11.0 SOILS

11.1 Introduction

CMP has completed an analysis of soils within the NECEC Project's transmission line corridor and related substation facilities locations. The Soil Survey Geographic Database ("SSURGO") compiled by the United States Department of Agriculture – Natural Resources Conservation Service ("USDA-NRCS"), hardcopies of published USDA-NRCS county soil surveys, and the Official Series Description ("OSD") website of the USDA-NRCS were utilized as the basis for the soils analysis along the NECEC transmission line corridor. To identify and map soils, Geographic Information Systems ("GIS") software was used to complete an overlay analysis of the georeferenced SSURGO data and the area of the transmission line corridor. Characteristics of the USDA-NRCS mapped soils were analyzed; summary descriptions of all soils identified along the NECEC corridor are provided in Section 11.2. Soils for transmission line and substation components are identified in Section 11.3 and Section 11.4.

Given that this analysis is based on existing NRCS SSURGO mapping, some mapped series are classified as having a mesic temperature regime. The mesic temperature regime of Soil Taxonomy is no longer applied to soils in Maine, and soils previously mapped with a mesic temperature regime are now correlated to series with a frigid temperature regime. However, given that existing SSURGO mapping was used as the basis for the transmission line corridor soils analysis, series with a mesic temperature regime are included in the mapping and descriptions of this section of the Site Law application. The revised temperature regime classifications now used in Maine do not affect soil based land use interpretations related to the Project.

Existing soil characteristics at the Merrill Road Converter Substation and the Fickett Road Substation sites were identified by the Class B High Intensity Soil Surveys, conducted by Robert Vile Soil Consulting. Soils were mapped in accordance with the Maine Association of Professional Soil Scientist High Intensity Soil Survey Standards. Findings of the high intensity soil surveys at each site are summarized in Section 11.4. The high intensity soil survey maps and reports are included in **Exhibit 11-1** and **Exhibit 11-2** of this section.

Additionally, Robert Vile Soil Consulting provided a letter opinion, based on the Class B High Intensity Soil Surveys, which addresses the potential construction limitations at the new substation sites (Exhibit 11-3 and 11-4). CMP intends to have full geotechnical reports completed by SW Cole by March 15, 2018 and will provide the results to MDEP as a supplement to this application. The geotechnical report will include a more detailed analysis of major limitations presented by the soil conditions at the substation sites and present potential design accommodations to address those limitations. In the locations where soils have limitations, proper engineering

techniques will be implemented to overcome the limitations of the soils. This may include the removal of native soils and the importation of adequate soils.

11.2 Summary Descriptions of Soils

Abram Sandy Loam – *Loamy, isotic, frigid Lithic Haplorthods*

Abram soils are very shallow, excessively drained soils formed in a thin glacial till on ridges and mountains. Depth to bedrock is less than 10 inches and there is no seasonal high-water table between the bedrock and the surface. Abram soils are hydrologic group D soils. Slopes range from 0 to 80 percent.

Adams Loamy Sand – *Sandy, isotic, frigid Typic Haplorthods*

Adams soils are very deep, somewhat excessively drained soils formed in glacio-fluvial or glacio-lacustrine sands on outwash plains, deltas, lake plains, moraines, terraces, and eskers. Depth to bedrock is greater than 60 inches, and Adams soils do not have a seasonal high-water table within 40 inches. Adams soils are hydrologic group A soils. Slopes within the program area range from 0 to 40 percent, with slopes greater than 8 percent classified as potentially highly erodible land.

Adams-Colton Association

The Adams-Colton Association soils map unit is comprised of Adams and Colton soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Adams soils are described above and Colton soils are described below.

Adams-Croghan Association

The Adams-Croghan Association soils map unit is comprised of Adams and Croghan soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Adams soils are described above and Croghan soils are described below.

Agawam Fine Sandy Loam – *Coarse-loamy over sandy or sandy-skeletal, mixed, active, mesic Typic Dystrudepts*

Agawam soils are very deep, well drained soils formed in sandy, water deposited materials on outwash plains and high stream terraces. Depth to bedrock is greater than 60 inches. Agawam soils do not have a seasonal water table within 40 inches, and are hydrologic group B soils. Slopes range from 0 to 15 percent, with slopes greater than 8 percent classified as potentially highly erodible land.

Allagash Very Fine Sandy Loam – *Coarse-loamy over sandy or sandy-skeletal, isotic, frigid Typic Haplorthods*

Allagash soils are very deep well drained soils formed in glacio-fluvial deposits on outwash plains and stream terraces. The seasonal high-water table is greater than 40 inches from the surface and depth to bedrock is greater than 60 inches. Allagash soils are hydrologic group B soils. Slopes range from 0 to 35 percent, with slopes less than 8 percent classified as potentially highly erodible land, and slopes of 5 to 15 percent as highly erodible land.

Belgrade Very Fine Sandy Loam – *Coarse-silty, mixed, active, mesic aquic Dystric Eutrudepts*

Belgrade soils are very deep, moderately well drained soils formed in glacio-lacustrine parent materials on terraces. The seasonal high-water table is 16 to 40 inches from the surface and depth to bedrock is greater than 60 inches. Belgrade soils are hydrologic group C soils. Slopes within the program area range from 0 to 25 percent, and are highly erodible land.

Bemis Gravelly Fine Sandy Loam - *Loamy, mixed, active, acid, shallow Aeric Cryaquepts*

Bemis soils consist of very deep, poorly drained soils on smooth, concave positions in valleys at higher elevations that form in dense glacial till. Slopes range from 0 to 15 percent.

Berkshire Fine Sandy Loam – *Coarse-loamy, isotic, frigid Typic Haplorthods*

Berkshire soils consist of very deep, well drained soils formed in till on glaciated uplands. The depth to bedrock is greater than 60 inches and there is no seasonal high-water table from 16 to 40 inches. Berkshire soils are hydrologic group C soils. Slopes range from 5 to 75 percent, with slopes less than 15 percent classified as potentially highly erodible land and slopes greater than 15 percent classified as highly erodible land.

Biddeford Silt Loam – *Fine, illitic, nonacid, frigid Histic Humaquepts*

Biddeford soils are very deep, very poorly drained soils formed in glacio-lacustrine or glacio-marine deposits on coastal lowlands and river valleys. Some areas have an organic surface horizon. As hydric soils, the seasonal high-water table is at the surface and depth to bedrock is greater than 60 inches. Biddeford soils are hydrologic group D soils. Slopes are nearly level.

