hue of 5YR to 10YR, value of 2.5 or 3 and chroma of 1 or 2. It has weak or moderate, very fine to medium granular structure.

Some areas have an Ap horizon with hue of 10YR, and with value and chroma of 3 or 4. The A horizon, where present, has hue of 5YR to 10YR, value of 2 or 3 and chroma of 1 to 3. It has weak or moderate, very fine or fine granular structure.

The E horizon has hue of 5YR to 10YR, value of 4 to 7 and chroma of 1 to 3. It has weak very fine or fine granular or weak very thin platy structure.

The Bh horizon has hue of 2.5YR to 5YR, value of 2 to 5 and chroma of 2 to 6. The Bhs horizon, where present, has hue of 2.5YR to 10YR, with value and chroma of 2 or 3. The Bs horizon has hue of 5YR to 10YR, value of 4 or 5 and chroma of 4 to 8. They have weak or moderate very fine to medium granular or subangular blocky structure.

Some pedons have a BC horizon with hue of 2.5Y or 5Y, with value and chroma of 4 to 6. It has weak or moderate fine and medium granular, thin or medium platy or very fine to medium subangular blocky structure.

The C horizon has hue of 2.5Y or 5Y, value of 4 to 6 and chroma of 2 to 4. It has weak or moderate, thin to thick platy structure or the horizon is massive. Soil structure in the horizon is considered to be inherited from the parent material.

The bedrock is generally slate, metasandstone, phyllite or schist.

COMPETING SERIES: These are the Bangor, Berkshire, Dekapen, Groveton, Houghtonville, Penquis, Potsdam, Revel, Tunbridge and Welcome series. The Bangor, Berkshire, Groveton, Houghtonville and Potsdam soils are greater than 100 cm to bedrock. Dekapen, Revel, and Welcome soils are influenced by volcanic ash. Penquis soils have crushable rock fragments throughout. Tunbridge soils have less than 10 percent clay in the particle-size control section.

GEOGRAPHIC SETTING: Elliottsville soils are on till plains, hills, ridges and mountains. Slope is dominantly 8 to 15 percent but ranges from 3 to 65 percent. The soils formed in a moderately deep mantle of glacial till derived mainly from slate, metasandstone, phyllite or schist. The climate is humid and cool temperate. The mean annual temperature ranges from about 3 to 7 degrees C, and mean annual precipitation ranges from 860 to 1170 mm. The frost-free season ranges from 80 to 130 days. Elevation ranges from 91 to 762 m above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the very deep Chesuncook, Monarda and Telos soils, and the shallow Monson soils. Chesuncook, Monarda and Telos soils are wetter soils in lower positions on the landscape. Monson soils are on higher knolls above the Elliottsville soils.

DRAINAGE AND PERMEABILITY: Well drained. Permeability is moderate.

USE AND VEGETATION: Mainly forest. Common tree species include American beech, yellow birch, red spruce, white spruce, balsam fir, red maple and sugar maple.

DISTRIBUTION AND EXTENT: Maine. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Franklin County Area and Part of Somerset County, Maine Soil Survey, 1992.

REMARKS: Diagnostic horizons and features recognized in this pedon include:

1. Albic horizon- the zone from 3 to 5 cm (E horizon).
2. Spodic horizon - the zone from 5 to 28 cm (Bh and Bs horizons).
3. Lithic contact - hard bedrock at 66 cm. (R horizon).
3. Other features - frigid temperature regime and udic moisture regime.

ADDITIONAL DATA: Source of data used in establishing the range in characteristics is composite data from the Field Appraisal of Resource Management Systems compiled by Dr. Paul R. Hepler, Department of Plant and Soil Sciences, University of Maine, Orono, Maine.

Soil interpretation record numbers for the Elliottsville series are: Elliottsville, ME0114; and Elliottsville, stony, ME0086.

National Cooperative Soil Survey
U.S.A.

LOCATION HOGBACK VT+NY

Established Series
Rev. SHG-RFL-CAW
05/2013

HOGBACK SERIES

The Hogback series consists of shallow, well drained soils on glaciated uplands. They formed in loamy till. Estimated saturated hydraulic conductivity is moderately high to high throughout the mineral soil. Slope ranges from 3 to 70 percent. Mean annual precipitation is about 50 inches, and mean annual temperature is about 43 degrees F.

TAXONOMIC CLASS: Loamy, isotic, frigid Lithic Haplohumods

TYPICAL PEDON: Hogback gravelly fine sandy loam, on a 40 percent northeast facing slope in a very rocky wooded area. (Colors are for moist soil.)

Oi -- 0 to 1 inches; slightly decomposed plant material.

Oe -- 1 to 3 inches; very dark gray (5YR 3/1) moderately decomposed plant material; massive; very friable; many very fine, fine, medium and coarse roots; 5 percent rock fragments; extremely acid; abrupt smooth boundary.

Oa -- 3 to 4 inches; black (5YR 2.5/1) highly decomposed plant material; weak fine granular structure; very friable; many very fine, fine, medium and coarse roots; 5 percent rock fragments; extremely acid; abrupt smooth boundary. (Combined thickness of the O horizon is 0 to 6 inches)

E -- 4 to 8 inches; gray (5YR 5/1) gravelly fine sandy loam; weak very fine granular structure; very friable; common fine and medium roots; 15 percent rock fragments; extremely acid; abrupt wavy boundary. (0 to 8 inches thick)

Bhs1 -- 8 to 9 inches; dark reddish brown (5YR 2.5/2) very fine sandy loam; weak very fine subangular blocky structure; very friable; many fine and common medium roots; 10 percent rock fragments; moderately smeary; extremely acid; abrupt wavy boundary.

Bhs2 -- 9 to 19 inches; dark brown (7.5YR 3/2) very fine sandy loam; weak very fine subangular blocky structure; very friable; many fine, medium and coarse roots; 10 percent rock fragments; moderately smeary; very strongly acid; abrupt wavy boundary. (Combined thickness of the Bhs horizons is 4 to 18 inches.)

R -- 19 inches; schist bedrock.

TYPE LOCATION: Orleans County, Vermont; Town of Jay; 735 feet south of State Route 105 on Long Trail, 20 feet east of trail; Jay Peak topographic quadrangle; 44 degrees 59 minutes 13 seconds N. and 72 degrees 30 minutes 10 seconds W., NAD 27.

RANGE IN CHARACTERISTICS: The thickness of the solum and depth to bedrock range from 10 to 20 inches. Reaction typically ranges from extremely acid to strongly acid throughout the soil, but some pedons are moderately acid just above the bedrock. Rock fragments are mostly gravel, channers or cobbles and range from 5 to 34 percent throughout the mineral soil. The spodic horizon is 4 to 18 inches thick.

The O horizon has hue of 2.5YR to 7.5YR or it is neutral, value of 2, 2.5, or 3, and chroma of 1. It ranges from slightly decomposed to highly decomposed plant material.

The A horizon, where present, has hue of 5YR to 10YR, value of 2, 2.5, or 3, and chroma of 1 or 2. It is fine sandy loam, very fine sandy loam or loam in the fine-earth fraction. It is 0 to 7 inches thick.

The E horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 1 or 2. It is loamy coarse sand, loamy sand, loamy fine sand, sandy loam, fine sandy loam, very fine sandy loam or loam in the fine-earth fraction.

The Bhs horizon has hue of 2.5YR to 7.5YR, with value and chroma of 3 or less. Some pedons have Bh horizons that have hue of 2.5YR to 10YR or are neutral and have value and chroma of 2.5 or less. Some pedons have a Bs horizon with hue of 5YR to 10YR, with value of 3 to 5 and chroma of 4 to 6. The B horizon is coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam or loam in the fine-earth fraction. B horizons range from non-smeary to moderately smeary.

Some pedons have a BC horizon that has hue of 2.5Y, value of 4 or 5 and chroma of 4.

Bedrock is slightly weathered schist, gneiss, phyllite, granite, or anorthosite.

COMPETING SERIES: There are currently no other series in this family.

The Creasey(T), Lyman and Rawsonville soils are in related families. Creasey and Lyman soils are Orthods. Rawsonville soils are moderately deep.

GEOGRAPHIC SETTING: Hogback soils are on glaciated uplands. They are on summits, shoulders and backslopes of mountains, ridges and hills. Slope ranges from 3 to 70 percent. The soils formed in loamy till of Wisconsin age. Mean annual precipitation ranges from 34 to 60 inches, and the mean annual temperature ranges from 38 to 45 degrees F. The frost-free season ranges from about 60 to 120 days. Elevation is typically between 1,500 and 3000 feet, but in places ranges as low as 380 feet above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the very deep Houghtonville and the moderately deep Rawsonville soils which are in similar positions on the landscape as Hogback soils.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained. Potential surface runoff is very high. Estimated saturated hydraulic conductivity is moderately high to high throughout the mineral soil.

USE AND VEGETATION: Most areas are wooded. The common trees are American beech, yellow birch, paper birch, sugar maple, red maple, balsam fir, white pine, red spruce, and white spruce. A few areas have been cleared and are used for hay or pasture.

DISTRIBUTION AND EXTENT: MLRA 143 and 144B in Vermont, Maine, New Hampshire, and New York. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Windham County, Vermont, 1984.

REMARKS: 1. The Classification and location of the typical pedon are changed with this revision. The former classification was Loamy, isotic, frigid Lithic Haplorthods. Recent laboratory data from Maine, New Hampshire, Vermont and New York shows that some pedons mapped as Hogback (and some mapped as Lyman) meet the requirements of the Humods suborder.

2. These soils were originally recognized as having some "thixotropic-like" properties, i.e., smeariness, high

organic carbon content, high effective clay percentage, high K value, and fragile nature (easily damaged by use) but have been classified as Orthods based on available laboratory data.

3. The diagnostic horizons and features recognized in this pedon are:
a. Ochric epipedon - the zone from 0 to 8 inches (O and E horizons).
b. Spodic horizon - the zone from 8 to 19 inches (Bhs horizon).
c. Lithic feature - bedrock at 15 inches from the mineral soil surface.

ADDITIONAL DATA: The spodic horizon of this pedon was sampled to determine carbon content for taxonomic placement. The data is available from the National

Soil Survey Laboratory, sample number S99VT-019-013.

National Cooperative Soil Survey
U.S.A.

LOCATION MONARDA ME+NH NY

Established Series
Rev. KJL-LRF-NB
09/2014

MONARDA SERIES

The Monarda series consists of poorly drained soils formed in dense till on lower slopes or in slight depressions on till plains. They are very deep to bedrock and shallow to dense till. Estimated saturated hydraulic conductivity is moderately high to high in the subsurface and upper part of the subsoil and low to moderately high in the lower part of the subsoil and in the substratum. Slope ranges from 0 to 15 percent. Mean annual temperature is about 4 degrees C and mean annual precipitation is about 940 mm at the type location.

TAXONOMIC CLASS: Loamy, mixed, active, acid, frigid, shallow Aeric Endoaquepts

TYPICAL PEDON: Monarda silt loam on a 2 percent north-facing slope in a very stony forested area. (Colors are for moist soil.)

Oe--0 to 8 cm; black (5YR 2/1) mucky peat (hemic material); weak medium granular structure; very friable; many very fine, fine, medium and coarse roots; extremely acid; abrupt wavy boundary. (0 to 15 cm thick)

Eg--8 to 15 cm; light gray (10YR 7/2) silt loam; weak thin platy structure; friable; many fine, medium and coarse roots; 5 percent gravel; extremely acid; clear wavy boundary. (0 to 25 cm thick)

Bg1--15 to 28 cm; light brownish gray (2.5Y 6/2) silt loam; weak thin platy structure; friable; common fine and medium roots; many medium faint pale olive (5Y 6/3) masses of iron accumulation; 10 percent gravel; very strongly acid; clear wavy boundary.

Bg2--28 to 41 cm; light olive gray (5Y 6/2) silt loam; weak thin platy structure; firm, few fine and medium roots; many medium distinct light olive brown (2.5Y 5/4) masses of iron accumulation; 10 percent gravel; strongly acid; clear wavy boundary. (The combined thickness of the Bg horizon is 5 to 41 cm)

BC--41 to 51 cm; olive (5Y 5/4) silt loam; massive; firm; few fine roots; many medium faint light olive brown (2.5Y 5/4) masses of iron accumulation and common fine distinct gray (5Y 6/1) iron depletions; 10 percent gravel; moderately acid; abrupt smooth boundary. (0 to 38 cm thick)

Cd--51 to 165 cm; olive (5Y 4/3) gravelly silt loam; strong very coarse prisms; firm, olive gray (5Y 5/2) faces of prisms which are separated from interiors of prisms by a thin layer of brown (7.5YR 4/4); common fine distinct gray (5Y 6/1) iron depletions and common medium faint light olive brown (2.5Y 5/4) masses of iron accumulation; 15 percent gravel; slightly acid.

TYPE LOCATION: Somerset County, Maine, Brassua Township (T2R2); 7.5 miles north on the Demo Road from Maine Routes 6 and 15 to a gravel pit on the east side of the road, through the pit and 2.5 miles east-southeast on a logging road, the site is 200 feet west of the road; USGS Brassua Lake West topographic quadrangle; lat. 45 degrees 40 minutes 30 seconds N. and long. 69 degrees 55 minutes 35 seconds W., NAD27.

RANGE IN CHARACTERISTICS: Thickness of the mineral solum ranges from 30 to 50 cm. Depth to bedrock is more than 152 cm. The weighted average of clay in the particle-size control section is 10 to 18 percent. Rock fragment content ranges from 5 to 70 percent in the Eg and A horizons, where present, and are

mainly pebble and cobble size. Throughout the remainder of the mineral soil profile, rock fragments are mainly pebble size, the weighted average ranging from 5 to 35 percent. Some pedons have channers. Stones and boulders cover 0 to 35 percent of the surface.

The Oe horizon, and Oa horizon, where present, have hue of 2.5YR to 10YR, value of 2 to 3, and chroma of 1 or 2. They have weak or moderate, very fine to medium granular structure. Consistence is very friable or friable.

The A and Ap horizons, where present, have hues of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 to 3. They are silt loam, loam, very fine sandy loam, or fine sandy loam in the fine-earth fraction. They have weak to strong, fine or medium granular structure and are very friable or friable. Reaction is extremely acid to moderately acid unless limed.

The Eg horizon, where present, has hue of 7.5YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It is silt loam, loam, very fine sandy loam, or fine sandy loam in the fine-earth fraction. It has weak thin or medium platy, weak fine subangular blocky, weak very fine or fine granular or weak very coarse prismatic structure or the horizon is massive. Consistence is very friable to firm. Reaction is extremely acid to moderately acid.

The B horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4. It is silt loam, loam or very fine sandy loam in the fine-earth fraction. It has weak or moderate, thin to very thick platy structure or very fine to medium subangular blocky, or weak very fine to medium granular or weak coarse prismatic parting to moderate medium platy. Consistence is friable or firm, nonsticky or slightly sticky and nonplastic or slightly plastic. Reaction is extremely acid to moderately acid.

The BC horizon has hue of 2.5Y or 5Y, value of 4 or 5, and chroma of 2 to 4. It is silt loam, loam, or very fine sandy loam in the fine-earth fraction. It has weak or moderate, medium to very thick platy structure, or weak or moderate subangular blocky, or weak to strong, coarse or very coarse prismatic parting to weak or moderate, medium to very thick platy or it is massive. Consistence is firm or very firm, nonsticky or slightly sticky and nonplastic or slightly plastic. Some pedons have an E' horizon that has characteristics similar to those of the BC horizon. Reaction is very strongly acid to moderately acid.

The Cd layer has hue of 2.5Y, 5Y, or 5GY, value of 4 to 6, and chroma of 1 to 4. It is silt loam, loam or very fine sandy loam in the fine-earth fraction. It has weak or moderate, thin to very thick plates or weak to strong, coarse or very coarse prisms that may part to plates, all of which is interpreted as inherited from the parent material, or the horizon is massive. Consistence is firm or very firm, slightly sticky and slightly plastic or plastic. Reaction is strongly acid to neutral.

COMPETING SERIES: There are currently no other series in the same family Pillsbury soils are in a related family. They have less than 10 percent clay in the particle-size control section.

GEOGRAPHIC SETTING: Monarda soils are on lower slopes or in slight depressions on till plains. Slopes range from 0 to 15 percent. The soils formed in dense glacial till derived mainly from slate, metasandstone, phyllite and shale with small amounts of granite, fine grained quartzite and sandstone. The climate is humid and cool temperate. The mean annual temperature ranges from 3 to 7 degrees C, and mean annual precipitation ranges from 864 to 1168 mm. The frost-free season ranges from 80 to 130 days. Elevation ranges from 36 to 762 m above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Bangor, Burnham, Chesuncook, Dixmont, Elliottsville, Howland, Monson, Penquis, Plaisted, Telos, Thorndike and Winnecook soils. The Bangor, Chesuncook, Dixmont, Howland, Plaisted, and Telos soils are better drained and are in higher positions on the landscape. Burnham soils are wetter soils in depressions. Elliottsville, Monson, Penquis, Thorndike and Winnecook soils are better drained, shallower to bedrock and are in higher positions on the landscapes.

DRAINAGE AND PERMEABILITY: Poorly drained. Estimated saturated hydraulic conductivity is moderately high to high in the subsurface and upper part of the subsoil and low to moderately high in the lower

part of the subsoil and in the substratum.Permeability is moderate to moderately rapid in the subsurface, moderate to moderately slow in the upper part of the subsoil and slow or very slow in the lower part of the subsoil and in the substratum.

USE AND VEGETATION: Mostly forest. Common tree species include red spruce, balsam fir, black spruce, northern white cedar, red maple, eastern white pine, eastern hemlock, and paper birch. A few areas are in hay or pastures.

DISTRIBUTION AND EXTENT: Maine, New Hampshire, and New York. The series is of large extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts

SERIES ESTABLISHED: Penobscot County, Maine, 1947.

REMARKS: Mineral solum thickness range narrowed to insure single family placement (rev. 2/2007). It is recognized that historically the series concept included deeper members. Family changed from coarse-loamy to loamy and great group from Epiaquepts to Endoaquepts with revision, 1/2005. The Monarda soils are borderline between acid and nonacid with the majority of pedons tested being acid. The current classification reflects this.

Note the series Typical Pedon needs evaluation as it is not shallow. See historical notes.

Diagnostic horizons and features recognized in this pedon include:

1. Ochric epipedon - the zone from 0 to 15 cm (Oe and Eg horizons).
2. Cambic horizon - the zone from 15 to 51 cm (Bg1, Bg2 and BC horizons).
3. Aquic conditions - redoximorphic features 8 cm below the mineral surface.
4 Endosaturation - classification defaults to Endoaquepts as the densic contact is not applicable to diagnostic horizons and properties.
5 Aeric feature - chroma of 4 in the BC horizon
6 Densic contact - Cd layer at a depth of 51 cm.

ADDITIONAL DATA: Source of data used in establishing taxonomic class and range in characteristics are Technical Bulletin 94, Maine Agricultural Experiment Station, unpublished data, Maine Agricultural Experiment Station and NRCS Characterization Data.

Soil Interpretation Record numbers for the Monarda series are: Monarda, ME0011; Monarda, rubbly, ME0136; and Monarda, stony, ME0012.

National Cooperative Soil Survey
U.S.A.

LOCATION PERU NH+MA ME NY VT

Established Series
Rev. HRM-RFL-DHZ
06/2016

PERU SERIES

The Peru series consists of moderately well drained soils that formed in loamy lodgment till on hills and mountains in glaciated uplands. They are moderately deep to a dense substratum and very deep to bedrock. Estimated saturated hydraulic conductivity is moderately high or high in the solum, and moderately low or moderately high in the dense substratum. Slope ranges from 0 to 60 percent. Mean annual precipitation is about 1180 mm, and mean annual temperature is about 6 degrees C.

TAXONOMIC CLASS: Coarse-loamy, isotic, frigid Aquic Haplorthods

TYPICAL PEDON: Peru fine sandy loam, on a north facing, 15 percent slope in a very stony wooded area. (Colors are for moist soil unless otherwise noted.)

Oe--0 to 3 cm; black (10YR 2/1) moderately decomposed plant material; very friable; very strongly acid (pH 4.9); abrupt smooth boundary. (O horizon thickness is 0 to 10 cm.)

A--3 to 13 cm; dark brown (7.5YR 3/2) fine sandy loam, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; many very fine and fine and few coarse roots; 5 percent rock fragments; very strongly acid (pH 4.8); abrupt wavy boundary. (0 to 10 cm thick)

E--13 to 15 cm; light brownish gray (10YR 6/2) fine sandy loam; weak medium granular structure; friable; common fine roots; 5 percent rock fragments; very strongly acid (pH 4.8); abrupt broken boundary. (0 to 10 cm thick)

Bs1--15 to 18 cm; dark brown (7.5YR 3/4) fine sandy loam; weak fine granular structure; friable; common fine and few coarse roots; 5 percent rock fragments; very strongly acid (pH 5.0); abrupt broken boundary.

Bs2--18 to 33 cm; strong brown (7.5YR 4/6) fine sandy loam; weak fine granular structure; friable; common fine and few coarse roots; 5 percent rock fragments; very strongly acid (pH 5.0); clear wavy boundary.

Bs3--33 to 46 cm; dark yellowish brown (10YR 4/6) fine sandy loam; weak medium subangular blocky structure; friable; common fine roots; 5 percent rock fragments; strongly acid (pH 5.2); abrupt wavy boundary. (Combined thickness of the Bs horizon is 7 to 38 cm).

BC--46 to 54 cm; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine subangular blocky structure; friable; few fine roots; common fine faint olive brown (2.5Y 4/3) iron depletions in the matrix; 5 percent rock fragments; strongly acid (pH 5.2); abrupt smooth boundary. (0 to 38 cm thick)

Cd1--54 to 94 cm; olive brown (2.5Y 4/3) fine sandy loam; 85 percent moderate medium plates and 15 percent sandy lenses; firm; common medium faint olive gray (5Y 4/2) iron depletions in the matrix; 5 percent rock fragments; strongly acid (pH 5.2); clear wavy boundary.

Cd2--94 to 165 cm; olive gray (5Y 4/2) fine sandy loam; 95 percent moderate thick plates and 5 percent sandy lenses; firm; common medium faint olive brown (2.5Y 4/3) masses of iron accumulation on faces of peds; 5

percent rock fragments; strongly acid (pH 5.2).

TYPE LOCATION: Merrimack County, New Hampshire; Town of New London; located about 275 meters west of County Road on Northwood Lane, and 35 meters south of the road; USGS Sunapee Lake North, NH topographic quadrangle; latitude 43 degrees 24 minutes 04 seconds N. and longitude 72 degrees 01 minutes 17 seconds W., NAD 83.

RANGE IN CHARACTERISTICS: The thickness of the mineral solum and depth to densic materials from the mineral surface range from 50 to 100 cm. Depth to bedrock is greater than 150 cm. Texture is typically fine sandy loam, sandy loam, or loam in the fine-earth fraction but includes silt loam and very fine sandy loam in the upper part of the solum. The weighted average of clay in the particle-size control section is 10 percent or less. The silt content in the solum and underlying till averages less than 50 percent, but ranges to 50 percent or more in the upper 25 cm of the solum. Rock fragments are dominantly gravel with some cobbles and stones and typically range from 5 to 30 percent throughout the mineral soil. Some pedons have horizons with less than 5 percent rock fragments. Reaction ranges from extremely acid to slightly acid in the solum, and from very strongly acid to slightly acid in the substratum.

The O horizons, where present, consist of slightly, moderately, and/or highly decomposed organic material. The Oe and Oa horizons have hue of 2.5YR to 10YR, value of 2 to 4, and chroma of 1 to 4.

The A, or Ap horizon where present, has hue of 5YR to 10YR and value and chroma of 2 to 4.

The E horizon is neutral or has hue of 5YR to 2.5Y, value of 4 to 7, and chroma of 0 to 2.

The Bhs horizon, where present, is up to 13 cm thick and has hue of 2.5YR to 10YR, a value of 2 to 3, and a chroma of 1 to 3.

The Bs horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 8.

The BC horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 2 to 6.

Some pedons have an E or E' horizon below the B horizon. It has hue of 10YR to 5Y, value of 4 to 6, and chroma of 2 or 3. Typically, it has a coarser texture than the overlying horizon.

Some pedons have a friable C horizon up to 20 cm thick that has color and texture similar to the underlying Cd horizon.

The Cd horizon has hue of 10YR to 5Y, value of 3 to 6, and chroma of 2 to 4. Consistence is firm or very firm. Arrangement of soil particles into plates is considered to be geogenic. Loose or friable segregated sand lenses with a horizontal orientation compose up to 20 percent of the densic materials. The lenses are typically coarse, medium, or fine sand ranging from 2 to 25 mm thick.

COMPETING SERIES: These are the Chesuncook, Crary, Dixmont, Howland, Ragmuff, Skerry, Sunapee, and Worden series. Chesuncook soils have a weighted average of more than 10 percent clay in the particle-size control section. Crary soils have a mantle of eolian or water deposited sediments ranging from 40 to 100 cm thick over till. Dixmont and Sunapee soils are formed in loamy supraglacial till and do not have densic materials within 100 cm of the mineral soil surface. Howland soils have a weighted average of more than 50 percent silt in the particle-size control section. Ragmuff soils are moderately deep to bedrock. Skerry soils have more than 20% sandy lenses in the Cd horizon. Worden soils are somewhat poorly drained.

GEOGRAPHIC SETTING: Peru soils are on nearly level to steep slopes in glaciated uplands. Typically they are on linear or convex areas of backslopes, footslopes, and toeslopes, but they also occur in concave positions. The soils formed in loamy lodgment till derived mainly from schist, gneiss, phyllite, and granite. Slope ranges from 0 to 60 percent. The mean annual precipitation is 790 to 1640 mm, and the mean annual temperature is 2 to

7 degrees C. The frost-free period ranges from 90 to 160 days. Elevation ranges from about 2 to 800 meters above sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Berkshire, Brayton, Cabot, Colonel, Lyman, Marlow, Monadnock, Peacham, Pillsbury, Sunapee, and Tunbridge soils. Berkshire, Lyman, Monadnock, Sunapee, and Tunbridge soils are formed in supraglacial till and do not have densic materials. Additionally, Lyman soils are shallow to bedrockk, and Tunbridge soils are moderately deep to bedrock. Peru soils are in a drainage sequence with the well drained Marlow soils, somewhat poorly drained Colonel soils, poorly drained Brayton, Cabot, and Pillsbury soils, and very poorly drained Peacham soils.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Moderately well drained. Estimated saturated hydraulic conductivity is moderately high or high in the solum, and moderately low or moderately high in the dense substratum.

USE AND VEGETATION: Most areas are wooded. The common trees are sugar maple, eastern white pine, balsam fir, red spruce, white spruce, white ash, yellow birch, paper birch, eastern hemlock, American beech, and red pine. Areas cleared of stones are used mainly for hay and pasture and some cultivated crops.

DISTRIBUTION AND EXTENT: Maine, Massachusetts, New Hampshire, New York, and Vermont. The soils of this series are extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Berkshire County, Massachusetts, 1923.

REMARKS: 1. Dixfield soils were recorrelated to Peru soils as part of the national Soil Data Join Recorrelation initiative. Revisions to the Peru Range in Characteristics incorporate values from the Dixfield Official Series Description. As a result of this revision to Peru, the Dixfield series status has been changed to inactive.

2. Diagnostic horizons and features recognized in this pedon are:

a. Ochric epipedon - the zone from 0 to 15 cm (Oe, A, and E horizons).
b. Spodic horizon - the zone from 15 to 33 cm (Bs1 and Bs2 horizons).
c. Aquic conditions - redoximorphic features at 43 cm below the mineral soil surface (BC, Cd1, and Cd2 horizons).
d. Densic materials - the zone from 54 to 165 cm (Cd1 and Cd2 horizons).

ADDITIONAL DATA: Characterization data for Peru and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

National Cooperative Soil Survey
U.S.A.

LOCATION PILLSBURY NH+MA ME NY

Established Series
Rev. SALP-RAS-SHG-RFL
05/2015

PILLSBURY SERIES

The Pillsbury series consists of poorly drained soils that formed in loamy lodgment till in glaciated uplands and lowlands. They are moderately deep to a dense substratum and very deep to bedrock. Estimated saturated hydraulic conductivity is moderately high or high in the solum and moderately low or moderately high in the dense substratum. Slope ranges from 0 to 15 percent. Mean annual precipitation is about 1180 mm, and mean annual temperature is about 6 degrees C.

TAXONOMIC CLASS: Coarse-loamy, mixed, superactive, acid, frigid Humic Endoaquepts

TYPICAL PEDON: Pillsbury cobbly loam, on a 1 percent slope in a very stony wooded area. (Colors are for moist soil.)

Oe--0 to 3 cm; mucky peat. (O horizon is 0 to 10 cm thick)

A--3 to 15 cm; black (10YR 2/1) cobbly loam; weak fine and medium granular structure; friable; many fine and common medium roots; 5 percent gravel, 10 percent cobbles, and 5 percent stones; very strongly acid (pH 4.8); clear smooth boundary. (0 to 20 cm thick)

Bg1--15 to 33 cm; dark grayish brown (10YR 4/2) cobbly fine sandy loam; weak medium granular structure; friable; few fine roots; few fine distinct dark yellowish brown (10YR 4/4) masses of iron accumulation and few fine prominent olive gray (5Y 5/2), and gray (5Y 5/1) iron depletions; 5 percent gravel, 10 percent cobbles, and 2 percent stones; very strongly acid (pH 4.8); clear smooth boundary.

Bg2--33 to 58 cm; dark grayish brown (2.5Y 4/2) cobbly fine sandy loam; weak medium subangular blocky structure; friable; very few fine roots; common medium prominent dark yellowish brown (10YR 4/4), light olive brown (2.5Y 5/4), and olive (5Y 5/6) masses of iron accumulation; 5 percent gravel, 10 percent cobbles, and 2 percent stones; very strongly acid (pH 5.0); clear smooth boundary. (Combined thickness of the Bg horizon is 10 to 60 cm.)

Cd--58 to 165 cm; olive brown (2.5Y 4/4) cobbly fine sandy loam; massive; firm; common medium faint dark yellowish brown (10YR 4/4), and common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; few widely spaced fracture faces with gray (5Y 5/1) interiors and yellowish brown (10YR 5/6) coatings that extend almost vertically into horizon; 10 percent gravel, 7 percent cobbles, and 3 percent stones; very strongly acid (pH 5.0).

TYPE LOCATION: Sullivan County, New Hampshire; Town of Lempster; located about 4.8 km west of NH Route 10, and 450 meters south of the Unity town line; USGS Newport, NH topographic quadrangle; latitude 43 degrees, 16 minutes, 10.67 seconds N. and longitude 72 degrees, 12 minutes, and 58.22 seconds W., NAD 1983.

RANGE IN CHARACTERISTICS: The thickness of the mineral solum ranges from 50 to 100 cm. Depth to bedrock is greater than 165 cm. Texture is typically loam, fine sandy loam, or sandy loam in the fine-earth fraction. Rock fragments are mostly gravel, cobbles, and stones, and range from 5 to 45 percent in the mineral solum and substratum. Unless limed, reaction is very strongly acid or strongly acid in the solum, and ranges

from very strongly acid to moderately acid in the substratum.

The O horizons, where present, consist of peat, mucky peat, and/or muck.

The A horizon has hue of 7.5YR to 5Y, value of 2 to 3, and chroma of 1 to 3.

Some pedons have an Ap horizon that has hue of 10YR to 5Y, value of 2 to 4, and chroma 1 to 3.

Some pedons have an E horizon that has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2.

The Bg horizon is neutral or has hue of 10YR to 5Y, value of 4 to 6, and chroma of 0 to 2.

Some pedons have a B, BC, and/or BCg horizon that has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 or 2.

The Cd layer has hue of 10YR to 5Y, value of 3 to 6, and chroma of 1 to 4. It is massive or has plates or course prisms of geogenic origin. Consistence is firm or very firm.

COMPETING SERIES: There are no other series in the same family. The Brayton, Cabot, and Monarda soils are in related families. These soils are all shallow to a dense substratum.

GEOGRAPHIC SETTING: Pillsbury soils are on nearly level to strongly sloping gradients in glaciated uplands and lowlands. They are typically on slightly convex to concave parts of backslopes, footslopes, and toeslopes. The soils formed in Wisconsin-aged, loamy lodgment till derived mainly from granite, gneiss, and schist. Slope ranges from 0 to 15 percent. The mean annual precipitation is 790 to 1640 mm, and the mean annual temperature is 2 to 7 degrees C. The frost-free period ranges from 90 to 140 days. Elevation ranges from about 100 to 800 meters above sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Berkshire, Colonel, Lyman, Marlow, Peru, Sunapee, and Tunbridge soils. Pillsbury soils are in a drainage sequence with the well drained Marlow soils, moderately well drained Peru soils, and somewhat poorly drained Colonel soils. Berkshire and Sunapee soils are moderately well drained, on higher positions in the landscape, and formed in supraglacial till. Lyman and Tunbridge soils are better drained, shallow and moderately deep to bedrock respectively, and occur on higher positions in the landscape.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Poorly drained. Estimated saturated hydraulic conductivity is moderately high or high in the solum and moderately low or moderately high in the dense substratum.

USE AND VEGETATION: Most areas are wooded. The common trees are red maple, sugar maple, eastern white pine, yellow birch, red spruce, balsam fir, and northern red oak. Areas cleared of stones are used mainly for hay and pasture.

DISTRIBUTION AND EXTENT: New Hampshire, Massachusetts, Maine, and New York. MLRAs 143 and 144B. The series is extensive.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Sullivan County, New Hampshire, 1981.

REMARKS: 1. The Pillsbury series was previously classified as Coarse-loamy, mixed, active, acid, frigid Aeric Endoaquepts.

2. Although the series is represented here as moderately deep to densic materials, Pillsbury soils have also been

correlated as members of the shallow family.

3. With this revision the series is restricted to the poorly drained class. However, Pillsbury soils have also been correlated as members of the somewhat poorly drained class.

4. Diagnostic horizons and features recognized in this pedon are:
a. Ochric epipedon - the zone from 0 to 15 cm (Oe and A horizons).
b. Cambic horizon - the zone from 15 to 58 cm (Bg1 and Bg2 horizons).
c. Redoximorphic features - chroma of 2 and redox concentrations in the zone from 15 to 58 cm (Bg1 and Bg2 horizons).
d. Densic materials - the zone from 58 to 165 cm (Cd layer).

ADDITIONAL DATA: Characterization data for Pillsbury and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

National Cooperative Soil Survey
U.S.A.

LOCATION RAWSONVILLE VT+ME NH NY

Established Series
Rev. SHG-RGD-CAW
04/2018

RAWSONVILLE SERIES

The Rawsonville series consists of moderately deep, well drained soils on glaciated uplands. They formed in loamy till. Estimated saturated hydraulic conductivity is moderately high or high in the mineral soil. Slope ranges from 3 to 70 percent. Mean annual precipitation is about 1,270 mm, and mean annual temperature is about 6 degrees C.

TAXONOMIC CLASS: Coarse-loamy, isotic, frigid Typic Haplohumods

TYPICAL PEDON: Rawsonville very fine sandy loam, on an 32 percent southwest facing slope in a very rocky wooded area. (Colors are for moist soil.)

Oe -- 0 to 5 cm; very dark grayish brown (10YR 3/2) rubbed, moderately decomposed plant material; many very fine roots; abrupt wavy boundary.

Oa -- 5 to 15 cm; black (N 2.5/0) highly decomposed plant material; weak fine granular structure; very friable; few coarse and many fine and very fine roots; extremely acid; abrupt wavy boundary. (The combined thickness of the O horizon is 0 to 20 cm.)

E -- 15 to 18 cm; dark gray (5Y 4/1) very fine sandy loam; weak fine and medium subangular blocky structure; friable; common very fine and fine roots; 5 percent rock fragments; very strongly acid; abrupt wavy boundary. (0 to 20 cm thick)

Bhs1 -- 18 to 25 cm; very dusky red (2.5YR 2.5/2) very fine sandy loam; weak fine subangular blocky structure; very friable; few medium and common very fine and fine roots; 7 percent rock fragments; moderately smeary; very strongly acid; gradual wavy boundary.

Bhs2 -- 25 to 38 cm; dark reddish brown (5YR 3/3) very fine sandy loam; weak fine subangular blocky structure; very friable; few medium and common very fine and fine roots; 7 percent rock fragments; moderately smeary; strongly acid; gradual wavy boundary. (The combined thickness of the Bhs horizon is 10 to 61 cm.)

BC -- 38 to 81 cm; dark grayish brown (2.5Y 4/2) very fine sandy loam; weak fine subangular blocky structure; very friable; few very fine and roots; 10 percent rock fragments; weakly smeary; strongly acid; abrupt wavy boundary. (0 to 28 cm thick)

R -- 81 cm; schist bedrock.

TYPE LOCATION: Caledonia County, Vermont; town of Stannard; 2,500 feet northwest of Stannard Pond and 1,200 feet south of the Wheelock Town line; USGS Stannard topographic quadrangle; latitude 44 degrees 32 minutes 09 seconds north, longitude 72 degrees 10 minutes 24 seconds west, NAD 27.

RANGE IN CHARACTERISTICS: The thickness of the mineral solum and depth to bedrock range from 50 to 100 cm. Reaction ranges from extremely acid through strongly acid throughout the mineral soil. Rock fragments are mostly gravel, cobbles channers, or stones and range from 0 to 30 percent throughout.

The O horizons, where present, have hue of 7.5YR, 10YR, or is neutral, value of 2.5 or 3, and chroma of 0 to 2.