Boothbay Silt Loam – *Fine-silty, mixed, superactive, frigid aquic Dystric Eutrudepts*

Boothbay soils are very deep, moderately well drained soils formed in glacio-lacustrine and glacio-marine parent materials on lake and marine plains. Depth to the seasonal high-water table is 16 to 40 inches, and

depth to bedrock is greater than 60 inches. Boothbay soils are hydrologic group C soils. Slopes range from 3 to 45 percent, and are potentially highly erodible land where slopes are less than 15 percent and highly erodible land where slopes exceed 15 percent.

Brayton Fine Sandy Loam – *Loamy, mixed, active, nonacid, frigid, shallow Aeric Endoaquepts*
Brayton soils are very deep, poorly drained soils formed in dense glacial till in depressions and on toe-slopes. As hydric soils, Brayton soils have a seasonal high-water table that is at or near the surface. Depth to bedrock is greater than 60 inches, and Brayton soils are hydrologic group C soils. Slopes range from 0 to 25 percent and are potentially highly erodible land.

Brayton-Colonel Association
The Brayton and Colonel Association map unit is comprised of Brayton and Colonel soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Brayton soils are described above and Colonel soils are described below.

Brayton-Peacham-Markey Association
The Brayton, Peacham, and Markey Association map unit is comprised of Brayton and Markey soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Brayton soils are described above and Markey and Peacham soils are both described below.

Bucksport – *Euic, frigid Typic Haplosaprists*
Bucksport soils are very deep, very poorly drained soils formed in well decomposed organic materials more than 51 inches thick over glacial till or glaciofluvial deposits. Slopes are nearly level and bedrock is greater than 60 inches.

Bucksport and Markey Complex
The Bucksport and Markey Complex map unit is comprised of Bucksport and Markey soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Bucksport soils are described above and Markey soils are described below.

Bucksport and Wonsqueak Mucks
The Bucksport and Wonsqueak Mucks map unit is comprised of Bucksport and Wonsqueak soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Bucksport soils are described above and Wonsqueak soils are described below.

Burnham – *Loamy, mixed, superactive, nonacid, frigid, shallow Histic Humaquepts*
Burnham soils consist of very deep, very poorly drained soils formed in dense glacial till in depressions. The depth to bedrock is greater than 60 inches and the water table is at or near the surface. Burnham soils are hydrologic group D soils. Slopes range from 0 to 5 percent.

Buxton Silt Loam – *Fine, illitic, frigid aquic Dystric Eutrudepts*
Buxton soils are very deep, moderately well drained soils formed in glacio-lacustrine and glacio-marine parent materials on coastal lowlands and river valleys. Depth to the seasonal high-water table is 16 to 40 inches, and depth to bedrock is greater than 60 inches. Buxton soils are hydrologic group C soils. Slopes within the program area range from 5 to 50 percent, and are potentially highly erodible land where slopes are less than 8 percent and highly erodible land where slopes exceed 8 percent.

Charles Silt Loam – *Coarse-silty, mixed, superactive, nonacid, frigid Aeric Fluvaquents*
Charles soils are very deep, poorly drained soils formed in alluvial deposits on flood plains. The seasonal high-water table is within 7 inches of the surface, and depth to bedrock is greater than 60 inches. Charles soils are hydrologic group C soils. Slopes range from 0 to 5 percent.

Charles-Cornish-Wonsqueak Complex
The Charles-Cornish-Wonsqueak Complex map unit is comprised of areas of Charles, Cornish and Wonsqueak soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Charles soils are described above and Cornish and Wonsqueak soils are both described below.

Charles-Medomak-Cornish Association
The Charles-Medomak-Cornish Association map unit is comprised of areas of Charles, Medomak and Cornish soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Charles soils are described above and Medomak and Cornish soils are both described below.

Charlton Fine Sandy Loam – *Coarse-loamy, mixed, active, mesic Typic Dystrudepts*
Charlton soils are very deep, well drained loamy soils formed in glacial till on till plains and hills. There is no seasonal high-water table within 40 inches of the surface, and depth to bedrock is greater than 60 inches. Charlton soils are hydrologic group B soils, and slopes range from 0 to 50 percent. Slopes less

than 15 percent are classified as potentially highly erodible land and slopes greater than 15 percent are classified as highly erodible land.

Chesuncook Silt Loam - *Coarse-loamy, isotic, frigid Aquic Haplorthods*

Chesuncook soils are very deep, moderately well drained soils formed in dense glacial till on till plains, hills, and mountains. Slopes range from 5 to 45 percent, and depth to bedrock is greater than 65 inches.

Chesuncook-Elliottsville-Telos Association

The Chesuncook-Elliottsville-Telos Association map unit is comprised of areas of Chesuncook, Elliottsville and Telos soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Chesuncook soils are described above and Elliottsville and Telos soils are both described below.

Chesuncook-Telos Association

The Chesuncook-Telos Association map unit is comprised of areas of Chesuncook and Telos soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Chesuncook soils are described above and Telos soils are described below.

Colonel Fine Sandy Loam – *Loamy, isotic, frigid, shallow Aquic Haplorthods*

Colonel soils are somewhat poorly drained soils formed in basal till on drumlins and till ridges. A hardpan is present 10 to 20 inches from the surface, and depth to bedrock is more than 60 inches from the surface. The seasonal high-water table occurs above the hardpan, approximately 7 to 16 inches from the surface. Colonel soils are hydrologic group C soils, with slopes that range from 0 to 35 percent.

Colonel-Peru-Pillsbury Association

The Colonel-Peru-Pillsbury Association map unit is comprised of areas of Colonel, Peru, and Pillsbury soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Colonel soils are described above and Peru and Pillsbury are both described below.

Colonel-Pillsbury-Peru Association

The Colonel-Pillsbury-Peru Association map unit is comprised of areas of Colonel, Pillsbury, and Peru soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Colonel soils are described above and Pillsbury and Peru are both described below.

Colonel-Skerry-Pillsbury Association

The Colonel-Skerry-Pillsbury Association map unit is comprised of areas of Colonel, Skerry and Pillsbury soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Colonel soils are described above and Skerry and Pillsbury are both described below.