Some pedons have an A horizon that is neutral or has hue of 5YR through 10YR, value of 2 through 3, and chroma of 0 through 2. It is fine sandy loam, very fine sandy loam, silt loam, or loam in the fine-earth fraction.

The E horizon has hue of 5YR through 5Y, value of 3 through 6, and chroma of 1 through 3. It is sandy loam, fine sandy loam, loamy sand, very fine sandy loam, loam, or silt loam in the fine-earth fraction. The E horizon may be discontinuous because of tree throw and other disturbances.

The Bhs horizon has hue of 2.5YR through 7.5YR with value and chroma of 3 or less.

Some pedons have a Bh horizon that is neutral with value of 2 or less or has hue of 10YR, value of 3 and chroma of 1.

Some pedons have a Bs horizon with hue of 5YR through 10YR, value of 3 or more and chroma of 4 or more.

The Bhs, Bs, and Bh horizons are sandy loam, fine sandy loam, very fine sandy loam, silt loam, or loam in the fine-earth fraction. They are moderately or weakly smeary.

The BC horizon has hue of 7.5YR through 5Y value of 3 through 5, and chroma of 2 through 4. It is sandy loam, fine sandy loam, loamy sand, or very fine sandy loam in the fine-earth fraction.

Some pedons have a C or Cd horizon with hue of 10YR through 5Y, value of 3 through 5, and chroma of 2 through 4. It is sandy loam, fine sandy loam, loamy sand, or very fine sandy loam in the fine-earth fraction.

Bedrock is slightly weathered schist, gneiss, phyllite, granite, or anorthosite.

COMPETING SERIES: There are no other series in this family.

The Glebe, Hogback and Tunbridge series are in related families. Glebe soils have a cryic temperature regime. Hogback soils are shallow. Tunbridge soils has less organic carbon in the spodic horizon.

GEOGRAPHIC SETTING: Rawsonville soils are on glaciated uplands. They are on mountain tops, mountain side slopes, ridges, hill tops, and hill slopes. Slope ranges from 3 to 70 percent. The soils formed in loamy glacial till of Wisconsin age. Mean annual precipitation ranges from about 790 to 2,420 mm, and the mean annual temperature ranges from -3 to 9 degrees C. The frost-free season ranges from about 60 to 120 days. Elevation is typically between 450 to 950 meters.

GEOGRAPHICALLY ASSOCIATED SOILS: The shallow Hogback and very deep Houghtonville soils are on similar landscapes. The very deep Mundal soils are moderately well drained, have a dense substratum, and are on slightly lower positions on the landscape. The very deep Ampersand soils are somewhat poorly drained, have a dense substratum, and are on nearly level to steep, shallow depressions and drainageways. The very deep Wilmington soils are poorly drained, have a dense substratum, and are on nearly level to sloping, concave, or depressional areas.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Well drained. Estimated saturated hydraulic conductivity is moderately high or high in the mineral soil.

USE AND VEGETATION: Most areas are wooded. The common trees are white ash, American beech, yellow birch, paper birch, red maple, sugar maple, balsam fir, red spruce, white spruce, and eastern hemlock.

DISTRIBUTION AND EXTENT: Vermont, New Hampshire, Maine, and New York. MLRAs 143 and 144B. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Windham County, Vermont, 1984.

REMARKS: The diagnostic horizons and features recognized in this pedon are:
Folistic epipedon - the zone from 0 through 15 cm (Oe and Oa horizons).
Spodic horizon - the zone from 18 to 38 cm (Bhs horizon).
Lithic contact - bedrock at 81 cm from the soil surface.

ADDITIONAL DATA: Characterization data for Rawsonville and similar soils is available through the National Cooperative Soil Survey Soil Characterization Database: http://ncsslabdatamart.sc.egov.usda.gov/

National Cooperative Soil Survey
U.S.A.

LOCATION TELOS ME

Established Series
Rev. KJL-LRF-MJK
07/2014

TELOS SERIES

The Telos series consists of somewhat poorly drained soils on till plains, hills, and ridges. They are shallow to dense lodgement till and very deep to bedrock. These soils formed in till. Saturated hydraulic conductivity is moderately high or high in the solum and low to moderately high in the substratum. Slope ranges from 0 to 25 percent. Mean annual temperature is about 4.4 degrees C, and mean annual precipitation is about 97 centimeters at the type location.

TAXONOMIC CLASS: Loamy, isotic, frigid, shallow Aquic Haplorthods

TYPICAL PEDON: Telos silt loam, on a 3 percent slope in a very stony forested area, at an elevation of about 500 meters. (Colors are for moist soil.)

Oi -- 0 to 5 centimeters; dark brown (7.5YR 3/4) slightly decomposed plant material; weak medium granular structure; very friable; common very fine and fine roots throughout; extremely acid; abrupt wavy boundary.

Oe -- 5 to 8 centimeters; black (10YR 2/1) moderately decomposed plant material; weak medium granular structure; very friable; few very fine roots throughout; extremely acid; abrupt wavy boundary. (Combined thickness of the O horizons is 5 to 18 centimeters.)

E -- 8 to 13 centimeters; light brownish gray (10YR 6/2) silt loam; weak medium subangular blocky structure; friable, common fine roots throughout; 5 percent gravel; extremely acid; abrupt wavy boundary. (0 to 15 centimeters thick.)

Bs -- 13 to 33 centimeters; brown (7.5YR 5/4) loam; weak medium subangular blocky structure; friable; common very fine to medium roots throughout; 5 percent gravels and 5 percent channers; very strongly acid; clear wavy boundary. (10 to 30 centimeters thick.)

BC -- 33 to 48 centimeters; light olive brown (2.5Y 5/4) loam; weak fine subangular blocky structure; friable; few very fine and fine roots throughout; 1 percent fine faint light yellowish brown (2.5Y 6/3), moist, areas of iron depletion throughout and 10 percent fine prominent strong brown (7.5YR 5/6), moist, masses of oxidized iron throughout; 5 percent gravels; strongly acid; clear wavy boundary. (0 to 18 centimeters thick.)

Cd -- 48 to 152 centimeters; olive (5Y 5/3) loam; structureless massive; firm; 1 percent fine prominent brownish yellow (10YR 6/8), moist, masses of oxidized iron throughout and 10 percent fine distinct light brownish gray (10YR 6/2), moist, areas of iron depletion throughout; 5 percent gravels and 5 percent channers; strongly acid.

TYPE LOCATION: Somerset County, Maine; Township 5, Range 15; 6.0 miles east of Ragmuff Road on the Bean Pot Road; USGS Bean Pot Pond, ME topographic quadrangle; Latitude 46 degrees, 5 minutes, 37.2 seconds N. and Longitude 69 degrees, 39 minutes, 30.9 seconds W., NAD 1927.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 33 to 50 centimeters. Thickness of the mineral soil over the dense till ranges from 25 to 50 centimeters. Depth to bedrock is more than 152 centimeters. Texture of the fine-earth fraction in the solum is silt loam, loam, very fine sandy loam, and fine

sandy loam. The weighted average of clay in the particle-size control section is 10 to 18 percent. Texture in the Cd layer is silt loam and loam in the fine-earth fraction. Rock fragment content ranges from 5 to 35 percent in the E or A horizons where present, and from 5 to 25 percent in the underlying material. Rock fragments are mainly channers and pebbles, but in the A and E horizons of some pedons they are mainly cobbles. Stones and boulders cover from 0 to 25 percent of the surface. Reaction ranges from extremely acid to moderately acid in the solum, and from strongly acid to slightly acid in the substratum.

The O horizon has a hue of 2.5YR to 10YR, value of 2 to 3, and chroma of 1 or 4.

Some areas have an Ap horizon with hue of 10YR and value and chroma of 3 or 4.

The E horizon has hue of 5YR to 10YR, value of 5 to 7, and chroma of 1 or 2. Consistence is very friable or friable.

The Bhs horizon has hue of 2.5YR or 5YR, with value and chroma of 2.5 or 3. The Bh horizon, where present, has hue of 7.5YR to 10YR, value of 2 to 3, and chroma of 2 or 3.

The Bs horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 4 to 8. Consistence is very friable or friable.

The BC horizon has hue of 2.5Y or 5Y, value of 4 to 6, and chroma of 3 or 4. Consistence is friable or firm.

Some pedons ahave an E' horizon with hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 2. Consistence is friable or firm.

The Cd layer has hue of 2.5Y or 5Y, value of 3 to 5, and chroma of 1 to 4. It is massive or it has strong very coarse prisms which may part to weak to strong, thin to very thick plates, or moderate or strong, fine to coarse angular blocks. Arrangement of soil particles into structural aggregates is considered to be inherited from the parent material. Consistence is firm or very firm.

COMPETING SERIES: Colonel is the only other series in the same family. Colonel soils have less than 10 percent clay content in the particle-size control section.

Chesuncook, Daigle, Dixfield, Dixmont, Howland, Peru, Skerry, and Sunapee series are in related families. Chesuncook soils are moderately deep to dense till, moderately well drained, and do not have redox depletions within 16 inches from the mineral soil surface. Daigle soils from 18 to 27 percent clay content in the particle-size control section. Dixfield, Dixmont, Howland, Peru, Skerry, and Sunapee soils have less than 10 percent clay in the particle-size control section.

GEOGRAPHIC SETTING: Telos soils are on upland till plains, hills, and ridges. Slope ranges from 0 to 25 percent. The soils formed in dense glacial till derived mainly from slate and other dark colored sedimentary and metamorphic rocks. The climate is humid and cool temperate. The mean annual temperature ranges from 2 to 7 degrees C and mean annual precipitation ranges from 86 to 117 centimeters. The frost-free season ranges from 80 to 130 days. Elevation ranges from 100 to 840 meters above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Burnham, Chesuncook, Elliottsville, Monarda, Monson, Ragmuff, and Thorndike soils. The Burnham and Monarda soils occur in lower positions on the landscape and are wetter. Chesuncook soils are better drained and are in higher positions on the landscape. Elliottsville, Monson, Ragmuff, and Thorndike soils are shallower to bedrock and occur in higher positions on the landscape.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Somewhat poorly drained. Saturated hydraulic conductivity is moderately high or high in the mineral solum and low to moderately high in the substratum.

USE AND VEGETATION: Mostly forest. Common tree species include red spruce, white spruce, balsam fir, yellow birch, paper birch, and red maple.

DISTRIBUTION AND EXTENT: Maine. MLRA 143, 144B, and 146. The series is of moderate extent.

MLRA SOIL SURVEY REGIONAL OFFICE (MO) RESPONSIBLE: Amherst, Massachusetts.

SERIES ESTABLISHED: Soil survey of Franklin County Area and Part of Somerset County, Maine, 1992.

REMARKS: Series classification was revised 11/05 from Coarse-loamy, isotic, frigid, shallow Aquic Haplorthods to Loamy, isotic, frigid, shallow Aquic Haplorthods to reflect shallow characteristic. Competing series section revised 5/06 to reflect classification.

Diagnostic horizons and features recognized in this pedon include:

a. Albic horizon - the zone from 8 to 13 centimeters (E horizon).
b. Spodic horizon - the zone from 13 to 33 centimeters (Bhs and Bs1 horizons).
c. Cambic horizon - the zone from 33 to 48 centimeters (BC horizon).
c. Densic materials - firm, dense lodgement till at a depth of 48 centimeters.
d. Aquic conditions - redoximorphic features at 25 centimeters below the mineral soil surface.

Additional Data: This pedon is characterized by the National Soil Survey Laboratory in Lincoln Nebraska, reference pedon 09N0166. Climate data are from US official station #171472 Clayton Lake, Maine. Source of data used in establishing taxonomic class and range in characteristics is Maine Agricultural and Forest Experiment Station, Technical Bulletin 155, 1994; NRCS Characterization Data; and composite data from the Field Appraisal of Resource Management Systems compiled by Dr. Paul R. Hepler, of the Department of Plant and Soil Sciences, University of Maine, Orono, Maine.

National Cooperative Soil Survey
U.S.A.

ATTACHMENT 1-3 PRE-DEVELOPMENT AND POST DEVELOPMENT STORMWATER DRAINAGE PLANS

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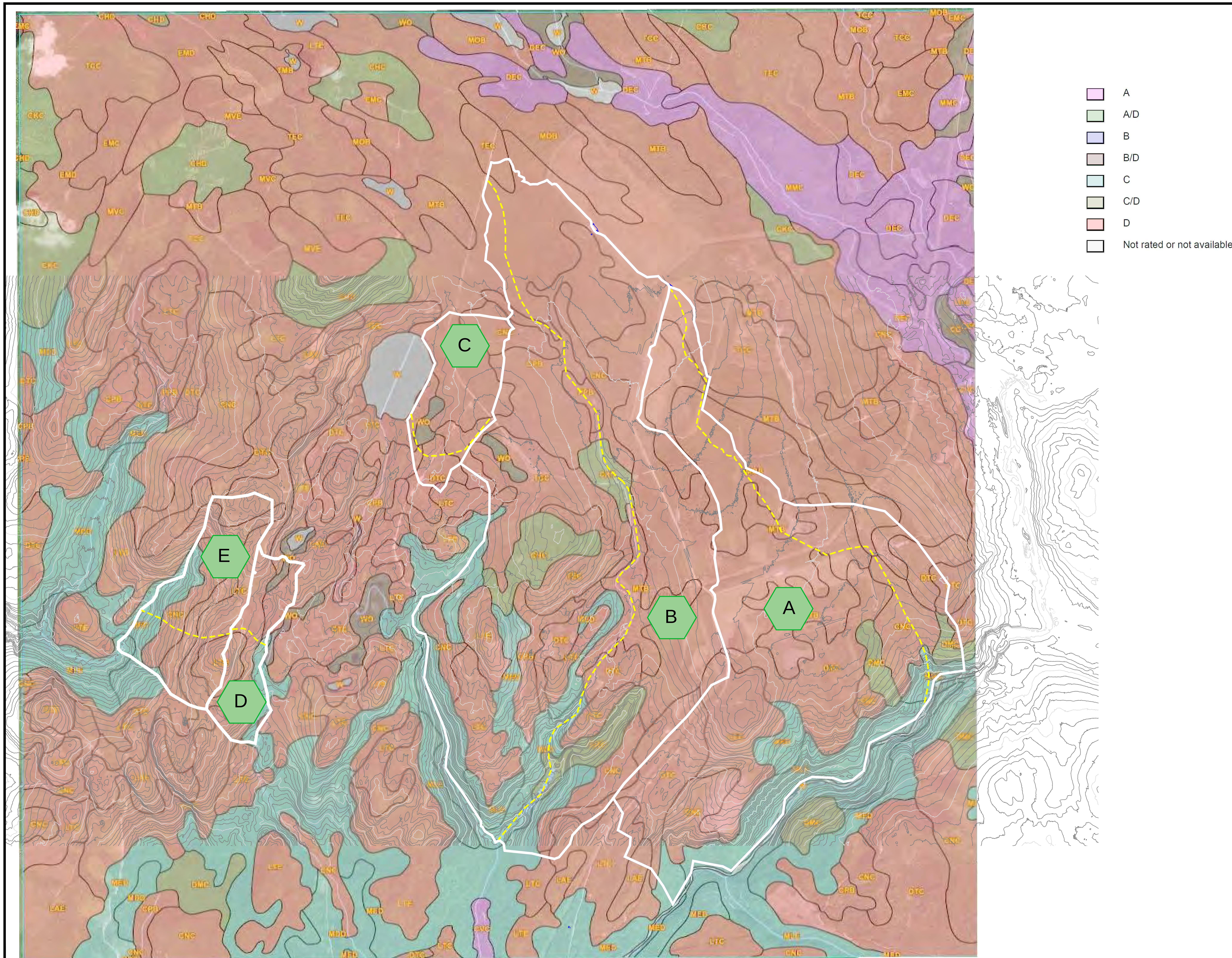


GENERAL NOTES:

1. SCALES NOTED ARE APPLICABLE TO FULL SIZE (24"X36") DRAWINGS ONLY. SCALE REDUCED DRAWINGS ACCORDINGLY.
2. NORTH AS SHOWN HEREON IS REFERENCED TO GRID NORTH. NAD83 MAINE STATE PLANES, WEST ZONE, US FOOT.
3. ELEVATIONS AS SHOWN HEREON ARE REFERENECED TO NAD 83.
4. EXISITNG TOPOGRAPHIC AND PLANIMETRIC SURVEY INFORMATION AS SHOWN HEREON IS THE RESULT OF AERIAL TOPOGRAPHIC MAPPING COMPLETED BY PHOTOGRAMMETRIC TECHNOLOGY, INC. DEVELOPED FROM AERIAL PHOTOGRAPHY COMPLETED BY PHOTOGRAMMETRIC TECHNOLOGY. INC.
5. ENVIRONMENTAL RESOURCE MAPPING (WETLANDS, STREAMS, VERNAL POOLS, ETC.) AS SHOWN HEREON BY TETRA TECH.
6. PROPERTY LINES AS SHOWN HEREON ARE THE RESULT OF LINES SURVEYED BY KENNEBEC RIVER COMPANY, INC.
7. INVERTS SHOWN ON PROPOSED CULVERTS MAY BE ADJUSTED BASED ON FIELD CONDITIONS.

No.	Revision/Issue	Date

PATRIOT RENEWABLES

EMS
ENGINEERING & MANAGEMENT SERVICES, INC.
549 SOUTH STREET, QUINCY, MA 02169
TEL:(617) 890-0600 FAX (617) 890-0606

Stamp:
STATE OF MAINE
ROBERT S. CUMMINGS

Drawing Title:
PRE-DEVELOPMENT CATCHMENT AREAS

Date: 03/25/2021	Scale: AS SHOWN
Drawn By: GAD	Chk'd By: RSC

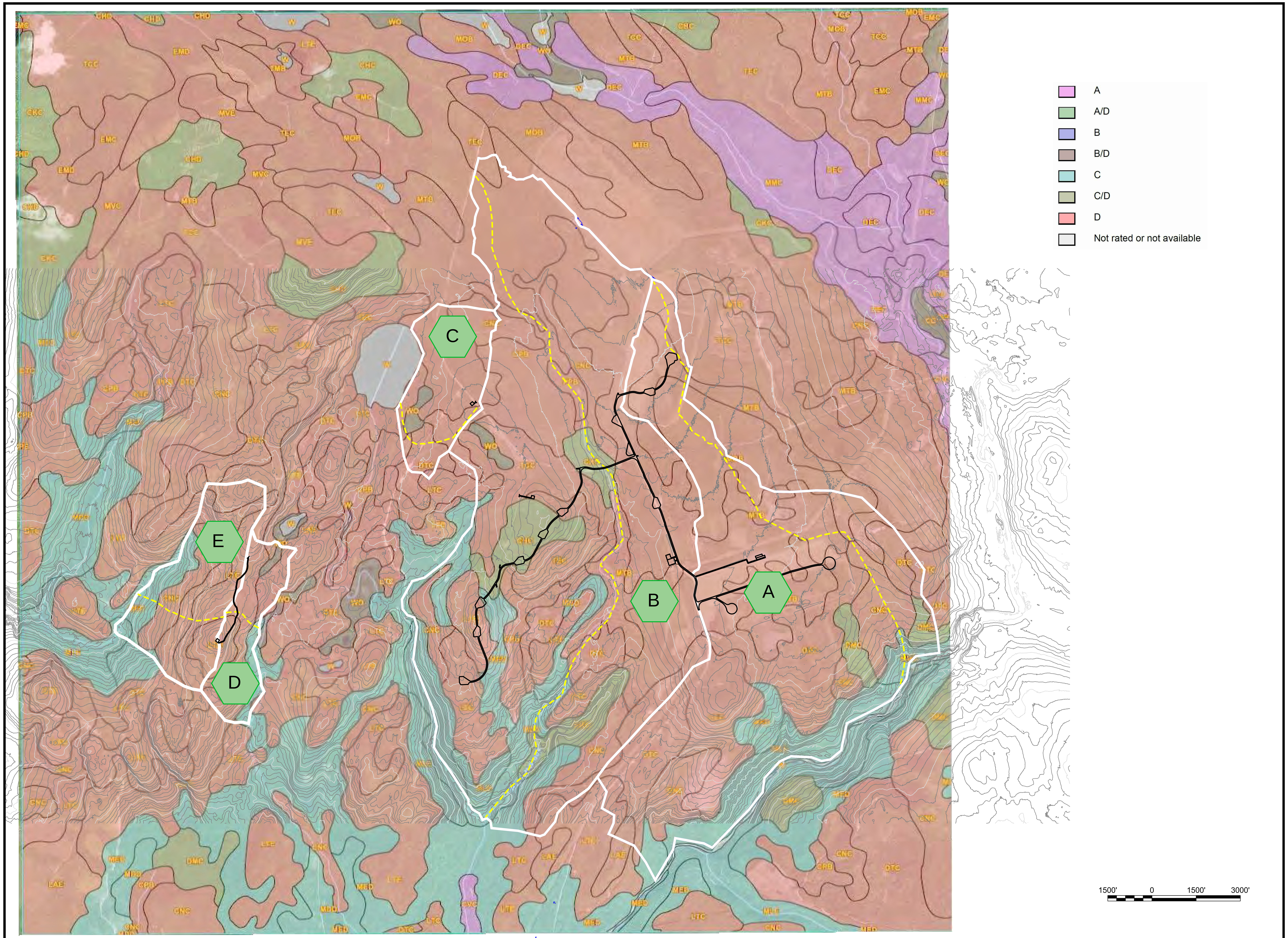
Project: WESTERN MAINE RENEWABLE ENERGY PROJECT

Address: MOSCOW, ME

Client: WESTERN MAINE RENEWABLES

Sheet Number: 1 OF 2

Dwg No.: FIGURE -1



GENERAL NOTES:

1. SCALES NOTED ARE APPLICABLE TO FULL SIZE (24"X36") DRAWINGS ONLY. SCALE REDUCED DRAWINGS ACCORDINGLY.

2. NORTH AS SHOWN HEREON IS REFERENCED TO GRID NORTH. NAD83 MAINE STATE PLANES, WEST ZONE, US FOOT.

3. ELEVATIONS AS SHOWN HEREON ARE REFERENECED TO NAD 83.

4. EXISITNG TOPOGRAPHIC AND PLANIMETRIC SURVEY INFORMATION AS SHOWN HEREON IS THE RESULT OF AERIAL TOPOGRAPHIC MAPPING COMPLETED BY PHOTOGRAMMETRIC TECHNOLOGY, INC. DEVELOPED FROM AERIAL PHOTOGRAPHY COMPLETED BY PHOTOGRAMMETRIC TECHNOLOGY. INC.

5. ENVIRONMENTAL RESOURCE MAPPING (WETLANDS, STREAMS, VERNAL POOLS, ETC.) AS SHOWN HEREON BY TETRA TECH.

6. PROPERTY LINES AS SHOWN HEREON ARE THE RESULT OF LINES SURVEYED BY KENNEBEC RIVER COMPANY, INC.

7. INVERTS SHOWN ON PROPOSED CULVERTS MAY BE ADJUSTED BASED ON FIELD CONDITIONS.

No.	Revision/Issue	Date

PATRIOT RENEWABLES

EMS
ENGINEERING & MANAGEMENT SERVICES, INC.
549 SOUTH STREET, QUINCY, MA 02169
TEL:(617) 890-0600 FAX (617) 890-0606

Stamp: STATE OF MAINE ROBERT S. CUMMINGS ENGINEER

Drawing Title:
POST-DEVELOPMENT CATCHMENT AREAS

Date: 03/25/2021	Scale: AS SHOWN
Drawn By: GAD	Chk'd By: RSC

Project: WESTERN MAINE RENEWABLE ENERGY PROJECT

Address: MOSCOW, ME

Client: WESTERN MAINE RENEWABLES

Sheet Number: 2 OF 2

Dwg. No.: FIGURE-2

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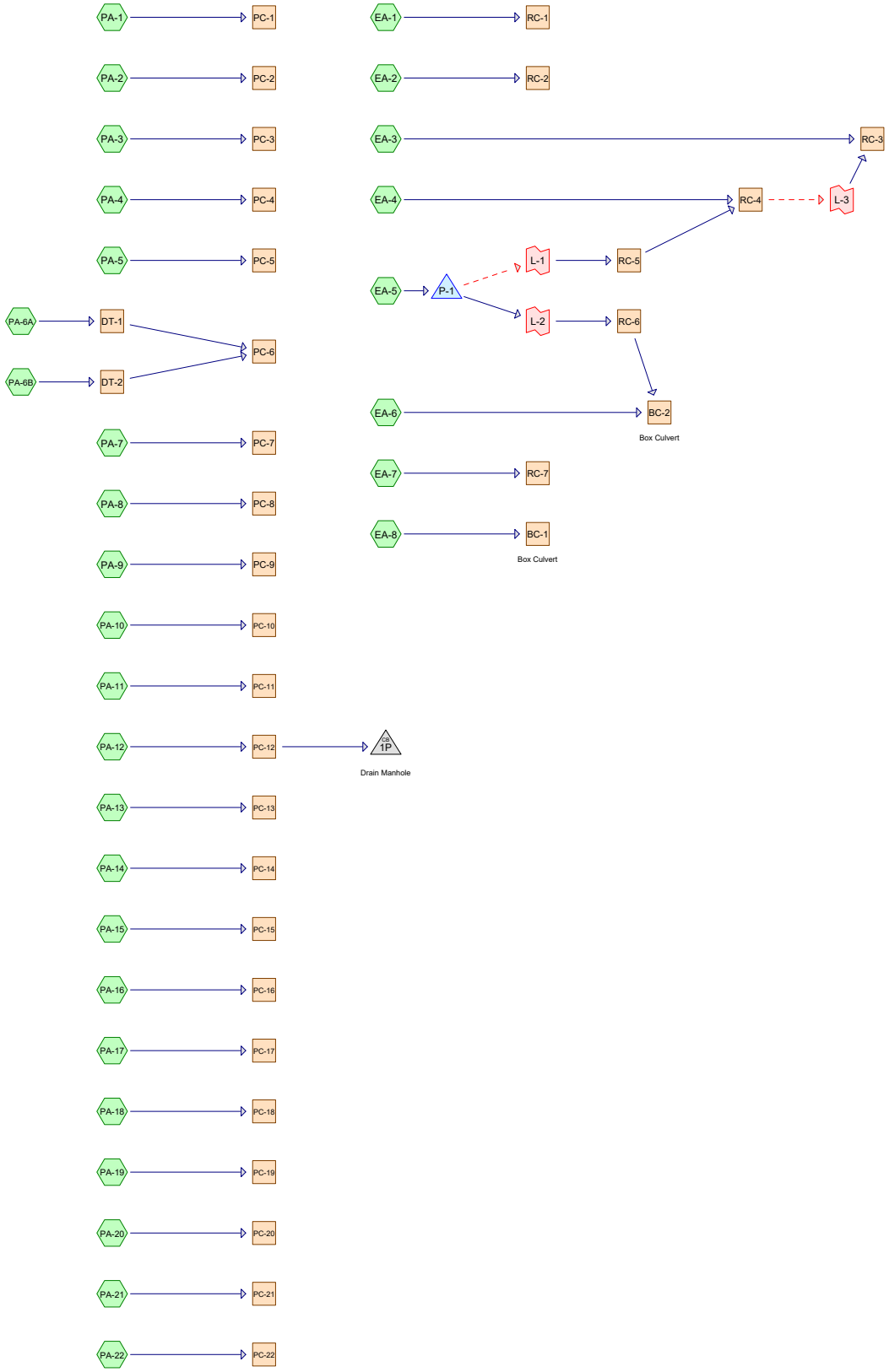
ATTACHMENT 1-4 CULVERT SIZING CALCULATIONS AND RELATED HYDROCAD® REPORTS



Routing Diagram for WMREP_CULVERTS

Prepared by {enter your company name here}, Printed 6/3/2021

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)
1	BC-1	1,314.00	1,312.00	70.0	0.0286	0.022	120.0	48.0	20.0
2	BC-2	1,342.00	1,340.00	70.0	0.0286	0.022	60.0	36.0	12.0
3	PC-1	1,283.50	1,282.00	70.0	0.0214	0.013	0.0	24.0	0.0
4	PC-10	1,493.00	1,492.00	55.0	0.0182	0.013	0.0	12.0	0.0
5	PC-11	1,472.00	1,471.00	65.0	0.0154	0.013	0.0	12.0	0.0
6	PC-12	1,425.00	1,423.00	100.0	0.0200	0.013	0.0	12.0	0.0
7	PC-13	1,363.00	1,361.00	77.0	0.0260	0.013	0.0	18.0	0.0
8	PC-14	1,359.00	1,356.00	64.0	0.0469	0.013	0.0	18.0	0.0
9	PC-15	1,359.00	1,355.00	70.0	0.0571	0.013	0.0	18.0	0.0
10	PC-16	1,360.00	1,359.00	70.0	0.0143	0.013	0.0	12.0	0.0
11	PC-17	1,481.00	1,476.00	60.0	0.0833	0.013	0.0	12.0	0.0
12	PC-18	1,304.00	1,297.00	117.0	0.0598	0.013	0.0	21.0	0.0
13	PC-19	1,450.00	1,449.00	49.0	0.0204	0.013	0.0	18.0	0.0
14	PC-2	1,298.00	1,297.50	42.0	0.0119	0.013	0.0	24.0	0.0
15	PC-20	1,381.00	1,380.00	50.0	0.0200	0.013	0.0	12.0	0.0
16	PC-21	1,394.75	1,394.25	35.0	0.0143	0.013	0.0	18.0	0.0
17	PC-22	1,398.00	1,397.00	39.0	0.0256	0.013	0.0	18.0	0.0
18	PC-3	1,309.00	1,308.00	45.0	0.0222	0.013	0.0	24.0	0.0
19	PC-4	1,322.00	1,321.50	40.0	0.0125	0.013	0.0	21.0	0.0
20	PC-5	1,392.00	1,390.00	135.0	0.0148	0.013	0.0	21.0	0.0
21	PC-6	1,384.00	1,383.00	50.0	0.0200	0.013	0.0	36.0	0.0
22	PC-7	1,376.00	1,375.00	91.0	0.0110	0.013	0.0	24.0	0.0
23	PC-8	1,374.00	1,373.50	50.0	0.0100	0.013	0.0	18.0	0.0
24	PC-9	1,394.00	1,393.00	50.0	0.0200	0.013	0.0	18.0	0.0
25	RC-1	1,327.50	1,327.00	63.0	0.0079	0.013	0.0	18.0	0.0
26	RC-2	1,312.00	1,310.00	76.0	0.0263	0.013	0.0	36.0	0.0
27	RC-3	1,322.00	1,320.00	67.0	0.0299	0.013	0.0	24.0	0.0
28	RC-4	1,330.00	1,326.00	100.0	0.0400	0.013	0.0	18.0	0.0
29	RC-5	1,356.00	1,355.00	60.0	0.0167	0.013	0.0	21.0	0.0
30	RC-6	1,356.00	1,355.00	65.0	0.0154	0.013	0.0	21.0	0.0
31	RC-7	1,387.00	1,386.00	58.0	0.0172	0.013	0.0	21.0	0.0
32	1P	1,422.80	1,417.00	255.0	0.0227	0.012	0.0	12.0	0.0
33	P-1	1,355.50	1,354.50	65.0	0.0154	0.012	0.0	21.0	0.0
34	P-1	1,356.00	1,355.00	65.0	0.0154	0.012	0.0	21.0	0.0

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EA-1: Runoff Area=81,000 sf 0.00% Impervious Runoff Depth>2.40"
Flow Length=1,365' Tc=103.9 min CN=78 Runoff=1.47 cfs 0.372 af

Subcatchment EA-2: Runoff Area=3,262,000 sf 0.00% Impervious Runoff Depth>2.28"
Flow Length=2,566' Tc=159.5 min CN=77 Runoff=41.98 cfs 14.217 af

Subcatchment EA-3: Runoff Area=1,546,000 sf 0.00% Impervious Runoff Depth>2.36"
Flow Length=2,566' Tc=159.5 min CN=78 Runoff=20.67 cfs 6.984 af

Subcatchment EA-4: Runoff Area=10.491 ac 0.00% Impervious Runoff Depth>2.43"
Flow Length=880' Tc=58.5 min CN=78 Runoff=12.07 cfs 2.122 af

Subcatchment EA-5: Runoff Area=1,383,000 sf 0.00% Impervious Runoff Depth>2.69"
Flow Length=3,752' Tc=64.4 min CN=81 Runoff=38.09 cfs 7.105 af

Subcatchment EA-6: Runoff Area=9.665 ac 0.00% Impervious Runoff Depth>2.52"
Flow Length=1,718' Tc=40.6 min CN=79 Runoff=14.07 cfs 2.033 af

Subcatchment EA-7: Runoff Area=5.739 ac 0.00% Impervious Runoff Depth>3.36"
Flow Length=1,660' Tc=42.2 min CN=88 Runoff=10.75 cfs 1.607 af

Subcatchment EA-8: Runoff Area=975.710 ac 0.00% Impervious Runoff Depth>2.09"
Flow Length=12,000' Tc=335.8 min CN=77 Runoff=322.37 cfs 169.856 af

Subcatchment PA-1: Runoff Area=1,355,212 sf 0.00% Impervious Runoff Depth>2.96"
Flow Length=2,580' Tc=63.1 min CN=84 Runoff=41.72 cfs 7.675 af

Subcatchment PA-10: Runoff Area=1.217 ac 0.00% Impervious Runoff Depth>2.45"
Flow Length=240' Tc=23.2 min CN=78 Runoff=2.21 cfs 0.248 af

Subcatchment PA-11: Runoff Area=1.968 ac 0.00% Impervious Runoff Depth>2.45"
Flow Length=240' Tc=25.0 min CN=78 Runoff=3.47 cfs 0.401 af

Subcatchment PA-12: Runoff Area=3.168 ac 0.00% Impervious Runoff Depth>2.36"
Flow Length=836' Tc=28.0 min CN=77 Runoff=5.12 cfs 0.623 af

Subcatchment PA-13: Runoff Area=4.660 ac 0.00% Impervious Runoff Depth>2.36"
Flow Length=870' Slope=0.1200 '/' Tc=27.2 min CN=77 Runoff=7.63 cfs 0.917 af

Subcatchment PA-14: Runoff Area=13.200 ac 0.00% Impervious Runoff Depth>2.34"
Flow Length=1,880' Tc=62.9 min CN=77 Runoff=13.94 cfs 2.575 af

Subcatchment PA-15: Runoff Area=16.046 ac 0.00% Impervious Runoff Depth>2.43"
Flow Length=1,450' Tc=46.1 min CN=78 Runoff=21.11 cfs 3.256 af

Subcatchment PA-16: Runoff Area=0.850 ac 0.00% Impervious Runoff Depth>2.99"
Flow Length=200' Tc=10.6 min CN=84 Runoff=2.53 cfs 0.212 af

Subcatchment PA-17: Runoff Area=0.437 ac 0.00% Impervious Runoff Depth>3.38"
Flow Length=200' Tc=10.6 min CN=88 Runoff=1.45 cfs 0.123 af

Subcatchment PA-18: Runoff Area=28.696 ac 0.00% Impervious Runoff Depth>2.59"
Flow Length=1,600' Tc=77.0 min CN=80 Runoff=29.80 cfs 6.191 af

Subcatchment PA-19: Runoff Area=5.808 ac 0.00% Impervious Runoff Depth>2.54"
Flow Length=200' Tc=10.6 min CN=79 Runoff=14.73 cfs 1.230 af

Subcatchment PA-2: Runoff Area=663,170 sf 0.00% Impervious Runoff Depth>2.96"
Flow Length=2,330' Tc=57.2 min CN=84 Runoff=21.64 cfs 3.760 af

Subcatchment PA-20: Runoff Area=1.837 ac 0.00% Impervious Runoff Depth>2.54"
Flow Length=200' Tc=10.6 min CN=79 Runoff=4.66 cfs 0.389 af

Subcatchment PA-21: Runoff Area=4.890 ac 0.00% Impervious Runoff Depth>2.71"
Flow Length=480' Tc=20.3 min CN=81 Runoff=10.42 cfs 1.105 af

Subcatchment PA-22: Runoff Area=4.683 ac 0.00% Impervious Runoff Depth>2.70"
Flow Length=750' Tc=35.7 min CN=81 Runoff=7.78 cfs 1.055 af

Subcatchment PA-3: Runoff Area=14.073 ac 0.00% Impervious Runoff Depth>2.96"
Flow Length=2,330' Tc=57.2 min CN=84 Runoff=20.00 cfs 3.476 af

Subcatchment PA-4: Runoff Area=10.950 ac 0.00% Impervious Runoff Depth>2.98"
Flow Length=1,180' Tc=30.8 min CN=84 Runoff=21.41 cfs 2.720 af

Subcatchment PA-5: Runoff Area=5.762 ac 0.00% Impervious Runoff Depth>3.17"
Flow Length=1,650' Tc=35.0 min CN=86 Runoff=11.23 cfs 1.521 af

Subcatchment PA-6A: Runoff Area=29.431 ac 0.00% Impervious Runoff Depth>2.52"
Flow Length=2,610' Tc=50.1 min CN=79 Runoff=38.24 cfs 6.176 af

Subcatchment PA-6B: Runoff Area=1,669,000 sf 0.00% Impervious Runoff Depth>2.53"
Flow Length=1,555' Tc=37.6 min CN=79 Runoff=58.00 cfs 8.064 af

Subcatchment PA-7: Runoff Area=1,243,000 sf 0.00% Impervious Runoff Depth>2.34"
Flow Length=1,970' Tc=70.0 min CN=77 Runoff=28.28 cfs 5.556 af

Subcatchment PA-8: Runoff Area=817,000 sf 0.00% Impervious Runoff Depth>2.34"
Flow Length=1,970' Tc=70.0 min CN=77 Runoff=18.59 cfs 3.652 af