Colton Gravelly Loamy Coarse Sand – *Sandy-skeletal, isotic, frigid Typic Haplorthods*

Colton soils are very deep, excessively drained soils formed in glacio-fluvial deposits of terraces, kames, eskers, and outwash plains. There is no seasonal high-water table within 40 inches of the surface, and depth to bedrock is greater than 60 inches. Colton soils are hydrologic group A soils. Slopes range from 5 to 70 percent and are potentially highly erodible land.

Colton-Adams Association

The Colton-Adams Association soils map unit is comprised of Colton and Adams soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Adams and Colton soils are described above.

Colton-Hermon Association

The Colton-Hermon Association soils map unit is comprised of Colton and Hermon soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Colton soils are described above and Hermon soils are described below.

Cornish – *Coarse-silty, mixed, superactive, frigid Fluvaquentic Dystrudepts*

Cornish soils are very deep, somewhat poorly drained soils formed in alluvial deposits on flood plains. There is a seasonal high-water table between 7 and 16 inches of the surface, and depth to bedrock is greater than 60 inches. Cornish soils are hydrologic group C soils. Slopes range from 0 to 5 percent.

Croghan Loamy Sand – *Sandy, isotic, frigid Aquic Haplorthods*

Croghan soils consist of very deep, moderately well drained soils formed in deltaic or glacio-fluvial deposits on terraces and sand plains. There is a seasonal high-water table within approximately 30 inches of the surface and depth to bedrock is greater than 60 inches. Croghan soils are hydrologic group B soils. Slopes range from 0 to 15 percent.

Danforth – *Loamy-skeletal, isotic, frigid Typic Haplorthods*

Danforth soils consist of very deep, well drained soils that form in glacial till on till plains and ridges. Depth to bedrock is greater than 60 inches. Slopes range from 5 to 45 percent.

Danforth-Elliottsville Association

The Danforth-Elliottsville Association map unit is comprised of Danforth and Elliottsville soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Danforth soils are described above and Elliottsville soils are described below.

Dune Land

Dune lands include areas of windblown sands, generally located at the edge of waterbodies.

Elmwood Fine Sandy Loam – *Coarse-loamy over clayey, mixed over illitic, superactive, frigid Aquic Dystric Eutrudepts*

Elmwood soils are very deep, moderately well drained soils formed in a thin layer of loamy outwash materials deposited over clayey marine or lacustrine deposits on lake plains, marine plains, outwash plains, and deltas. There is a seasonal high-water table within 16 to 40 inches of the surface and depth to bedrock is greater than 60 inches. Elmwood soils are hydrologic group C soils. Slopes range from 0 to 25 percent.

Elliottsville Silt Loam - *Coarse-loamy, isotic, frigid Typic Haplorthods*

Elliottsville soils are moderately deep, well drained soils that formed in glacial till on till plains, hills, ridges and mountains. There is no seasonal high-water table within 40 inches of the surface and depth to bedrock ranges from 20 to 40 inches. Slopes range from 5 to 65 percent.

Elliottsville-Monson Complex

The Elliottsville-Monson Association map unit is comprised of Elliottsville and Monson soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Elliottsville soils are described above and Monson soils are described below.

Fryeburg Silt Loam – *Coarse-silty, mixed, superactive, frigid Fluventic Dystrudepts*

Fryeburg soils are very deep, well drained soils formed in alluvial deposits on flood plains. Slopes range from 0 to 8 percent. There is no seasonal high-water table within 40 inches of the surface, and depth to

bedrock is greater than 60 inches. Fryeburg soils are hydrologic group B soils. Slopes range from 0 to 8 percent.

Hadley Silt Loam – *Coarse-silty, mixed, superactive, nonacid, mesic Typic Udifluvents*
Hadley soils are very deep well drained soils formed in silty alluvium on flood plains. Hadley soils are hydrologic group B soils, with a depth to bedrock greater than 60 inches. There is no seasonal high-water table within 40 inches of the surface. Slopes range from 0 to 5 percent.

Hartland Very Fine Sandy Loam – *Coarse-silty, mixed, active, mesic Dystric Eutrudepts*
Hartland soils consist of very deep, well drained soils on terraces and glacial lake plains formed in silty eolian or glaciolacustrine deposits. Depth to bedrock is greater than 60 inches, and there is no seasonal high-water table within 40 inches of the surface. Hartland soils are hydrologic group B soils. Slopes range from 0 to 50 percent, with slopes less than 8 percent potentially highly erodible land and slopes greater than 8 percent highly erodible land.

Hermon Fine Sandy Loam – *Sandy-skeletal, isotic, frigid Typic Haplorthods*
Hermon soils very deep, somewhat excessively drained soils on upland till plains, hills, and ridges. Hermon soils have formed in ablation till. There is no seasonal high-water table and depth to bedrock is greater than 60 inches. Hermon soils are hydrologic group A soils. Slopes within the program area range from 0 to 60 percent, and are potentially highly erodible land.

Hermon-Monadnock Association
The Hermon-Monadnock Association map unit is comprised of Hermon and Monadnock soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Hermon soils are described above and Monadnock soils are described below.

Hermon-Rawsonville-Skerry Association
The Hermon-Rawsonville-Skerry Association map unit is comprised of Hermon, Rawsonville, and Skerry soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Hermon soils are described above and Rawsonville and Skerry soils are both described below.

Hermon-Skerry Association

The Hermon-Skerry Association map unit is comprised of Hermon and Skerry soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Hermon soils are described above and Skerry soils are described below.

Hinckley Gravelly Sandy Loam – *Sandy-skeletal, mixed, mesic Typic Udorthents*

Hinckley soils consist of very deep, excessively drained soils formed in water-sorted materials, and are located on terraces, outwash plains, deltas, kames, and eskers. There is no seasonal high-water table within 40 inches of the surface, and depth to bedrock is greater than 60 inches. Hinckley soils are hydrologic group A soils with slopes that range from 0 to 60 percent, and are potentially highly erodible land.

Hogback Gravelly Fine Sandy Loam – *Loamy, isotic, frigid Lithic Haplohumods*

Hogback soils consist of shallow, well drained soils on glaciated uplands that formed in loamy till. There is no seasonal high-water table within 40 inches of the surface, and depth to bedrock ranges from 10 to 20 inches. Slopes range from 5 to 70 percent.