Subcatchment PA-9: Runoff Area=7.897 ac 0.00% Impervious Runoff Depth>2.51"
Flow Length=1,970' Tc=70.0 min CN=79 Runoff=8.42 cfs 1.649 af

Reach BC-1: Box Culvert Avg. Flow Depth=2.15' Max Vel=14.99 fps Inflow=322.37 cfs 169.856 af
.0" x 48.0" Box Pipe w/ 20.0" inside fill n=0.022 L=70.0' S=0.0286 '/' Capacity=256.71 cfs Outflow=322.36 cfs 169.834 af

Reach BC-2: Box Culvert Avg. Flow Depth=0.73' Max Vel=7.82 fps Inflow=28.62 cfs 6.914 af
60.0" x 36.0" Box Pipe w/ 12.0" inside fill n=0.022 L=70.0' S=0.0286 '/' Capacity=91.23 cfs Outflow=28.61 cfs 6.912 af

Reach DT-1: Avg. Flow Depth=1.22' Max Vel=5.74 fps Inflow=38.24 cfs 6.176 af
n=0.022 L=1,200.0' S=0.0100 '/' Capacity=57.80 cfs Outflow=38.00 cfs 6.155 af

Reach DT-2: Avg. Flow Depth=1.48' Max Vel=6.49 fps Inflow=58.00 cfs 8.064 af
n=0.022 L=1,350.0' S=0.0104 '/' Capacity=58.86 cfs Outflow=57.34 cfs 8.036 af

Reach PC-1: Avg. Flow Depth=1.15' Max Vel=11.14 fps Inflow=41.72 cfs 7.675 af
24.0" Round Pipe x 2.00 n=0.013 L=70.0' S=0.0214 '/' Capacity=66.23 cfs Outflow=41.72 cfs 7.674 af

Reach PC-10: Avg. Flow Depth=0.48' Max Vel=5.98 fps Inflow=2.21 cfs 0.248 af
12.0" Round Pipe n=0.013 L=55.0' S=0.0182 '/' Capacity=4.80 cfs Outflow=2.20 cfs 0.248 af

Reach PC-11: Avg. Flow Depth=0.67' Max Vel=6.23 fps Inflow=3.47 cfs 0.401 af
12.0" Round Pipe n=0.013 L=65.0' S=0.0154 '/' Capacity=4.42 cfs Outflow=3.45 cfs 0.401 af

Reach PC-12: Avg. Flow Depth=0.83' Max Vel=7.31 fps Inflow=5.12 cfs 0.623 af
12.0" Round Pipe n=0.013 L=100.0' S=0.0200 '/' Capacity=5.04 cfs Outflow=5.10 cfs 0.623 af

Reach PC-13: Avg. Flow Depth=0.71' Max Vel=9.32 fps Inflow=7.63 cfs 0.917 af
18.0" Round Pipe n=0.013 L=77.0' S=0.0260 '/' Capacity=16.93 cfs Outflow=7.60 cfs 0.917 af

Reach PC-14: Avg. Flow Depth=0.85' Max Vel=13.52 fps Inflow=13.94 cfs 2.575 af
18.0" Round Pipe n=0.013 L=64.0' S=0.0469 '/' Capacity=22.74 cfs Outflow=13.93 cfs 2.574 af

Reach PC-15: Avg. Flow Depth=1.05' Max Vel=15.92 fps Inflow=21.11 cfs 3.256 af
18.0" Round Pipe n=0.013 L=70.0' S=0.0571 '/' Capacity=25.11 cfs Outflow=21.10 cfs 3.255 af

Reach PC-16: Avg. Flow Depth=0.55' Max Vel=5.64 fps Inflow=2.53 cfs 0.212 af
12.0" Round Pipe n=0.013 L=70.0' S=0.0143 '/' Capacity=4.26 cfs Outflow=2.50 cfs 0.212 af

Reach PC-17: Avg. Flow Depth=0.25' Max Vel=9.24 fps Inflow=1.45 cfs 0.123 af
12.0" Round Pipe n=0.013 L=60.0' S=0.0833 '/' Capacity=10.28 cfs Outflow=1.44 cfs 0.123 af

Reach PC-18: Avg. Flow Depth=1.15' Max Vel=17.77 fps Inflow=29.80 cfs 6.191 af
21.0" Round Pipe n=0.013 L=117.0' S=0.0598 '/' Capacity=38.76 cfs Outflow=29.78 cfs 6.191 af

Reach PC-19: Avg. Flow Depth=1.20' Max Vel=9.68 fps Inflow=14.73 cfs 1.230 af
18.0" Round Pipe n=0.013 L=49.0' S=0.0204 '/' Capacity=15.01 cfs Outflow=14.64 cfs 1.229 af

Reach PC-2: Avg. Flow Depth=1.45' Max Vel=8.86 fps Inflow=21.64 cfs 3.760 af
24.0" Round Pipe n=0.013 L=42.0' S=0.0119 '/' Capacity=24.68 cfs Outflow=21.63 cfs 3.760 af

Reach PC-20: Avg. Flow Depth=0.76' Max Vel=7.28 fps Inflow=4.66 cfs 0.389 af
12.0" Round Pipe n=0.013 L=50.0' S=0.0200 '/' Capacity=5.04 cfs Outflow=4.62 cfs 0.389 af

Reach PC-21: Avg. Flow Depth=1.04' Max Vel=7.94 fps Inflow=10.42 cfs 1.105 af
18.0" Round Pipe n=0.013 L=35.0' S=0.0143 '/' Capacity=12.56 cfs Outflow=10.39 cfs 1.105 af

Reach PC-22: Avg. Flow Depth=0.72' Max Vel=9.33 fps Inflow=7.78 cfs 1.055 af
18.0" Round Pipe n=0.013 L=39.0' S=0.0256 '/' Capacity=16.82 cfs Outflow=7.77 cfs 1.055 af

Reach PC-3: Avg. Flow Depth=1.11' Max Vel=11.19 fps Inflow=20.00 cfs 3.476 af
24.0" Round Pipe n=0.013 L=45.0' S=0.0222 '/' Capacity=33.72 cfs Outflow=20.00 cfs 3.476 af

Reach PC-4: Avg. Flow Depth=1.75' Max Vel=8.38 fps Inflow=21.41 cfs 2.720 af
21.0" Round Pipe n=0.013 L=40.0' S=0.0125 '/' Capacity=17.72 cfs Outflow=19.02 cfs 2.719 af

Reach PC-5: Avg. Flow Depth=0.96' Max Vel=8.32 fps Inflow=11.23 cfs 1.521 af
21.0" Round Pipe n=0.013 L=135.0' S=0.0148 '/' Capacity=19.29 cfs Outflow=11.22 cfs 1.521 af

Reach PC-6: Avg. Flow Depth=2.42' Max Vel=15.21 fps Inflow=92.99 cfs 14.191 af
36.0" Round Pipe n=0.013 L=50.0' S=0.0200 '/' Capacity=94.33 cfs Outflow=92.98 cfs 14.191 af

Reach PC-7: Avg. Flow Depth=2.00' Max Vel=8.59 fps Inflow=28.28 cfs 5.556 af
24.0" Round Pipe n=0.013 L=91.0' S=0.0110 '/' Capacity=23.71 cfs Outflow=24.27 cfs 5.555 af

Reach PC-8: Avg. Flow Depth=1.10' Max Vel=6.71 fps Inflow=18.59 cfs 3.652 af
18.0" Round Pipe x 2.00 n=0.013 L=50.0' S=0.0100 '/' Capacity=21.01 cfs Outflow=18.59 cfs 3.651 af

Reach PC-9: Avg. Flow Depth=0.81' Max Vel=8.67 fps Inflow=8.42 cfs 1.649 af
18.0" Round Pipe n=0.013 L=50.0' S=0.0200 '/' Capacity=14.86 cfs Outflow=8.41 cfs 1.649 af

Reach RC-1: Avg. Flow Depth=0.40' Max Vel=3.86 fps Inflow=1.47 cfs 0.372 af
18.0" Round Pipe n=0.013 L=63.0' S=0.0079 '/' Capacity=9.36 cfs Outflow=1.47 cfs 0.372 af

Reach RC-2: Avg. Flow Depth=1.30' Max Vel=14.34 fps Inflow=41.98 cfs 14.217 af
36.0" Round Pipe n=0.013 L=76.0' S=0.0263 '/' Capacity=108.20 cfs Outflow=41.98 cfs 14.215 af

Reach RC-3: Avg. Flow Depth=1.03' Max Vel=12.62 fps Inflow=20.67 cfs 7.275 af
24.0" Round Pipe n=0.013 L=67.0' S=0.0299 '/' Capacity=39.09 cfs Outflow=20.67 cfs 7.275 af

Reach RC-4: Avg. Flow Depth=1.23' Max Vel=13.55 fps Inflow=27.66 cfs 4.291 af
" Round Pipe n=0.013 L=100.0' S=0.0400 '/' Capacity=21.01 cfs Outflow=21.01 cfs 4.000 af Overflow=6.65 cfs 0.291 af

Reach RC-5: Avg. Flow Depth=1.20' Max Vel=9.47 fps Inflow=16.58 cfs 2.168 af
21.0" Round Pipe n=0.013 L=60.0' S=0.0167 '/' Capacity=20.46 cfs Outflow=16.58 cfs 2.168 af

Reach RC-6: Avg. Flow Depth=1.35' Max Vel=9.29 fps Inflow=18.49 cfs 4.882 af
21.0" Round Pipe n=0.013 L=65.0' S=0.0154 '/' Capacity=19.65 cfs Outflow=18.49 cfs 4.881 af

Reach RC-7: Avg. Flow Depth=0.89' Max Vel=8.72 fps Inflow=10.75 cfs 1.607 af
21.0" Round Pipe n=0.013 L=58.0' S=0.0172 '/' Capacity=20.81 cfs Outflow=10.75 cfs 1.607 af

Pond 1P: Drain Manhole Peak Elev=1,425.12' Inflow=5.10 cfs 0.623 af
12.0" Round Culvert n=0.012 L=255.0' S=0.0227 '/' Outflow=5.10 cfs 0.623 af

Pond P-1: Peak Elev=1,358.92' Storage=19,220 cf Inflow=38.09 cfs 7.105 af
Primary=18.49 cfs 4.882 af Secondary=16.58 cfs 2.168 af Outflow=35.08 cfs 7.050 af

Link L-1: Inflow=16.58 cfs 2.168 af
Primary=16.58 cfs 2.168 af

Link L-2: Inflow=18.49 cfs 4.882 af
Primary=18.49 cfs 4.882 af

Link L-3: Inflow=6.65 cfs 0.291 af
Primary=6.65 cfs 0.291 af

Total Runoff Area = 1,433.105 ac Runoff Volume = 266.868 af Average Runoff Depth = 2.23"
100.00% Pervious = 1,433.105 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EA-1:

Runoff = 1.47 cfs @ 13.40 hrs, Volume= 0.372 af, Depth> 2.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (sf)	CN	Description
78,000	77	Woods, Good, HSG D
3,000	96	Gravel surface, HSG D
81,000	78	Weighted Average
81,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
53.3	800	0.0100	0.25		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
19.8	515	0.0300	0.43		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
103.9	1,365	Total			

Summary for Subcatchment EA-2:

Runoff = 41.98 cfs @ 14.14 hrs, Volume= 14.217 af, Depth> 2.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (sf)	CN	Description
3,200,000	77	Woods, Good, HSG D
62,000	96	Gravel surface, HSG D
3,262,000	77	Weighted Average
3,262,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
108.9	2,001	0.0150	0.31		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
19.8	515	0.0300	0.43		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
159.5	2,566	Total			

Summary for Subcatchment EA-3:

Runoff = 20.67 cfs @ 14.13 hrs, Volume= 6.984 af, Depth> 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (sf)	CN	Description
1,500,000	77	Woods, Good, HSG D
46,000	96	Gravel surface, HSG D
1,546,000	78	Weighted Average
1,546,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
108.9	2,001	0.0150	0.31		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
19.8	515	0.0300	0.43		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
159.5	2,566	Total			

Summary for Subcatchment EA-4:

Runoff = 12.07 cfs @ 12.80 hrs, Volume= 2.122 af, Depth> 2.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
10.032	77	Woods, Good, HSG D
0.459	96	Gravel surface, HSG D
10.491	78	Weighted Average
10.491		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
27.7	830	0.0400	0.50		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
58.5	880	Total			

Summary for Subcatchment EA-5:

Runoff = 38.09 cfs @ 12.87 hrs, Volume= 7.105 af, Depth> 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (sf)	CN	Description
165,000	84	50-75% Grass cover, Fair, HSG D
218,000	96	Gravel surface, HSG D
1,000,000	77	Woods, Good, HSG D
1,383,000	81	Weighted Average
1,383,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0600	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
38.3	1,610	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
22.2	2,092	0.0100	1.57	18.87	**Channel Flow,** Area= 12.0 sf Perim= 42.0' r= 0.29' n= 0.041 Riprap, 2-inch
64.4	3,752	Total			

Summary for Subcatchment EA-6:

Runoff = 14.07 cfs @ 12.57 hrs, Volume= 2.033 af, Depth> 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
8.747	77	Woods, Good, HSG D
0.918	96	Gravel surface, HSG D
9.665	79	Weighted Average
9.665		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	50	0.0200	0.14		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
0.9	55	0.0220	1.04		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
15.8	1,150	0.0300	1.21		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.8	463	0.0300	0.43		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
40.6	1,718	Total			

Summary for Subcatchment EA-7:

Runoff = 10.75 cfs @ 12.57 hrs, Volume= 1.607 af, Depth> 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
3.788	84	50-75% Grass cover, Fair, HSG D
1.951	96	Gravel surface, HSG D
5.739	88	Weighted Average
5.739		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0600	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
38.3	1,610	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
42.2	1,660	Total			

Summary for Subcatchment EA-8:

Runoff = 322.37 cfs @ 16.78 hrs, Volume= 169.856 af, Depth> 2.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
972.710	77	Woods, Good, HSG D
3.000	96	Gravel surface, HSG D
975.710	77	Weighted Average
975.710		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	50	0.0300	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.40"
306.0	7,950	0.0300	0.43		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
2.5	1,050		6.95		**Lake or Reservoir,** Mean Depth= 1.50'
9.6	2,950	0.0180	5.11	368.03	**Channel Flow,** Area= 72.0 sf Perim= 84.7' r= 0.85' n= 0.035 Earth, dense weeds
335.8	12,000	Total			

Summary for Subcatchment PA-1:

Runoff = 41.72 cfs @ 12.84 hrs, Volume= 7.675 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (sf)	CN	Description
1,355,212	84	50-75% Grass cover, Fair, HSG D
1,355,212		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0100	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
22.9	1,180	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
32.1	1,350	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
63.1	2,580	Total			

Summary for Subcatchment PA-10:

Runoff = 2.21 cfs @ 12.33 hrs, Volume= 0.248 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.148	77	Woods, Good, HSG D
0.069	96	Gravel surface, HSG D
1.217	78	Weighted Average
1.217		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
18.3	50	0.0370	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
4.9	190	0.0660	0.64		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
23.2	240	Total			

Summary for Subcatchment PA-11:

Runoff = 3.47 cfs @ 12.35 hrs, Volume= 0.401 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.899	77	Woods, Good, HSG D
0.069	96	Gravel surface, HSG D
1.968	78	Weighted Average
1.968		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	50	0.0400	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
7.3	190	0.0300	0.43		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
25.0	240	Total			

Summary for Subcatchment PA-12:

Runoff = 5.12 cfs @ 12.40 hrs, Volume= 0.623 af, Depth> 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
3.099	77	Woods, Good, HSG D
0.069	96	Gravel surface, HSG D
3.168	77	Weighted Average
3.168		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.1200	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
16.6	786	0.1000	0.79		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
28.0	836	Total			

Summary for Subcatchment PA-13:

Runoff = 7.63 cfs @ 12.38 hrs, Volume= 0.917 af, Depth> 2.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
4.591	77	Woods, Good, HSG D
0.069	96	Gravel surface, HSG D
4.660	77	Weighted Average
4.660		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.1200	0.07		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
15.8	820	0.1200	0.87		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
27.2	870	Total			

Summary for Subcatchment PA-14:

Runoff = 13.94 cfs @ 12.86 hrs, Volume= 2.575 af, Depth> 2.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
13.085	77	Woods, Good, HSG D
0.115	96	Gravel surface, HSG D
13.200	77	Weighted Average
13.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	50	0.0610	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
47.9	1,830	0.0650	0.64		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
62.9	1,880	Total			

Summary for Subcatchment PA-15:

Runoff = 21.11 cfs @ 12.64 hrs, Volume= 3.256 af, Depth> 2.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
15.220	77	Woods, Good, HSG D
0.826	96	Gravel surface, HSG D
16.046	78	Weighted Average
16.046		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.0	50	0.0610	0.06		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
31.1	1,400	0.0900	0.75		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
46.1	1,450	Total			

Summary for Subcatchment PA-16:

Runoff = 2.53 cfs @ 12.15 hrs, Volume= 0.212 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.620	80	>75% Grass cover, Good, HSG D
0.230	96	Gravel surface, HSG D
0.850	84	Weighted Average
0.850		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0100	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
2.5	150	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.6	200	Total			

Summary for Subcatchment PA-17:

Runoff = 1.45 cfs @ 12.15 hrs, Volume= 0.123 af, Depth> 3.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
0.230	80	>75% Grass cover, Good, HSG D
0.207	96	Gravel surface, HSG D
0.437	88	Weighted Average
0.437		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0100	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
2.5	150	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.6	200	Total			

Summary for Subcatchment PA-18:

Runoff = 29.80 cfs @ 13.05 hrs, Volume= 6.191 af, Depth> 2.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
28.007	80	>75% Grass cover, Good, HSG D
0.689	96	Gravel surface, HSG D
28.696	80	Weighted Average
28.696		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	50	0.0100	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
46.2	1,550	0.0500	0.56		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
77.0	1,600	Total			

Summary for Subcatchment PA-19:

Runoff = 14.73 cfs @ 12.15 hrs, Volume= 1.230 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
5.349	77	Woods, Good, HSG D
0.459	96	Gravel surface, HSG D
5.808	79	Weighted Average
5.808		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0100	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
2.5	150	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.6	200	Total			

Summary for Subcatchment PA-2:

Runoff = 21.64 cfs @ 12.77 hrs, Volume= 3.760 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (sf)	CN	Description
663,170	84	50-75% Grass cover, Fair, HSG D
663,170		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0100	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
22.9	1,180	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
26.2	1,100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
57.2	2,330	Total			

Summary for Subcatchment PA-20:

Runoff = 4.66 cfs @ 12.15 hrs, Volume= 0.389 af, Depth> 2.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
1.653	77	Woods, Good, HSG D
0.184	96	Gravel surface, HSG D
1.837	79	Weighted Average
1.837		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0100	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
2.5	150	0.0200	0.99		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.6	200	Total			

Summary for Subcatchment PA-21:

Runoff = 10.42 cfs @ 12.28 hrs, Volume= 1.105 af, Depth> 2.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
4.729	80	>75% Grass cover, Good, HSG D
0.161	96	Gravel surface, HSG D
4.890	81	Weighted Average
4.890		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0100	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
12.2	430	0.0550	0.59		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
20.3	480	Total			

Summary for Subcatchment PA-22:

Runoff = 7.78 cfs @ 12.50 hrs, Volume= 1.055 af, Depth> 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
4.339	80	>75% Grass cover, Good, HSG D
0.344	96	Gravel surface, HSG D
4.683	81	Weighted Average
4.683		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
23.4	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
12.3	700	0.1450	0.95		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
35.7	750	Total			

Summary for Subcatchment PA-3:

Runoff = 20.00 cfs @ 12.77 hrs, Volume= 3.476 af, Depth> 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
14.073	84	50-75% Grass cover, Fair, HSG D
14.073		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0100	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
22.9	1,180	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
26.2	1,100	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
57.2	2,330	Total			

Summary for Subcatchment PA-4:

Runoff = 21.41 cfs @ 12.42 hrs, Volume= 2.720 af, Depth> 2.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
10.950	84	50-75% Grass cover, Fair, HSG D
10.950		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0100	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
19.1	980	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.6	150	0.0100	0.70		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
30.8	1,180	Total			

Summary for Subcatchment PA-5:

Runoff = 11.23 cfs @ 12.48 hrs, Volume= 1.521 af, Depth> 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
3.466	79	50-75% Grass cover, Fair, HSG C
2.296	96	Gravel surface, HSG D
5.762	86	Weighted Average
5.762		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	50	0.0600	0.21		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
31.1	1,600	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
35.0	1,650	Total			

Summary for Subcatchment PA-6A:

Runoff = 38.24 cfs @ 12.69 hrs, Volume= 6.176 af, Depth> 2.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
22.544	79	50-75% Grass cover, Fair, HSG C
6.887	77	Woods, Good, HSG D
29.431	79	Weighted Average
29.431		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	50	0.0100	0.10		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
28.2	1,450	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.3	480	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.5	630	0.0100	4.16	37.89	**Channel Flow,** Area= 9.1 sf Perim= 18.8' r= 0.48' n= 0.022 Earth, clean & straight
50.1	2,610	Total			

Summary for Subcatchment PA-6B:

Runoff = 58.00 cfs @ 12.52 hrs, Volume= 8.064 af, Depth> 2.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (sf)	CN	Description
1,569,000	79	50-75% Grass cover, Fair, HSG C
100,000	77	Woods, Good, HSG D
1,669,000	79	Weighted Average
1,669,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0120	0.11		**Sheet Flow,** Grass: Short n= 0.150 P2= 2.70"
19.7	1,110	0.0180	0.94		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.4	395	0.0160	0.63		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
37.6	1,555	Total			

Summary for Subcatchment PA-7:

Runoff = 28.28 cfs @ 12.97 hrs, Volume= 5.556 af, Depth> 2.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (sf)	CN	Description
1,223,000	77	Woods, Good, HSG D
20,000	96	Gravel surface, HSG D
1,243,000	77	Weighted Average
1,243,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	50	0.0400	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
52.3	1,920	0.0600	0.61		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
70.0	1,970	Total			

Summary for Subcatchment PA-8:

Runoff = 18.59 cfs @ 12.97 hrs, Volume= 3.652 af, Depth> 2.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (sf)	CN	Description
807,000	77	Woods, Good, HSG D
10,000	96	Gravel surface, HSG D
817,000	77	Weighted Average
817,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	50	0.0400	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
52.3	1,920	0.0600	0.61		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
70.0	1,970	Total			

Summary for Subcatchment PA-9:

Runoff = 8.42 cfs @ 12.96 hrs, Volume= 1.649 af, Depth> 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 Year 24-hr Rainfall=4.70"

Area (ac)	CN	Description
7.208	77	Woods, Good, HSG D
0.689	96	Gravel surface, HSG D
7.897	79	Weighted Average
7.897		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.7	50	0.0400	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 2.70"
52.3	1,920	0.0600	0.61		**Shallow Concentrated Flow,** Forest w/Heavy Litter Kv= 2.5 fps
70.0	1,970	Total			

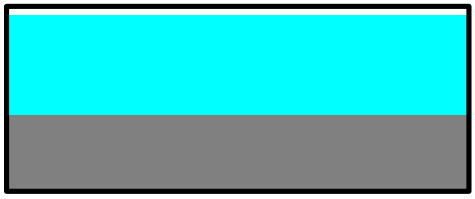
Summary for Reach BC-1: Box Culvert

Inflow Area = 975.710 ac, 0.00% Impervious, Inflow Depth > 2.09" for 25 Year 24-hr event
Inflow = 322.37 cfs @ 16.78 hrs, Volume= 169.856 af
Outflow = 322.36 cfs @ 16.78 hrs, Volume= 169.834 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 14.99 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 9.48 fps, Avg. Travel Time= 0.1 min

Peak Storage= 1,506 cf @ 16.78 hrs
Average Depth at Peak Storage= 3.82' above invert (2.15' above fill) , Surface Width= 10.00'
Bank-Full Depth= 4.00' above invert (2.33' above fill) Flow Area= 23.3 sf, Capacity= 256.71 cfs

120.0" W x 48.0" H Box Pipe w/ 20.0" inside fill
n= 0.022 Earth, clean & straight
Length= 70.0' Slope= 0.0286 '/' (101 Elevation Intervals)
Inlet Invert= 1,314.00', Outlet Invert= 1,312.00'



Summary for Reach BC-2: Box Culvert

Inflow Area = 41.414 ac, 0.00% Impervious, Inflow Depth > 2.00" for 25 Year 24-hr event
Inflow = 28.62 cfs @ 12.71 hrs, Volume= 6.914 af
Outflow = 28.61 cfs @ 12.72 hrs, Volume= 6.912 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 7.82 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.66 fps, Avg. Travel Time= 0.3 min

Peak Storage= 256 cf @ 12.72 hrs
Average Depth at Peak Storage= 1.73' above invert (0.73' above fill) , Surface Width= 5.00'
Bank-Full Depth= 3.00' above invert (2.00' above fill) Flow Area= 10.0 sf, Capacity= 91.23 cfs

60.0" W x 36.0" H Box Pipe w/ 12.0" inside fill
n= 0.022 Earth, clean & straight
Length= 70.0' Slope= 0.0286 '/' (101 Elevation Intervals)
Inlet Invert= 1,342.00', Outlet Invert= 1,340.00'

Summary for Reach DT-1:

Inflow Area = 29.431 ac, 0.00% Impervious, Inflow Depth > 2.52" for 25 Year 24-hr event
Inflow = 38.24 cfs @ 12.69 hrs, Volume= 6.176 af
Outflow = 38.00 cfs @ 12.79 hrs, Volume= 6.155 af, Atten= 1%, Lag= 6.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.74 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 2.58 fps, Avg. Travel Time= 7.7 min

Peak Storage= 7,949 cf @ 12.73 hrs
Average Depth at Peak Storage= 1.22' , Surface Width= 7.87'
Bank-Full Depth= 1.50' Flow Area= 9.0 sf, Capacity= 57.80 cfs

3.00' x 1.50' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 1,200.0' Slope= 0.0100 '/'
Inlet Invert= 1,394.00', Outlet Invert= 1,382.00'

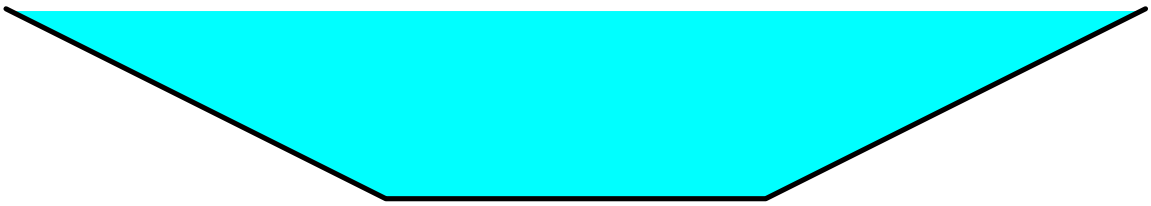
Summary for Reach DT-2:

Inflow Area = 38.315 ac, 0.00% Impervious, Inflow Depth > 2.53" for 25 Year 24-hr event
Inflow = 58.00 cfs @ 12.52 hrs, Volume= 8.064 af
Outflow = 57.34 cfs @ 12.63 hrs, Volume= 8.036 af, Atten= 1%, Lag= 6.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.49 fps, Min. Travel Time= 3.5 min
Avg. Velocity = 2.84 fps, Avg. Travel Time= 7.9 min

Peak Storage= 11,936 cf @ 12.57 hrs
Average Depth at Peak Storage= 1.48' , Surface Width= 8.93'
Bank-Full Depth= 1.50' Flow Area= 9.0 sf, Capacity= 58.86 cfs

3.00' x 1.50' deep channel, n= 0.022 Earth, clean & straight
Side Slope Z-value= 2.0 '/' Top Width= 9.00'
Length= 1,350.0' Slope= 0.0104 '/'
Inlet Invert= 1,396.00', Outlet Invert= 1,382.00'



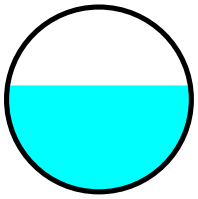
Summary for Reach PC-1:

Inflow Area = 31.111 ac, 0.00% Impervious, Inflow Depth > 2.96" for 25 Year 24-hr event
Inflow = 41.72 cfs @ 12.84 hrs, Volume= 7.675 af
Outflow = 41.72 cfs @ 12.85 hrs, Volume= 7.674 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 11.14 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 5.28 fps, Avg. Travel Time= 0.2 min

Peak Storage= 262 cf @ 12.84 hrs
Average Depth at Peak Storage= 1.15' , Surface Width= 3.95'
Bank-Full Depth= 2.00' Flow Area= 6.3 sf, Capacity= 66.23 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
24.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.0214 '/'
Inlet Invert= 1,283.50', Outlet Invert= 1,282.00'



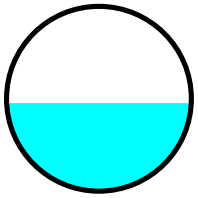
Summary for Reach PC-10:

Inflow Area = 1.217 ac, 0.00% Impervious, Inflow Depth > 2.45" for 25 Year 24-hr event
Inflow = 2.21 cfs @ 12.33 hrs, Volume= 0.248 af
Outflow = 2.20 cfs @ 12.33 hrs, Volume= 0.248 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 5.98 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.53 fps, Avg. Travel Time= 0.4 min

Peak Storage= 20 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.48' , Surface Width= 1.00'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.80 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 55.0' Slope= 0.0182 '/'
Inlet Invert= 1,493.00', Outlet Invert= 1,492.00'



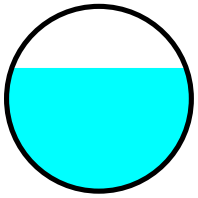
Summary for Reach PC-11:

Inflow Area = 1.968 ac, 0.00% Impervious, Inflow Depth > 2.45" for 25 Year 24-hr event
Inflow = 3.47 cfs @ 12.35 hrs, Volume= 0.401 af
Outflow = 3.45 cfs @ 12.36 hrs, Volume= 0.401 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 6.23 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.74 fps, Avg. Travel Time= 0.4 min

Peak Storage= 36 cf @ 12.35 hrs
Average Depth at Peak Storage= 0.67' , Surface Width= 0.94'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.42 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 65.0' Slope= 0.0154 '/'
Inlet Invert= 1,472.00', Outlet Invert= 1,471.00'



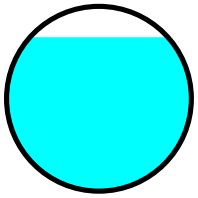
Summary for Reach PC-12:

Inflow Area = 3.168 ac, 0.00% Impervious, Inflow Depth > 2.36" for 25 Year 24-hr event
Inflow = 5.12 cfs @ 12.40 hrs, Volume= 0.623 af
Outflow = 5.10 cfs @ 12.40 hrs, Volume= 0.623 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 7.31 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.44 fps, Avg. Travel Time= 0.5 min

Peak Storage= 70 cf @ 12.40 hrs
Average Depth at Peak Storage= 0.83' , Surface Width= 0.75'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.04 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 100.0' Slope= 0.0200 '/'
Inlet Invert= 1,425.00', Outlet Invert= 1,423.00'



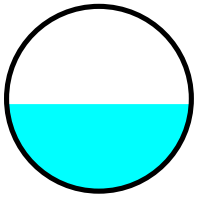
Summary for Reach PC-13:

Inflow Area = 4.660 ac, 0.00% Impervious, Inflow Depth > 2.36" for 25 Year 24-hr event
Inflow = 7.63 cfs @ 12.38 hrs, Volume= 0.917 af
Outflow = 7.60 cfs @ 12.39 hrs, Volume= 0.917 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 9.32 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.04 fps, Avg. Travel Time= 0.3 min

Peak Storage= 63 cf @ 12.39 hrs
Average Depth at Peak Storage= 0.71' , Surface Width= 1.50'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 16.93 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 77.0' Slope= 0.0260 '/'
Inlet Invert= 1,363.00', Outlet Invert= 1,361.00'



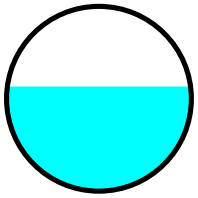
Summary for Reach PC-14:

Inflow Area = 13.200 ac, 0.00% Impervious, Inflow Depth > 2.34" for 25 Year 24-hr event
Inflow = 13.94 cfs @ 12.86 hrs, Volume= 2.575 af
Outflow = 13.93 cfs @ 12.86 hrs, Volume= 2.574 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 13.52 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.77 fps, Avg. Travel Time= 0.2 min

Peak Storage= 66 cf @ 12.86 hrs
Average Depth at Peak Storage= 0.85' , Surface Width= 1.49'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 22.74 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 64.0' Slope= 0.0469 '/'
Inlet Invert= 1,359.00', Outlet Invert= 1,356.00'



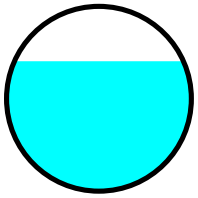
Summary for Reach PC-15:

Inflow Area = 16.046 ac, 0.00% Impervious, Inflow Depth > 2.43" for 25 Year 24-hr event
Inflow = 21.11 cfs @ 12.64 hrs, Volume= 3.256 af
Outflow = 21.10 cfs @ 12.65 hrs, Volume= 3.255 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 15.92 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 7.68 fps, Avg. Travel Time= 0.2 min

Peak Storage= 93 cf @ 12.64 hrs
Average Depth at Peak Storage= 1.05' , Surface Width= 1.37'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 25.11 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.0571 '/'
Inlet Invert= 1,359.00', Outlet Invert= 1,355.00'



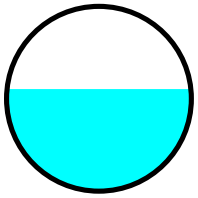
Summary for Reach PC-16:

Inflow Area = 0.850 ac, 0.00% Impervious, Inflow Depth > 2.99" for 25 Year 24-hr event
Inflow = 2.53 cfs @ 12.15 hrs, Volume= 0.212 af
Outflow = 2.50 cfs @ 12.15 hrs, Volume= 0.212 af, Atten= 1%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 5.64 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 2.12 fps, Avg. Travel Time= 0.6 min

Peak Storage= 31 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.55' , Surface Width= 0.99'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 4.26 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 70.0' Slope= 0.0143 '/'
Inlet Invert= 1,360.00', Outlet Invert= 1,359.00'



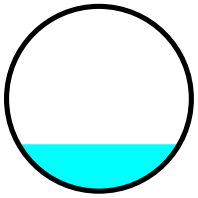
Summary for Reach PC-17:

Inflow Area = 0.437 ac, 0.00% Impervious, Inflow Depth > 3.38" for 25 Year 24-hr event
Inflow = 1.45 cfs @ 12.15 hrs, Volume= 0.123 af
Outflow = 1.44 cfs @ 12.15 hrs, Volume= 0.123 af, Atten= 1%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 9.24 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.24 fps, Avg. Travel Time= 0.3 min

Peak Storage= 9 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.25' , Surface Width= 0.87'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 10.28 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 60.0' Slope= 0.0833 '/'
Inlet Invert= 1,481.00', Outlet Invert= 1,476.00'



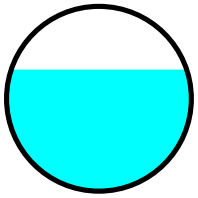
Summary for Reach PC-18:

Inflow Area = 28.696 ac, 0.00% Impervious, Inflow Depth > 2.59" for 25 Year 24-hr event
Inflow = 29.80 cfs @ 13.05 hrs, Volume= 6.191 af
Outflow = 29.78 cfs @ 13.05 hrs, Volume= 6.191 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 17.77 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 9.14 fps, Avg. Travel Time= 0.2 min

Peak Storage= 196 cf @ 13.05 hrs
Average Depth at Peak Storage= 1.15' , Surface Width= 1.66'
Bank-Full Depth= 1.75' Flow Area= 2.4 sf, Capacity= 38.76 cfs

21.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 117.0' Slope= 0.0598 '/'
Inlet Invert= 1,304.00', Outlet Invert= 1,297.00'



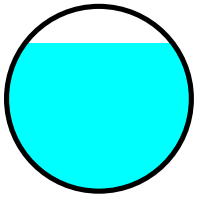
Summary for Reach PC-19:

Inflow Area = 5.808 ac, 0.00% Impervious, Inflow Depth > 2.54" for 25 Year 24-hr event
Inflow = 14.73 cfs @ 12.15 hrs, Volume= 1.230 af
Outflow = 14.64 cfs @ 12.15 hrs, Volume= 1.229 af, Atten= 1%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 9.68 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.97 fps, Avg. Travel Time= 0.2 min

Peak Storage= 74 cf @ 12.15 hrs
Average Depth at Peak Storage= 1.20' , Surface Width= 1.20'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 15.01 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 49.0' Slope= 0.0204 '/'
Inlet Invert= 1,450.00', Outlet Invert= 1,449.00'



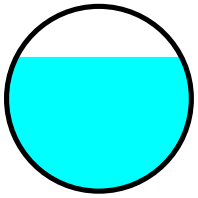
Summary for Reach PC-2:

Inflow Area = 15.224 ac, 0.00% Impervious, Inflow Depth > 2.96" for 25 Year 24-hr event
Inflow = 21.64 cfs @ 12.77 hrs, Volume= 3.760 af
Outflow = 21.63 cfs @ 12.77 hrs, Volume= 3.760 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.86 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.26 fps, Avg. Travel Time= 0.2 min

Peak Storage= 103 cf @ 12.77 hrs
Average Depth at Peak Storage= 1.45' , Surface Width= 1.78'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 24.68 cfs

24.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 42.0' Slope= 0.0119 '/'
Inlet Invert= 1,298.00', Outlet Invert= 1,297.50'