Hogback-Abram Complex

The Hogback-Abram Complex map unit is comprised of Hogback and Abram soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Hogback and Abram soils are both described above.

Hogback-Rawsonville Complex

The Hogback-Rawsonville Complex map unit is comprised of Hogback and Rawsonville soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Hogback soils are described above and Rawsonville soils are described below.

Hollis Fine Sandy Loam – *Loamy, mixed, active, mesic Lithic Dystrudepts*

Hollis soils are shallow, well drained to somewhat excessively drained soils formed in a thin mantle of ablation till derived mainly from gneiss, schist, and granite on bedrock-controlled hills and ridges. Some areas have many rock outcrops. There is no seasonal high-water table and depth to bedrock is within 20 inches of the surface. Hollis soils are hydrologic group C and D soils with slopes that range from 0 to 60 percent. Hollis soils are potentially highly erodible land where slopes are less than 8 percent, and highly erodible land where slopes are greater than 8 percent.

Knob Lock – *Dysic, frigid Lithic Udifolists*

Knob Lock soils consist of very shallow, well drained through excessively drained organic soils on mountains and hills. There is no seasonal high-water table and depth to bedrock ranges from 3 to 20 inches. Slopes range from 3 to 80 percent.

Lamoine – *Frigid Aeric Haplaquepts*

Lamoine soils are lower to intermediate, somewhat poorly drained soils formed in lowlands. The depth to bedrock is greater than 60 inches, and a seasonal (November – June) perched water table is present from 0.5 to 2.0 feet. Lamoine soils are hydrologic group D soils, with slopes that range from 0 to 15 percent.

Lamoine-Buxton Complex

The Lamoine-Buxton Complex map unit is comprised of areas of Lamoine and Buxton soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Lamoine and Buxton soils are both described above.

Leicester Fine Sandy Loam – *Coarse-loamy, mixed, active, acid, mesic Aeric Endoaquepts*

Leicester soils are very deep, poorly drained hydric soils formed in friable till. They are located in nearly level or gently sloping drainage ways and on foot-slope and toe-slope positions on hills. Depth to bedrock is greater than 60 inches and the seasonal high-water table is within 12 inches of the surface. Leicester soils are hydrologic group C soils and slopes range from 0 to 8 percent.

Limerick Silt Loam – *Coarse-silty, mixed, active, nonacid, mesic Fluvaquentic Endoaquepts*

Limerick soils are very deep, poorly drained hydric soils formed in recent alluvium on floodplains. The seasonal high-water table is within 12 inches of the surface, and bedrock is deeper than 60 inches of the surface. Limerick soils are hydrologic group C soils with nearly level slopes.

Lovewell – *Coarse-silty, mixed, superactive, frigid Fluvaquentic Dystrudepts*

Lovewell soils are very deep, moderately well drained soils formed in alluvial sediments on flood plains. There is a seasonal high-water table from 16 to 40 inches from the surface, and the depth to bedrock is greater than 60 inches. Lovewell soils are hydrologic group B soils. Slopes range from 0 to 5 percent.

Lovewell-Cornish Complex

The Lovewell-Cornish Complex map unit is comprised of areas of Lovewell and Cornish soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Lovewell and Cornish soils are both described above.

Lyman Fine Sandy Loam – *Loamy, isotic, frigid Lithic Haplorthods*

Lyman soils are shallow, somewhat excessively drained soils formed in ablation till on rocky hills, mountains, and high plateaus. Some map units have many rock outcrops. There is no seasonal high-water table, and depth to bedrock is typically 10 to 20 inches of the surface. Lyman soils are hydrologic group C and D soils with slopes that range from 5 to 80 percent. Lyman soils are potentially highly erodible land where slopes are less than 8 percent, and highly erodible land where slopes are greater than 8 percent.

Lyman-Rock Outcrop-Tunbridge Complex

The Lyman-Rock Outcrop-Tunbridge Complex map unit is comprised of Lyman and Tunbridge soils, and rock outcrops that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Lyman soils are described above and Tunbridge soils are described below.

Lyman-Tunbridge-Abram Complex

The Lyman-Tunbridge-Abram Complex map unit is comprised of areas of Lyman, Tunbridge, and Abram soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Lyman and Abram soils are both described above and Tunbridge soils are described below.

Lyman-Tunbridge-Rock Outcrop

The Lyman-Tunbridge-Rock Outcrop map unit is comprised of Lyman and Tunbridge soils, and rock outcrops that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Lyman soils are described above, and Tunbridge soils are described below.

Madawaska Fine Sandy Loam – *Coarse-loamy over sandy or sandy-skeletal, isotic, frigid Aquic Haplorthods*

Madawaska soils consist of very deep, moderately well drained and somewhat poorly drained soils formed in glacio-fluvial deposits on outwash plains and stream terraces. The seasonal high-water table is 16 to 40 inches below the surface and depth to bedrock is greater than 60 inches. Madawaska soils are hydrologic group B soils. Slopes range from 0 to 15 percent and are potentially highly erodible land.

Madawaska-Allagash Association

The Madawaska-Allagash Association map unit is comprised of areas of Madawaska and Allagash soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Madawaska and Allagash soils are both described above.

Made Land – *Udorthents*

Made land includes human-altered areas comprised of fill materials. The properties and characteristics of these soils are highly variable.

Markey – *Sandy or sandy-skeletal, mixed, euic, frigid Terric Haplosaprists*

Markey soils are very deep, very poorly drained organic soils. These soils have formed in thick organic materials over sandy deposits in depressions. Depth to bedrock is greater than 60 inches and the water table is usually or always at the surface.

Marlow Very Stony Fine Sandy Loam – *Coarse-loamy, isotic, frigid Oxyaquic Haplorthods*

Marlow soils consist of very deep, well drained soils formed in loamy till on drumlins and glaciated uplands. Marlow soils are moderately deep to densic contact. There is no seasonal high-water table within 40 inches of the surface and depth to bedrock is greater than 60 inches. Marlow soils are in hydrologic group C. Slopes range from 0 to 60 percent, with slopes less than 15 percent potentially highly erodible land and slopes greater than 15 percent highly erodible land.

Marlow-Berkshire Very Stony Fine Sandy Loam

The Marlow-Berkshire map unit is comprised of areas of Marlow and Berkshire soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Marlow and Berkshire soils are both described above.

Marlow-Peru Association

The Marlow-Peru Association map unit is comprised of areas of Marlow and Peru soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Marlow soils are described above and Peru soils are described below.

Marlow-Peru-Rawsonville Association

The Marlow-Peru-Rawsonville Association map unit is comprised of areas of Marlow, Peru, and Rawsonville soils that form a pattern on the landscape that is too intermingled to differentiate at the

mapped scale. Marlow soils are described above and Peru and Rawsonville soils are both described below.

Masardis and Masardis Variant Fine Sandy Loam – *Sandy-skeletal, isotic, frigid Typic Haplorthods*
Masardis soils consist of very deep, somewhat excessively drained soils formed in glaciofluvial or ice contact deposits. Depth to bedrock is deeper than 60 inches and there is no seasonal high-water table within 40 inches of the surface. Slopes range from 0 to 80 percent.

Masardis-Danforth-Peacham Association
The Masardis-Danforth-Peacham Association map unit is comprised of areas of Masardis, Danforth, and Peacham soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Masardis and Danforth soils are both described above and Peacham soils are described below.

Medomak Silt Loam – *Coarse-silty, mixed, superactive, nonacid, frigid Fluvaquentic Humaquepts*
Medomak soils consist of very deep, very poorly drained hydric soils formed in alluvial deposits on flood plains. Depth to bedrock is greater than 60 inches and the seasonal high-water table is less than 12 inches from the surface. Medomak soils are hydrologic group D soils and slopes range from 0 to 2 percent.

Melrose Fine Sandy Loam – *Coarse-loamy over clayey, mixed over illitic, superactive, frigid Oxyaquic Dystrudepts*
Melrose soils consist of very deep; well drained soils formed in a thin layer of loamy outwash materials over clayey marine or lacustrine deposits. Melrose soils are located on lake and marine plains, outwash plains, and deltas. The depth to bedrock is greater than 60 inches and there is no seasonal high-water table within 40 inches of the surface. Melrose soils are hydrologic group C soils, and are potentially highly erodible land. Slopes range from 0 to 50 percent.

Merrimac Fine Sandy Loam – *Sandy, mixed, mesic Typic Dystrudepts*
Merrimac soils are very deep, somewhat excessively drained soils formed in glacial outwash on terraces and plains and other glacio-fluvial landforms. There is no seasonal high-water table, and depth to bedrock is greater than 60 inches from the surface. Merrimac soils are hydrologic group B soils. Slopes range from 0 to 35 percent and are potentially highly erodible land.

Mixed Alluvial Land
Mixed alluvial land includes soils that have formed in alluvial deposits along river floodplains.

Monadnock – *Coarse-loamy over sandy or sandy-skeletal, isotic, frigid Typic Haplorthods*
The Monadnock soils are very deep, well drained soils that formed in a loamy mantle overlying sandy glacial till on upland hills, plains, and mountain side slopes. Depth to bedrock is deeper than 60 inches and the seasonal high-water table is deeper than 40 inches from the surface. Monadnock soils are hydrologic group B soils. Slopes range from 0 to 60 percent.

Monarda Silt Loam – *Loamy, mixed, active, acid, frigid, shallow Aeric Endoaquepts*
Monarda soils are very deep, poorly drained hydric soils formed in dense glacial till on lower slopes or in slight depressions on till plains. They are shallow to densic contact. The depth to bedrock is greater than 60 inches and the seasonal high-water table is within 12 inches of the surface. Monarda soils are hydrologic group D soils, and slopes range from 0 to 15 percent.

Monarda-Burnham Complex
The Monarda and Burnham map unit is comprised of areas of Monarda and Burnham soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Monarda and Burnham soils are both described above.

Monarda-Telos Complex
The Monarda and Telos map unit is comprised of areas of Monarda and Telos soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Monarda soils are described above and Telos soils are described below.

Monson Silt Loam – *Loamy, isotic, frigid Lithic Haplorthods*
Monson soils are shallow, somewhat excessively drained soils that form in glacial till on knolls of till plains, and on hills, ridges, and mountains. Depth to bedrock is 10 to 20 inches, and there is no seasonal high-water table. Slopes range from 5 to 60 percent.

Monson-Elliottsville-Knob Lock Complex
The Monson-Elliottsville-Knob Lock map unit is comprised of areas of Monson, Elliottsville, and Knob Lock soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Monson, Elliottsville, and Knob Lock soils are each described above.

Naumburg Sand – *Sandy, isotic, frigid Typic Endoaquods*

Naumburg soils are very deep, poorly drained hydric soils formed in sandy deltaic or glaciofluvial deposits on sand plains and terraces. Naumburg soils are located at topographically low positions on the landscape. The seasonal high-water table is typically within 12 inches of the surface, and depth to bedrock is greater than 60 inches. Naumburg soils are hydrologic group C soils. Slopes are nearly level.

Nicholville Silt Loam – *Coarse-silty, isotic, frigid Aquic Haplorthods*

Nicholville soils are very deep, moderately well drained soils formed in wind or water deposited material having a high content of silt and very fine sand. Depth to bedrock is greater than 60 inches and the seasonal high-water table occurs from 16 to 40 inches. Nicholville soils are hydrologic group C soils. Slopes range from 0 through 60 percent.

Ninigret Fine Sandy Loam – *Coarse-loamy over sandy or sandy-skeletal, mixed, active, mesic Aquic Dystrudepts*

Ninigret soils are very deep, moderately well drained soils formed in loamy over sandy and gravelly glacial outwash. Ninigret soils are formed on glaciofluvial landforms, and are typically found in slight depressions and broad drainage ways. Depth to bedrock is greater than 60 inches and the seasonal high-water table is from 16 to 40 inches. Ninigret soils are hydrologic group B soils, and are potentially highly erodible land. Slopes range from 0 to 15 percent.

Paxton Fine Sandy Loam – *Coarse-loamy, mixed, active, mesic Oxyaquic Dystrudepts*

Paxton soils are very deep, well drained loamy soils formed in dense basal till. The depth to bedrock is greater than 60 inches and there is no seasonal high-water table within 40 inches of the surface. Densic contact is moderately deep. Paxton soils are hydrologic group C soils. Slopes range from 0 to 45 percent, with slopes less than 15 percent being potentially highly erodible land and slopes greater than 15 percent being highly erodible land.