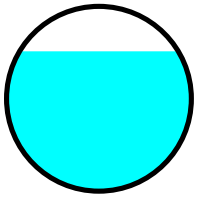
Summary for Reach PC-20:

Inflow Area = 1.837 ac, 0.00% Impervious, Inflow Depth > 2.54" for 25 Year 24-hr event
Inflow = 4.66 cfs @ 12.15 hrs, Volume= 0.389 af
Outflow = 4.62 cfs @ 12.15 hrs, Volume= 0.389 af, Atten= 1%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 7.28 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 2.95 fps, Avg. Travel Time= 0.3 min

Peak Storage= 32 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.76' , Surface Width= 0.86'
Bank-Full Depth= 1.00' Flow Area= 0.8 sf, Capacity= 5.04 cfs

12.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 50.0' Slope= 0.0200 '/'
Inlet Invert= 1,381.00', Outlet Invert= 1,380.00'



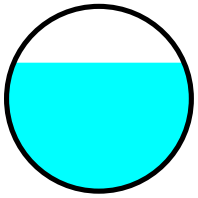
Summary for Reach PC-21:

Inflow Area = 4.890 ac, 0.00% Impervious, Inflow Depth > 2.71" for 25 Year 24-hr event
Inflow = 10.42 cfs @ 12.28 hrs, Volume= 1.105 af
Outflow = 10.39 cfs @ 12.28 hrs, Volume= 1.105 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 7.94 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.35 fps, Avg. Travel Time= 0.2 min

Peak Storage= 46 cf @ 12.28 hrs
Average Depth at Peak Storage= 1.04' , Surface Width= 1.38'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 12.56 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 35.0' Slope= 0.0143 '/'
Inlet Invert= 1,394.75', Outlet Invert= 1,394.25'



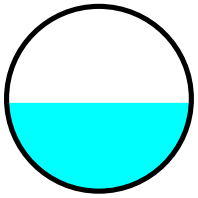
Summary for Reach PC-22:

Inflow Area = 4.683 ac, 0.00% Impervious, Inflow Depth > 2.70" for 25 Year 24-hr event
Inflow = 7.78 cfs @ 12.50 hrs, Volume= 1.055 af
Outflow = 7.77 cfs @ 12.50 hrs, Volume= 1.055 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 9.33 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.08 fps, Avg. Travel Time= 0.2 min

Peak Storage= 32 cf @ 12.50 hrs
Average Depth at Peak Storage= 0.72' , Surface Width= 1.50'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 16.82 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 39.0' Slope= 0.0256 '/'
Inlet Invert= 1,398.00', Outlet Invert= 1,397.00'



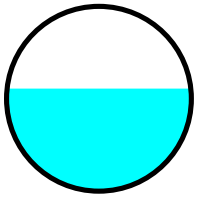
Summary for Reach PC-3:

Inflow Area = 14.073 ac, 0.00% Impervious, Inflow Depth > 2.96" for 25 Year 24-hr event
Inflow = 20.00 cfs @ 12.77 hrs, Volume= 3.476 af
Outflow = 20.00 cfs @ 12.77 hrs, Volume= 3.476 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 11.19 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 5.20 fps, Avg. Travel Time= 0.1 min

Peak Storage= 80 cf @ 12.77 hrs
Average Depth at Peak Storage= 1.11' , Surface Width= 1.99'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 33.72 cfs

24.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 45.0' Slope= 0.0222 '/'
Inlet Invert= 1,309.00', Outlet Invert= 1,308.00'



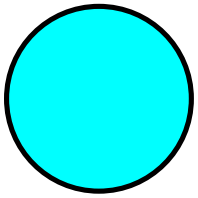
Summary for Reach PC-4:

Inflow Area = 10.950 ac, 0.00% Impervious, Inflow Depth > 2.98" for 25 Year 24-hr event
Inflow = 21.41 cfs @ 12.42 hrs, Volume= 2.720 af
Outflow = 19.02 cfs @ 12.31 hrs, Volume= 2.719 af, Atten= 11%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.38 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.95 fps, Avg. Travel Time= 0.2 min

Peak Storage= 96 cf @ 12.35 hrs
Average Depth at Peak Storage= 1.75'
Bank-Full Depth= 1.75' Flow Area= 2.4 sf, Capacity= 17.72 cfs

21.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 40.0' Slope= 0.0125 '/'
Inlet Invert= 1,322.00', Outlet Invert= 1,321.50'



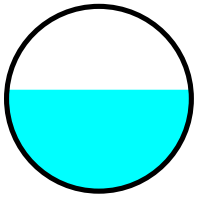
Summary for Reach PC-5:

Inflow Area = 5.762 ac, 0.00% Impervious, Inflow Depth > 3.17" for 25 Year 24-hr event
Inflow = 11.23 cfs @ 12.48 hrs, Volume= 1.521 af
Outflow = 11.22 cfs @ 12.49 hrs, Volume= 1.521 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.32 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 3.53 fps, Avg. Travel Time= 0.6 min

Peak Storage= 182 cf @ 12.48 hrs
Average Depth at Peak Storage= 0.96' , Surface Width= 1.74'
Bank-Full Depth= 1.75' Flow Area= 2.4 sf, Capacity= 19.29 cfs

21.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 135.0' Slope= 0.0148 '/'
Inlet Invert= 1,392.00', Outlet Invert= 1,390.00'



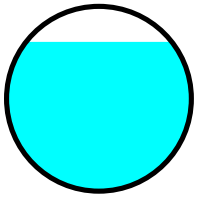
Summary for Reach PC-6:

Inflow Area = 67.746 ac, 0.00% Impervious, Inflow Depth > 2.51" for 25 Year 24-hr event
Inflow = 92.99 cfs @ 12.69 hrs, Volume= 14.191 af
Outflow = 92.98 cfs @ 12.69 hrs, Volume= 14.191 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 15.21 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 7.45 fps, Avg. Travel Time= 0.1 min

Peak Storage= 306 cf @ 12.69 hrs
Average Depth at Peak Storage= 2.42' , Surface Width= 2.37'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 94.33 cfs

36.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 50.0' Slope= 0.0200 '/'
Inlet Invert= 1,384.00', Outlet Invert= 1,383.00'



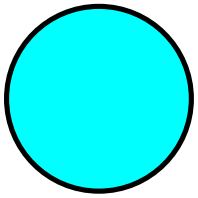
Summary for Reach PC-7:

Inflow Area = 28.535 ac, 0.00% Impervious, Inflow Depth > 2.34" for 25 Year 24-hr event
Inflow = 28.28 cfs @ 12.97 hrs, Volume= 5.556 af
Outflow = 24.27 cfs @ 12.71 hrs, Volume= 5.555 af, Atten= 14%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.59 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 4.78 fps, Avg. Travel Time= 0.3 min

Peak Storage= 286 cf @ 12.75 hrs
Average Depth at Peak Storage= 2.00'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 23.71 cfs

24.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 91.0' Slope= 0.0110 '/'
Inlet Invert= 1,376.00', Outlet Invert= 1,375.00'



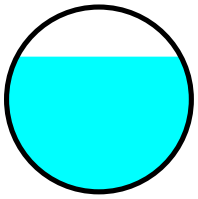
Summary for Reach PC-8:

Inflow Area = 18.756 ac, 0.00% Impervious, Inflow Depth > 2.34" for 25 Year 24-hr event
Inflow = 18.59 cfs @ 12.97 hrs, Volume= 3.652 af
Outflow = 18.59 cfs @ 12.97 hrs, Volume= 3.651 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.71 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.52 fps, Avg. Travel Time= 0.2 min

Peak Storage= 138 cf @ 12.97 hrs
Average Depth at Peak Storage= 1.10' , Surface Width= 2.66'
Bank-Full Depth= 1.50' Flow Area= 3.5 sf, Capacity= 21.01 cfs

A factor of 2.00 has been applied to the storage and discharge capacity
18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 50.0' Slope= 0.0100 '/'
Inlet Invert= 1,374.00', Outlet Invert= 1,373.50'



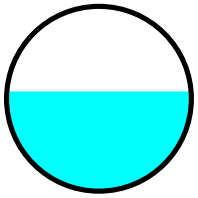
Summary for Reach PC-9:

Inflow Area = 7.897 ac, 0.00% Impervious, Inflow Depth > 2.51" for 25 Year 24-hr event
Inflow = 8.42 cfs @ 12.96 hrs, Volume= 1.649 af
Outflow = 8.41 cfs @ 12.96 hrs, Volume= 1.649 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 2
Max. Velocity= 8.67 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.34 fps, Avg. Travel Time= 0.2 min

Peak Storage= 49 cf @ 12.96 hrs
Average Depth at Peak Storage= 0.81' , Surface Width= 1.50'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 14.86 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 50.0' Slope= 0.0200 '/'
Inlet Invert= 1,394.00', Outlet Invert= 1,393.00'



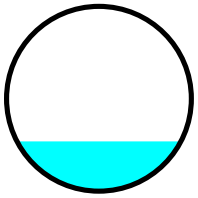
Summary for Reach RC-1:

Inflow Area = 1.860 ac, 0.00% Impervious, Inflow Depth > 2.40" for 25 Year 24-hr event
Inflow = 1.47 cfs @ 13.40 hrs, Volume= 0.372 af
Outflow = 1.47 cfs @ 13.41 hrs, Volume= 0.372 af, Atten= 0%, Lag= 0.4 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.86 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.06 fps, Avg. Travel Time= 0.5 min

Peak Storage= 24 cf @ 13.40 hrs
Average Depth at Peak Storage= 0.40' , Surface Width= 1.33'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 9.36 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 63.0' Slope= 0.0079 '/'
Inlet Invert= 1,327.50', Outlet Invert= 1,327.00'



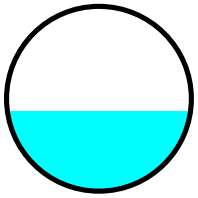
Summary for Reach RC-2:

Inflow Area = 74.885 ac, 0.00% Impervious, Inflow Depth > 2.28" for 25 Year 24-hr event
Inflow = 41.98 cfs @ 14.14 hrs, Volume= 14.217 af
Outflow = 41.98 cfs @ 14.14 hrs, Volume= 14.215 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 14.34 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 8.50 fps, Avg. Travel Time= 0.1 min

Peak Storage= 222 cf @ 14.14 hrs
Average Depth at Peak Storage= 1.30' , Surface Width= 2.97'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 108.20 cfs

36.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 76.0' Slope= 0.0263 '/'
Inlet Invert= 1,312.00', Outlet Invert= 1,310.00'



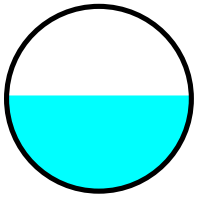
Summary for Reach RC-3:

Inflow Area = 35.491 ac, 0.00% Impervious, Inflow Depth > 2.46" for 25 Year 24-hr event
Inflow = 20.67 cfs @ 14.13 hrs, Volume= 7.275 af
Outflow = 20.67 cfs @ 14.13 hrs, Volume= 7.275 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 12.62 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 7.51 fps, Avg. Travel Time= 0.1 min

Peak Storage= 110 cf @ 14.13 hrs
Average Depth at Peak Storage= 1.03' , Surface Width= 2.00'
Bank-Full Depth= 2.00' Flow Area= 3.1 sf, Capacity= 39.09 cfs

24.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 67.0' Slope= 0.0299 '/'
Inlet Invert= 1,322.00', Outlet Invert= 1,320.00'



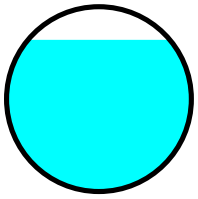
Summary for Reach RC-4:

Inflow Area = 10.491 ac, 0.00% Impervious, Inflow Depth > 4.91" for 25 Year 24-hr event
Inflow = 27.66 cfs @ 12.93 hrs, Volume= 4.291 af
Outflow = 21.01 cfs @ 12.70 hrs, Volume= 4.000 af, Atten= 24%, Lag= 0.0 min
Overflow = 6.65 cfs @ 12.93 hrs, Volume= 0.291 af

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs / 3
Max. Velocity= 13.55 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.64 fps, Avg. Travel Time= 0.3 min

Peak Storage= 155 cf @ 12.60 hrs
Average Depth at Peak Storage= 1.23' , Surface Width= 1.15'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 21.01 cfs
Any excess flow will be diverted to the secondary overflow

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 100.0' Slope= 0.0400 '/'
Inlet Invert= 1,330.00', Outlet Invert= 1,326.00'



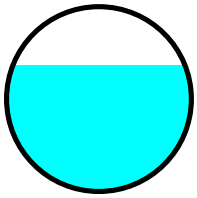
Summary for Reach RC-5:

Inflow = 16.58 cfs @ 13.07 hrs, Volume= 2.168 af
Outflow = 16.58 cfs @ 13.08 hrs, Volume= 2.168 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.47 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.59 fps, Avg. Travel Time= 0.3 min

Peak Storage= 105 cf @ 13.08 hrs
Average Depth at Peak Storage= 1.20' , Surface Width= 1.63'
Bank-Full Depth= 1.75' Flow Area= 2.4 sf, Capacity= 20.46 cfs

21.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 60.0' Slope= 0.0167 '/'
Inlet Invert= 1,356.00', Outlet Invert= 1,355.00'



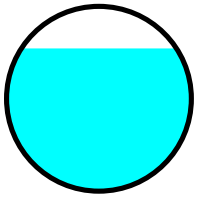
Summary for Reach RC-6:

Inflow Area = 31.749 ac, 0.00% Impervious, Inflow Depth > 1.85" for 25 Year 24-hr event
Inflow = 18.49 cfs @ 13.07 hrs, Volume= 4.882 af
Outflow = 18.49 cfs @ 13.08 hrs, Volume= 4.881 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 9.29 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 5.87 fps, Avg. Travel Time= 0.2 min

Peak Storage= 129 cf @ 13.07 hrs
Average Depth at Peak Storage= 1.35' , Surface Width= 1.47'
Bank-Full Depth= 1.75' Flow Area= 2.4 sf, Capacity= 19.65 cfs

21.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 65.0' Slope= 0.0154 '/'
Inlet Invert= 1,356.00', Outlet Invert= 1,355.00'



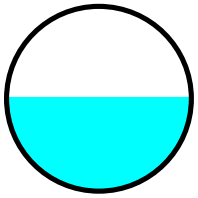
Summary for Reach RC-7:

Inflow Area = 5.739 ac, 0.00% Impervious, Inflow Depth > 3.36" for 25 Year 24-hr event
Inflow = 10.75 cfs @ 12.57 hrs, Volume= 1.607 af
Outflow = 10.75 cfs @ 12.57 hrs, Volume= 1.607 af, Atten= 0%, Lag= 0.2 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 8.72 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 3.73 fps, Avg. Travel Time= 0.3 min

Peak Storage= 71 cf @ 12.57 hrs
Average Depth at Peak Storage= 0.89' , Surface Width= 1.75'
Bank-Full Depth= 1.75' Flow Area= 2.4 sf, Capacity= 20.81 cfs

21.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 58.0' Slope= 0.0172 '/'
Inlet Invert= 1,387.00', Outlet Invert= 1,386.00'



Summary for Pond 1P: Drain Manhole

Inflow Area = 3.168 ac, 0.00% Impervious, Inflow Depth > 2.36" for 25 Year 24-hr event
Inflow = 5.10 cfs @ 12.40 hrs, Volume= 0.623 af
Outflow = 5.10 cfs @ 12.40 hrs, Volume= 0.623 af, Atten= 0%, Lag= 0.0 min
Primary = 5.10 cfs @ 12.40 hrs, Volume= 0.623 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,425.12' @ 12.40 hrs

Device	Routing	Invert	Outlet Devices
#1	Primary	1,422.80'	**12.0" Round Culvert** L= 255.0' Ke= 0.500 Inlet / Outlet Invert= 1,422.80' / 1,417.00' S= 0.0227 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf

Primary OutFlow Max=5.09 cfs @ 12.40 hrs HW=1,425.11' (Free Discharge)
1=Culvert (Inlet Controls 5.09 cfs @ 6.48 fps)

Summary for Pond P-1:

Inflow Area = 31.749 ac, 0.00% Impervious, Inflow Depth > 2.69" for 25 Year 24-hr event
Inflow = 38.09 cfs @ 12.87 hrs, Volume= 7.105 af
Outflow = 35.08 cfs @ 13.07 hrs, Volume= 7.050 af, Atten= 8%, Lag= 12.5 min
Primary = 18.49 cfs @ 13.07 hrs, Volume= 4.882 af
Secondary = 16.58 cfs @ 13.07 hrs, Volume= 2.168 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1,358.92' @ 13.07 hrs Surf.Area= 8,194 sf Storage= 19,220 cf

Plug-Flow detention time= 12.0 min calculated for 7.035 af (99% of inflow)
Center-of-Mass det. time= 7.8 min (875.4 - 867.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,355.00'	29,000 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
1,355.00	1,600	0	0
1,360.00	10,000	29,000	29,000

Device	Routing	Invert	Outlet Devices
#1	Primary	1,355.50'	**21.0" Round RCP_Round 21"** L= 65.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 1,355.50' / 1,354.50' S= 0.0154 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 2.41 sf
#2	Secondary	1,356.00'	**21.0" Round RCP_Round 21"** L= 65.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 1,356.00' / 1,355.00' S= 0.0154 '/' Cc= 0.900 n= 0.012 Concrete pipe, finished, Flow Area= 2.41 sf

Primary OutFlow Max=18.48 cfs @ 13.07 hrs HW=1,358.92' (Free Discharge)
↑└**1=RCP_Round 21"** (Inlet Controls 18.48 cfs @ 7.68 fps)

Secondary OutFlow Max=16.57 cfs @ 13.07 hrs HW=1,358.92' (Free Discharge)
↑└**2=RCP_Round 21"** (Inlet Controls 16.57 cfs @ 6.89 fps)

Summary for Link L-1:

Inflow = 16.58 cfs @ 13.07 hrs, Volume= 2.168 af
Primary = 16.58 cfs @ 13.07 hrs, Volume= 2.168 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link L-2:

Inflow Area = 31.749 ac, 0.00% Impervious, Inflow Depth > 1.85" for 25 Year 24-hr event
Inflow = 18.49 cfs @ 13.07 hrs, Volume= 4.882 af
Primary = 18.49 cfs @ 13.07 hrs, Volume= 4.882 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link L-3:

Inflow = 6.65 cfs @ 12.93 hrs, Volume= 0.291 af
Primary = 6.65 cfs @ 12.93 hrs, Volume= 0.291 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

ATTACHMENT 1-5 SCHEDULE OF PROPOSED CULVERTS

Western Maine Renewable Energy Project

Stormwater Culvert Schedule:

Culvert ID	Road/Site ID	Station Location	Drainage Area (acres)	Q25 (cfs)	Culvert Diameter (in.)	Length (ft.)	Inv. In (ft.)	Inv. Out (ft.)	Slope (ft./ft.)
RC-01	Stream Road	12+16	1.86	1.47	18	63	1327.5	1327	0.008
RC-02	Stream Road	14+90	74.89	41.98	36	76	1312	1310	0.026
RC-03	Stream Road	59+25	35.49	20.67	24	67	1322	1320	0.030
RC-04	Stream Road	63+30	10.49	12.07	18	100	1334	1331	0.030
RC-05	Stream Road	36+30	31.75	16.58	21	60	1356	1355	0.017
RC-06	Stream Road	53+72	31.75	18.49	21	65	1356	1355	0.015
RC-07	Adjacent to Stream rd	92+00	5.74	00+14	21	58	1387	1386	0.017
PC-01	New Access Road-3	11+40	31.11	41.72	24	70	1283.5	1282	0.021
PC-02	New Access Road-3	-02+00	15.22	21.64	24	42	1298	1297.5	0.012
PC-03	New Access Road-3	-13+00	14.07	20	24	45	1309	1308	0.022
PC-04	New Access Road-3	-28+00	10.95	21.41	21	40	1322	1321.5	0.013
PC-5	New Access Road-5	0+50	5.76	11.23	21	135	1392	1390	0.015
PC-6	New Access Road-5	15+50	67.74	96.24	36	50	1384	1383	0.020
PC-7	New Access Road-4	00+40	28.54	28.28	24	91	1376	1375	0.011
PC-8	New Access Road-4	03+50	18.76	18.59	18	50	1374	1373.5	0.010
PC-9	New Access Road-4	08+90	7.90	8.42	18	50	1394	1393	0.020
PC-10	New Access Road-4	25+00	1.22	2.21	12	55	1493	1492	0.018
PC-11	New Access Road-4	32+50	1.97	3.47	12	65	1472	1471	0.015
PC-12A	New Access Road-4	38+50	3.17	5.12	12	100	1425	1423	0.020
PC-12B	New Access Road-4	39+20	3.17	5.12	12	255	1422.8	1417	0.023
PC-13	New Access Road-4	46+00	4.66	7.63	18	77	1363	1361	0.026
PC-14	New Access Road-4	47+75	13.20	13.94	18	64	1359	1356	0.047
PC-15	New Access Road-4	49+05	16.05	21.11	18	70	1359	1355	0.057
PC-16	New Access Road-4	53+00	0.85	2.53	12	70	1360	1359	0.014
PC-17	New Access Road-4	73+00	0.44	1.44	12	60	1481	1476	0.083
PC-18	New Access Road-4	91+70	28.70	29.8	21	117	1304	1297	0.060
PC-19	Radar Tower 2 Road	00+10	5.81	14.73	18	49	1450	1449	0.020
PC-20	Radar Tower 3 Road	10+45	1.84	4.66	12	50	1381	1380	0.020
PC-21	Radar Tower 3 Road	21+30	4.89	10.42	18	35	1394.75	1394.25	0.014
PC-22	Radar Tower 3 Road	24+30	4.68	7.78	18	40	1398	1397	0.025

ATTACHMENT 1-6 SAMPLE DECLARATION OF RESTRICTIONS FOR FORESTED BUFFERS

Forested buffer, Limited disturbance FORM H-2

1. Forested buffer, limited disturbance

DECLARATION OF RESTRICTIONS (Forested Buffer, Limited Disturbance)

THIS DECLARATION OF RESTRICTIONS is made this _____day of _____, 20___, by _____ , _____, (Name) (Street Address) _____, _____County, Maine, _____, (herein referred to as the (City or Town) (County) (Zip Code) "Declarant"), pursuant to a permit received from the Maine Department of Environmental Protection under the Site Location of Development Act to preserve a buffer area on a parcel of land near _____,_____ . (Road Name) (Known Feature and/or Town) WHEREAS, the Declarant holds title to certain real property situated in _____, Maine (Town) described in a deed from_____ to _____dated (Name) (Name of Declarant) _____, 20____, and recorded in Book ____ Page ____ at the _____County Registry of Deeds, herein referred to as the "property"; and WHEREAS, Declarant desires to place certain restrictions, under the terms and conditions herein, over a portion of said real property (hereinafter referred to as the "Restricted Buffer") described as follows: (Note: Insert description of restricted buffer area location here) WHEREAS, pursuant to the Site Location of Development Act, 38 M.R.S.A. §§ 481-490, and Department Rules for stormwater management, Chapter 500, promulgated by the Maine Board of Environmental Protection, Declarant has agreed to impose certain restrictions on the Restricted Buffer Area as more particularly set forth herein and has agreed that these restrictions may be enforced by the Maine Department of Environmental Protection or any successor (hereinafter the "MDEP"), NOW, THEREFORE, the Declarant hereby declares that the Restricted Buffer Area is and shall forever be held, transferred, sold, conveyed, occupied and maintained subject to the conditions and restrictions set forth herein. The Restrictions shall run with the Restricted Buffer Area and shall be binding on all parties having any right, title or interest in and to the Restricted Buffer Area, or any portion thereof, and their heirs, personal representatives, successors, and assigns. Any present or future owner or occupant of the Restricted Buffer Area or any portion thereof, by the acceptance of a deed of conveyance of all or part of the Covenant Area or an instrument conveying any interest therein, whether or not the deed or instrument shall so express, shall be deemed to have accepted the Restricted Buffer Area subject to the Restrictions and shall agree to be bound by, to comply with and to be subject to each and every one of the Restrictions hereinafter set forth. 1. Restrictions on Restricted Buffer Area. Unless the owner of the Restricted Buffer Area, or any successors or assigns, obtains the prior written approval of the MDEP, the Restricted Buffer Area must remain undeveloped in perpetuity. To maintain the ability of the Restricted Buffer Area to filter and absorb stormwater, and to maintain compliance with the Site Location of Development Act and the permit issued thereunder to the Declarant, the use of the Restricted Buffer Area is hereinafter limited as follows. a. No soil, loam, peat, sand, gravel, concrete, rock or other mineral substance, refuse, trash, vehicle bodies or parts, rubbish, debris, junk waste, pollutants or other fill material may be placed, stored or dumped on the Restricted Buffer Area, nor may the topography of the area be altered or manipulated in any way; b. Any removal of trees or other vegetation within the Restricted Buffer Area must be limited to the following: (i) No purposefully cleared openings may be created and an evenly distributed stand of trees and other vegetation must be maintained. An "evenly distributed stand of trees " is defined as maintaining a minimum rating score of 24 points in any 25 foot by 50 foot square

(2500 square feet) area, as determined by the following rating scheme: Diameter of tree at 4½ feet above ground level Points 2 - 4 inches 1 4 - 8 inches 2 8 - 12 inches 4 >12 inches 8 Where existing trees and other vegetation result in a rating score less than 24 points, no trees may be cut or sprayed with biocides except for the normal maintenance of dead, windblown or damaged trees and for pruning of tree branches below a height of 12 feet provided two thirds of the tree's canopy is maintained; (ii) No undergrowth, ground cover vegetation, leaf litter, organic duff layer or mineral soil may be disturbed except that one winding path, that is no wider than six feet and that does not provide a downhill channel for runoff, is allowed through the area; c. No building or other temporary or permanent structure may be constructed, placed or permitted to remain on the Restricted Buffer Area, except for a sign, utility pole or fence; d. No trucks, cars, dirt bikes, ATVs, bulldozers, backhoes, or other motorized vehicles or mechanical equipment may be permitted on the Restricted Buffer Area; e. Any level lip spreader directing flow to the Restricted Buffer Area must be regularly inspected and adequately maintained to preserve the function of the level spreader. Any activity on or use of the Restricted Buffer Area inconsistent with the purpose of these Restrictions is prohibited. Any future alterations or changes in use of the Restricted Buffer Area must receive prior approval in writing from the MDEP. The MDEP may approve such alterations and changes in use if such alterations and uses do not impede the stormwater control and treatment capability of the Restricted Buffer Area or if adequate and appropriate alternative means of stormwater control and treatment are provided. 2. Enforcement. The MDEP may enforce any of the Restrictions set forth in Section 1 above. 3. Binding Effect. The restrictions set forth herein shall be binding on any present or future owner of the Restricted Buffer Area. If the Restricted Buffer Area is at any time owned by more than one owner, each owner shall be bound by the foregoing restrictions to the extent that any of the Restricted Buffer Area is included within such owner's property. 4. Amendment. Any provision contained in this Declaration may be amended or revoked only by the recording of a written instrument or instruments specifying the amendment or the revocation signed by the owner or owners of the Restricted Buffer Area and by the MDEP. 5. Effective Provisions of Declaration. Each provision of this Declaration, and any agreement, promise, covenant and undertaking to comply with each provision of this Declaration, shall be deemed a land use restriction running with the land as a burden and upon the title to the Restricted Buffer Area. 6. Severability. Invalidity or unenforceability of any provision of this Declaration in whole or in part shall not affect the validity or enforceability of any other provision or any valid and enforceable part of a provision of this Declaration. 7. Governing Law. This Declaration shall be governed by and interpreted in accordance with the laws of the State of Maine.

(Name) _____

STATE OF MAINE

_____ County, _____, 20__.

(County) (Date)

Personally appeared before me the above named _____, who swore to the truth of the foregoing to the best of (his/her) knowledge, information and belief and acknowledged the foregoing instrument to be (his/her) free act and deed.

_____

Notary Public _____

ATTACHMENT 1-7 SCHEDULE OF STORMWATER BEST MANAGEMENT PRACTICES

File: Moscow-Model
Date: 3/10/2021

Western Maine Renewable Energy Project

Stormwater Treatment Calculations:
Watersheds draining to the Kennebec River via Chase Chase Stream, Basset Brook, Austin Stream and Mink brook
Chapter 500, Stormwater Management, Section 4.B.(3).(c) describes a linear project
Required stormwater treatment of impervious area = 75%

BMP ID Legend
RSF = Road side Forested buffer
RSM = Road side Meadow buffer
BF = Forested buffer adjacent to road/small impervious area
BM = Meadow buffer adjacent to road/small impervious area
LSF = Forested level lip spreader buffer
LSM = Meadow level lip spreader buffer
DTF = Forested Ditch Turnout
DTM = Meadow Ditch Turnout

Road ID	Station Location				BMP ID	Soil HSG	Buffer Slope (ft./ft.)	Min. Flow Path Length (ft.)	Buffer or Stone Berm Length (ft.)	Impervious Area (acres)	Impervious Area Treated (acres)
Access Road-1	00+00	to	07+50	-	-	-	-	-	-	0.207	0.000
Access Road-1	07+50	to	19+25	R	RSM 03A	D	0.030	55	1175	0.324	0.324
Access Road-1	28+25	to	30+50	R	RSM 03B	D	0.030	55	225	0.062	0.062
Access Road-1	31+50	to	44+25	R	RSM 03C	D	0.030	55	1275	0.351	0.351
Access Road-1	44+25	to	44+50	-	-	-	-	-	-	0.007	0.000
Access Road-2	00+00	to	02+25	-	-	-	-	-	-	0.062	0.000
Access Road-2	02+25	to	13+50	R	LSF 02	C	0.022	100	67	0.310	0.310
Access Road-2	13+50		15+00	R	RSF 01	C	0.015	35	170	0.041	0.041
Access Road-2	15+00	to	16+25	-	-	-	-	-	-	0.034	0.000
Access Road-2	16+25	to	19+75	R	RSM 01	C	0.021	55	300	0.096	0.096
Access Road-2	19+75	to	22+50	R	RSF 02	C	0.035	35	300	0.076	0.076
Access Road-2	22+50	to	24+25	-	-	-	-	-	-	0.048	0.000
Access Road-2	24+25	to	26+00	R	LSF 01	C	0.025	100	125	0.048	0.048
Access Road-3	00+00	to	16+50	-	-	-	-	-	-	0.455	0.000
Access Road-3	16+50	to	23+00	L	LSF 04	D	0.093	150	107	0.179	0.179
Access Road-3	23+00	to	26+50	L	RSF 04	D	0.073	35	360	0.096	0.096
Access Road-3	26+50	to	28+50	R	BF 04	D	0.143	180	209	0.055	0.055
Access Road-3	28+50	to	32+00	R	RSF 05	D	0.122	35	335	0.096	0.096
Access Road-3	32+00	to	40+50	R	LSF 05	C	0.079	100	93	0.234	0.234
Access Road-3	40+50	to	59+50	-	-	-	-	-	-	0.523	0.000
Access Road-3	59+50	to	63+50	L	LSF 06	C	0.142	100	129	0.110	0.110
Access Road-3	63+50	to	67+50	-	-	-	-	-	-	0.110	0.000
Access Road-3	67+75	to	73+50	L	LSM 01	C	0.122	150	203	0.158	0.158
Access Road-3	73+50	to	84+00	L	LSM 02	C	0.135	150	135	0.289	0.289
Access Road-3	84+00	to	87+50	L	RSF 06	C	0.105	35	265	0.096	0.096
Access Road-3	87+50	to	93+00	-	-	-	-	-	-	0.152	0.000
Radar Tower 1 Access	00+00	to	01+00	-	BF 05	C/D	0.011	150	150	0.046	0.046
Radar Tower 2 Access	00+00	to	02+50	-	-	-	-	-	-	0.115	0.000
Radar Tower 2 Access	02+50	to	04+00	-	LSF 06	C	0.200	100	70	0.069	0.069
Radar Tower 3 Access	21+00	to	33+50	-	-	-	-	-	-	0.344	0.000
T01	Turbine Pad Access				LSF 01	C	0.025	100	125	0.082	0.082
T01	Crane Pad				LSF 01	C	0.025	100	125	0.149	0.149
T01	Turbine Gravel Apron				LSF 01	C	0.025	100	125	0.097	0.097
T02	Turbine Pad Access				LSF 02	C	0.022	100	70	0.056	0.056
T02	Crane Pad				LSF 02	C	0.022	100	70	0.149	0.149
T02	Turbine Gravel Ring				LSF 02	C	0.022	100	70	0.097	0.097
T03	Turbine Pad Access				BF 01	C	0.031	100	210	0.044	0.044
T03	Crane Pad				BF 01	C	0.031	100	210	0.149	0.149
T03	Turbine Gravel Ring				BF 01	C	0.031	100	210	0.097	0.097
T04	Turbine Pad Access				LSF 03	C	0.035	100	115	0.073	0.073
T04	Crane Pad				LSF 03	C	0.035	100	115	0.149	0.149
T04	Turbine Gravel Ring				LSF 03	C	0.035	100	115	0.097	0.097
T05	Turbine Pad Access				BF 02	C	0.030	100	105	0.045	0.045
T05	Crane Pad				BF 02	C	0.030	100	105	0.149	0.149
T05	Turbine Gravel Ring				BF 02	C	0.030	100	105	0.097	0.097
T06	Turbine Pad Access				BM 01	C	0.017	150	165	0.215	0.215
T06	Crane Pad				BM 01	C	0.017	150	165	0.149	0.149
T06	Turbine Gravel Ring				BM 01	C	0.017	150	165	0.097	0.097

T07	Turbine Pad Access	BM 02	D	0.010	150	200	0.246	0.246
T07	Crane Pad	BM 02	D	0.010	150	200	0.149	0.149
T07	Turbine Gravel Ring	BM 02	D	0.010	150	200	0.097	0.097
T08	Turbine Pad Access	BF 03	C	0.041	150	230	0.041	0.041
T08	Crane Pad	BF 03	C	0.149	150	230	0.149	0.149
T08	Turbine Gravel Ring	BF 03	C	0.097	150	230	0.097	0.097
T09	Turbine Pad Access	LSF 04	D	0.061	150	110	0.061	0.013
T09	Crane Pad	LSF 04	D	0.149	150	110	0.149	0.149
T09	Turbine Gravel Ring	LSF 04	D	0.097	150	110	0.097	0.097
T10	Turbine Pad Access	BF 04	D	0.061	180	208	0.061	0.061
T10	Crane Pad	BF 04	D	0.149	180	208	0.149	0.149
T10	Turbine Gravel Ring	BF 04	D	0.097	180	208	0.097	0.097
T11	Turbine Pad Access	LSF 05	C	0.041	100	95	0.062	0.062
T11	Crane Pad	LSF 05	C	0.149	100	95	0.149	0.149
T11	Turbine Gravel Ring	LSF 05	C	0.097	100	95	0.097	0.097
T12	Turbine Pad Access	LSF 06	C	0.041	100	130	0.043	0.043
T12	Crane Pad	LSF 07	C	0.149	100	130	0.149	0.149
T12	Turbine Gravel Ring	LSF 08	C	0.097	100	130	0.097	0.097
T13	Turbine Pad Access	LSM 01	D	0.041	150	203	0.044	0.044
T13	Crane Pad	LSM 01	D	0.149	150	203	0.149	0.149
T13	Turbine Gravel Ring	LSM 01	D	0.097	150	203	0.097	0.097
T14	Turbine Pad Access	BF 04	C	0.041	90	220	0.038	0.038
T14	Crane Pad	BF 04	C	0.149	90	220	0.149	0.149
T14	Turbine Gravel Ring	BF 04	C	0.097	90	220	0.097	0.097
Radar Tower 1	Radar Tower Pad	BF 05	C/D	0.110	150	150	0.230	0.230
Radar Tower 2	Radar Tower Pad	LSF 07	C	0.110	100	65	0.230	0.230
Radar Tower 3	Radar Tower Pad	BF 06	C	0.093	100	50	0.230	0.230
Substation	Substation Pad	LSF 08	C	0.110	100	300	1.313	1.313
						Totals:	**11.354**	**9.249**

Impervious Area Eliminated:

Impervious Area	Total Area (acres)
Existing Roads	0.000
Total:	**0.000**

Revised Totals:	**11.354**	**9.249**
Percentage Impervious Area Treated:		**81.46%**
Percentage Required:		**75.00%**

ATTACHMENT 1-8 INSPECTION AND MAINTENANCE LOG

Inspection and Maintenance Log of Stormwater Structures

Silt Fencing:	Inspected By/ Date:	Action Taken/ Date
a. Bottom of fence		
b. Sediment Build-Up		
c. Rips, Tears, Holes		

Ditches and Swales:	Inspected By/ Date:	Action Taken/ Date
a. Check Dams		
b. Erosion of Ditches		
c. Slumping of Ditch Banks		
d. Short-Circuiting by Check Dams		
e. Accumulation of Sediment		

Roadside Slopes:	Inspected By/ Date:	Action Taken/ Date
a. Erosion of slopes		
b. Established vegetation		

Culverts:	Inspected By/ Date:	Action Taken/ Date
a. Pipe Openings		
b. Sumps		
c. Frost Action		
d. Inlet / Outlet Protection		

Level Spreader & Spillway:	Inspected By/ Date:	Action Taken/ Date
a. Short-Circuiting		
b. Sediment Build-Up		
c. Spillway Erosion		

Buffers:	Inspected By/ Date:	Action Taken/ Date
a. Sediment Build-Up		
b. Erosion, Bare Soil		
c. Vegetation		

*Refer to inspection intervals, and maintenance procedures listed in the Stormwater Manegement Plan.