Peat and Muck

The Peat and Muck map unit is comprised of thick organic deposits formed as a result of continuous or nearly continuous saturation. This map unit is located in wetlands and depressions on the landscape, and has not been correlated to a specific soil series.

Peacham – *Loamy, mixed, active, nonacid, frigid, shallow Histic Humaquepts*

The Peacham soils are very poorly drained soils in depressions and drainage-ways on glaciated uplands formed in organic materials less than 16 inches thick underlain by dense, loamy till. Depth to bedrock is greater than 60 inches and the seasonal high-water table is at the surface most or all of the time. Peacham soils are hydrologic group D soils. Slopes range from 0 to 10 percent.

Peru Fine Sandy Loam – *Coarse-loamy, isotic, frigid Aquic Haplorthods*

Peru soils are very deep, moderately well drained soils formed in dense loamy glacial till. The depth to bedrock is greater than 60 inches and the seasonal high-water table is from 16 to 40 inches. Peru soils are hydrologic group C soils. Slopes range from 0 to 35 percent and are potentially highly erodible land.

Peru-Colonel-Marlow Association

The Peru-Colonel-Marlow map unit is comprised of areas of Peru, Colonel, and Marlow soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Peru, Colonel, and Marlow soils are each described above.

Peru-Colonel-Rawsonville Association

The Peru-Colonel-Rawsonville map unit is comprised of areas of Peru, Colonel, and Rawsonville soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Peru, Colonel, and Rawsonville soils are each described above.

Peru-Marlow Association

The Peru and Marlow map unit is comprised of areas of Peru and Marlow soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Peru and Marlow soils are both described above.

Pillsbury Cobbly Loam – *Coarse-loamy, mixed, superactive, acid, frigid Humic Endoaquepts*

Pillsbury soils are moderately deep to a dense substratum and very deep to bedrock soils that form in loamy lodgment till in glaciated uplands and lowlands. Depth to bedrock is greater than 65 inches, and there is no seasonal high-water table. Slopes range from 0 to 15 percent.

Pillsbury-Peacham Association

The Pillsbury and Peacham map unit is comprised of areas of Pillsbury and Peacham soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Pillsbury and Peacham soils are both described above.

Pits, Sand and Gravel – *Udorthents*

Gravel pits are human-altered areas, usually within sandy textured glacial outwash or ice-contact deposits. Soils within these areas have been excavated and cut, typically for the purpose of sand and gravel extraction.

Podunk Fine Sandy Loam – *Coarse-loamy, mixed, active, frigid Fluvaquentic Dystrudepts*

Podunk soils are very deep, moderately well drained soils formed in recent alluvium on floodplains. The seasonal high-water table is typically within 16 to 40 inches of the surface, and depth to bedrock is greater than 60 inches. Podunk soils are hydrologic group B soils with nearly level slopes.

Rawsonville Very Fine Sandy Loam – *Coarse-loamy, isotic, frigid Typic Haplohumods*

Rawsonville soils are moderately deep, well drained soils that form in loamy till on glaciated uplands. Depth to bedrock ranges from 20 to 40 inches, and there is no seasonal high-water table. Slopes range from 3 through 70 percent.

Ricker – *Dysic Lithic Cryofolists*

Ricker soils are shallow to very shallow and well drained to excessively well drained organic soils that form in thin organic deposits underlain in most places by a very thin mineral horizon over bedrock on mountains and hills. Depth to bedrock is within 20 inches of the surface. Slopes range from 5 to 80 percent.

Ricker-Saddleback-Rock Outcrop Complex

The Ricker, Saddleback, and Rock Outcrop map unit is comprised of areas of Ricker, Saddleback, and Rock Outcrop soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Ricker soils are described above and Saddleback soils are described below.

Ridgebury Fine Sandy Loam – *Loamy, mixed, active, acid, mesic, shallow Aeric Endoaquepts*

Ridgebury soils are very deep, poorly drained hydric soils formed in till derived mainly from granite, gneiss, and schist. Densic contact is typically 14 to 19 inches, and depth to bedrock is greater than 60

inches. The seasonal high-water table is within 12 inches of the surface. Ridgebury soils are hydrologic group C soils. Slopes range from 0 to 15 percent.

Rock Outcrop-Thorndike-Lyman Association

The Rock Outcrop, Thorndike, and Lyman map unit is comprised of areas of Rock Outcrop, Thorndike, and Lyman soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Lyman soils are described above and Thorndike soils are described below.

Roundabout – *Frigid Aeric Haplaquepts*

Roundabout soils are poorly drained soils that form in depressions and lowlands. Depth to bedrock is greater than 60 inches, and a perched water table is present at 0.5 to 1.5 feet from November through May or during periods of excessive precipitation. Roundabout soils are hydrologic group C soils. Slopes range from 0 to 10 percent.

Roundabout-Croghan Association

The Roundabout and Croghan map unit is comprised of areas of Roundabout and Croghan soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Roundabout and Croghan soils are both described above.

Saddleback Fine Sandy Loam – *Loamy, isotic Lithic Humicryods*

Saddleback soils are shallow, well drained soils that form in glacial till on mountains. Depth to bedrock ranges from 10 to 20 inches, and slopes range from 3 to 80 percent.

Saddleback-Ricker Complex

The Saddleback and Ricker map unit is comprised of areas of Saddleback and Ricker soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Saddleback and Ricker soils are both described above.

Scantic Silt Loam – *Fine, illitic, nonacid, frigid Typic Epiaquepts*

Scantic soils consist of very deep, poorly drained hydric soils formed in glacio-marine or glacio-lacustrine deposits on coastal lowlands and river valleys. The seasonal high-water table is within 12 inches of the surface and bedrock is deeper than 60 inches. Scantic soils are in soil hydrologic group D, and have slopes that range from 0 to 10 percent.

Scarboro Fine Sandy Loam – *Sandy, mixed, mesic Histic Humaquepts*

Scarboro soils are very deep, very poorly drained hydric soils in sandy glaciofluvial deposits on outwash plains, deltas, and terraces. They are nearly level soils in depressions. The depth to bedrock is greater than 60 inches and the water table is at or near the surface. Scarboro soils are hydrologic group D soils. Slopes range from 0 to 5 percent.

Scio Silt Loam – *Coarse-silty, mixed, active, mesic Aquic Dystrudepts*

Scio soils are very deep, moderately well drained soils formed in eolian, lacustrine, or alluvial sediments dominated by silt and very fine sand. These soils are on terraces, old alluvial fans, and in upland basins. Scio soils have a seasonal high-water table from 16 to 40 inches from the surface and depth to bedrock is greater than 60 inches. Scio soils are hydrologic group B and C soils, depending on slope. Slopes range from 0 to 25 percent, with slopes less than 8 percent being potentially highly erodible land, and slopes greater than 8 percent being highly erodible land.

Sisk Silt Loam – *Coarse-loamy, isotic Oxyaquic Humicryods*

Sisk soils are very deep, well drained soils that form in dense glacial till in high elevation valleys and on side slopes of mountains. Stones and boulders typically cover from 0 to 15 percent of the surface. Slopes range from 10 to 60 percent.

Skerry Fine Sandy Loam – *Coarse-loamy, isotic, frigid Aquic Haplorthods*

Skerry soils are very deep, moderately well drained soils formed in loamy materials over dense, sandy glacial till on drumlins and glaciated uplands. The depth to hardpan generally ranges from 20 to 38 inches. Bedrock depth is greater than 60 inches, and the seasonal high-water table typically occurs above the hardpan between 16 and 40 inches. Skerry soils are hydrologic group C soils, with slopes that range from 0 to 25 percent.

Skowhegan Loamy Fine Sand – *Sandy, isotic, frigid Aquic Haplorthods*

Skowhegan soils are very deep, moderately well and somewhat poorly drained soils formed in glaciofluvial deposits on outwash plains and stream terraces. Bedrock is greater than 60 inches from the surface, and the seasonal high-water table often occurs 12 to 24 inches from the surface. Skowhegan soils are hydrologic group B soils with slopes that range from 0 to 10 percent.

Stetson Fine Sandy Loam – *Sandy-skeletal, isotic, frigid Typic Haplorthods*

Stetson soils are very deep, well drained, and somewhat excessively drained soils on outwash plains, terraces, kames, and eskers. These soils formed in glaciofluvial deposits derived mainly from slate, shale, and phyllite, with lesser amounts of gneiss, granite, and limestone. The depth to bedrock is greater than 60 inches and there is no seasonal high-water table within 40 inches of the surface. Stetson soils are hydrologic group B soils. Slopes range from 0 to 60 percent.

Suffield Silt Loam – *Coarse-silty over clayey, mixed, active, mesic Dystric Eutrudepts*

Suffield soils consist of very deep, well drained soils formed in lacustrine or marine sediments, located primarily on gently sloping to very steep dissected plains. There is no water table within 40 inches of the surface and bedrock is deeper than 60 inches. Suffield soils are hydrologic group C soils, and are highly erodible land. Slopes range from 5 to 45 percent.

Sulfaquents – *Sulfaquents*

In Maine, sulfaquents are poorly drained to very poorly drained hydric soils of estuarine wetlands and tidal marshes. These soils may form in a variety of parent materials, but are typically formed in glaciomarine deposits. Sulfaquent map units have not been correlated to the series level of Soil Taxonomy.

Sulfihemists – *Sulfihemists*

In Maine, sulfihemists are very poorly drained hydric soils with an organic surface horizon in estuarine wetlands and salt marshes. These soils may form in a variety of parent materials, but are typically formed in glaciomarine deposits. Sulfihemist map units have not been correlated to the series level of Soil Taxonomy.

Sunday Loamy Fine Sand – *Mixed, frigid Typic Udipsamments*

Sunday soils are very deep, excessively drained soils form in sandy alluvial deposits on floodplains. Flooding varies from once or twice a year to once in 10 years. Bedrock is deeper than 60 inches. Slopes are nearly level.

Surplus Sandy Loam – *Coarse-loamy, isotic Aquic Haplocryods*

Surplus soils are very deep, moderately well drained and somewhat poorly drained soils that form in dense till on mountain side slopes. Stones and boulders typically cover 0 to 15 percent of the surface. Depth to bedrock is greater than 60 inches. Slopes range from 5 to 45 percent.

Surplus-Bemis Association

The Surplus and Bemis map unit is comprised of areas of Surplus and Bemis soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Surplus and Bemis soils are both described above.

Surplus-Sisk Association

The Surplus and Sisk map unit is comprised of areas of Surplus and Sisk soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Surplus and Sisk soils are both described above.

Sutton Loam – *Coarse-loamy, mixed, active, mesic Aquic Dystrudepts*

Sutton soils are very deep, moderately well drained loamy soils formed in till. They are nearly level to strongly sloping soils on plains, low ridges, and hills, typically on lower slopes and in slight depressions. The depth to bedrock is greater than 60 inches and there is a seasonal high-water table from 16 to 40 inches. Sutton soils are hydrologic group C soils. Slopes range from 0 to 15 percent.

Swanton Fine Sandy Loam – *Coarse-loamy over clayey, mixed over illitic, superactive, nonacid, frigid Aeric Epiaquepts*

Swanton soils are very deep, poorly drained hydric soils formed in a thin mantle of loamy outwash materials over clayey marine or lacustrine deposits on lake and marine plains, and outwash plains and deltas. The depth to bedrock is greater than 60 inches and there is a seasonal high-water table within 12 inches of the surface. Swanton soils are hydrologic group C soils. Slopes range from 0 to 10 percent.

Swanville Silt Loam – *Fine-silty, mixed, active, nonacid, frigid Aeric Epiaquepts*

Swanville soils are very deep, poorly drained hydric soils formed in glaciolacustrine or glaciomarine deposits on lake and marine plains. The depth to bedrock is greater than 60 inches, and the seasonal high-water table is within 12 inches of the surface. Swanville soils are hydrologic group C soils. Slopes range from 0 to 10 percent.

Swanville-Boothbay Association

The Swanville-Boothbay Association includes map units of Swanville and Boothbay soils that form a pattern on the landscape that cannot be differentiated at the mapped scale. Swanville and Boothbay soils are both described above.

Telos Silt Loam – *Loamy, isotic, frigid, shallow Aquic Haplorthods*

Telos soils are shallow to dense lodgement till and very deep to bedrock, somewhat poorly drained soils that form in till on till plains, hills, and ridges. Bedrock is deeper than 60 inches. Slopes range from 0 to 25 percent.

Telos-Chesuncook Association

The Telos-Chesuncook Association includes map units of Telos and Chesuncook soils that form a pattern on the landscape that cannot be differentiated at the mapped scale. Telos and Chesuncook soils are both described above.

Telos-Chesuncook-Elliottsville Association

The Telos-Chesuncook-Elliottsville Association includes map units of Telos, Chesuncook, and Elliottsville soils that form a pattern on the landscape that cannot be differentiated at the mapped scale. Telos, Chesuncook, and Elliottsville soils are each described above.

Telos-Monarda-Monson Association

The Telos-Monarda-Monson Association includes map units of Telos, Monarda, and Monson soils that form a pattern on the landscape that cannot be differentiated at the mapped scale. Telos, Monarda, and Monson soils are each described above.

Thorndike Silt Loam – *Loamy-skeletal, isotic, frigid Lithic Haplorthods*

Thorndike soils are shallow, somewhat excessively drained soils formed in glacial till on hills and mountains. The depth to bedrock ranges from 10 to 20 inches, and there is no seasonal high-water table. Thorndike soils are hydrologic group C soils. Slopes range from 0 to 45 percent.

Tunbridge – *Coarse-loamy, isotic, frigid Typic Haplorthods*

Tunbridge soils consist of moderately deep, well drained soils on glaciated uplands formed in loamy glacial till. The depth to bedrock is 20 to 40 inches, and there is no seasonal high-water table. Tunbridge soils are hydrologic group C soils. Slopes range from 0 to 75 percent, and are potentially highly erodible land.

Tunbridge-Berkshire-Peru Association

The Tunbridge-Berkshire-Peru Association includes map units of Tunbridge, Berkshire and Peru soils that form a pattern on the landscape that cannot be differentiated at the mapped scale. Tunbridge, Berkshire and Peru soils are each described above.

Tunbridge-Lyman Complex

The Tunbridge-Lyman Complex is comprised of areas of Tunbridge and Lyman soils that form a pattern on the landscape that is too intermingled to differentiate at the mapped scale. Tunbridge soils are described below and Lyman soils are described above.

Udorthents – *Udorthents*

Udorthents are human-altered soils such filled land, and stripped/cut areas. The properties and characteristics of these soils are highly variable.

Udorthents-Urban Land Complex – *Udorthents*

The Udorthents-Urban Land Complex map unit includes areas of Udorthents (described above) and urban land in a pattern that is too mixed to differentiate at the mapped scale. This map unit corresponds to human-altered soils and developed areas.

Urban Land

Urban land includes developed areas where soils have been altered.

Walpole Fine Sandy Loam – *Sandy, mixed, mesic Aeric Endoaquepts*

Walpole soils are very deep, poorly drained hydric soils formed in outwash in low-lying positions on terraces and plains. The depth to bedrock is greater than 60 inches and the seasonal high-water table is within 12 inches of the surface. Walpole soils are hydrologic group C soils. Slopes range from 0 to 8 percent.

Whately Fine Sandy Loam – *Coarse-loamy over clayey, mixed over illitic, superactive, nonacid, frigid Mollic Epiaquepts*

Whately soils are very deep, very poorly drained hydric soils formed in thin loamy outwash over clayey marine or lacustrine deposits on lakes and marine plains, and outwash plains and deltas. The depth to bedrock is greater than 60 inches, and there is a water table at or near the surface. Whately soils are hydrologic group D soils. Slopes are generally less than 5 percent.

Winooski Silt Loam – *Coarse-silty, mixed, active, mesic Fluvaquentic Dystrudepts*
Winooski soils are very deep, moderately well drained, and have formed in alluvial material on nearly level floodplains. The seasonal high-water table is 16 to 40 inches below the surface, and depth to bedrock is greater than 60 inches. Winooski soils are hydrologic group B soils. Slopes are nearly level.

Wonsqueak Mucky Peat – *Loamy, mixed, euic, frigid Terric Haplosaprists*
Wonsqueak soils are very deep; very poorly drained hydric soils formed in well decomposed (sapric) organic soil materials over loamy mineral material. Wonsqueak soils form in depressions in a variety of surficial deposits. Surface horizons are frequently saturated by shallow groundwater, and depth to bedrock is greater than 60 inches. Slopes are nearly level to less than 5 percent.

Woodbridge Fine Sandy Loam – *Coarse-loamy, mixed, active, mesic Aquic Dystrudepts*
Woodbridge soils are very deep, moderately well drained loamy soils formed in dense till. They are nearly level to moderately steep soils on till plains, hills, and drumlins. The depth to bedrock is greater than 60 inches, and there is a seasonal high-water table from 16 to 40 inches. A hardpan is present from 20 to 40 inches. Woodbridge soils are hydrologic group C soils. Slopes range from 0 to 25 percent and are potentially highly erodible land.

11.3 Soils Within Specific NECEC Corridors

Soils mapped within each specified NECEC Project transmission line corridor component are discussed below. In addition, hydric soils in each of the transmission component are specified. Based on the Applicant's analysis of SSURGO mapping, soils within the Project's transmission line corridor components will accommodate NECEC construction activities. Soil constraints within the Project's transmission line corridor components will be managed and mitigated through implementation of erosion and sediment control measures incorporated in CMP's Environmental Guidelines for Construction Activities on Transmission Line and Substation Projects for Contractors and Subcontractors (see **Exhibit 14-1**), proper site and Project design, and special construction procedures.

11.3.1 Segment 1

Soils located along this Segment are depicted on the Floodplain and Soils Series Maps (**Appendix 4**). Mapped hydric soils along this line corridor include Biddeford, Brayton, Bucksport, Charles, Leicester, Limerick, Mixed Alluvial Sand, Monarda, Naumberg, Pillsbury, Roundabout, Scantic, Scarboro, Swanton, Swanville, Whalpole, and Whately series. The Peat and Muck map unit is also hydric and found within this line corridor. On-site wetland delineations have been completed within this transmission line

corridor, and the resultant wetland delineation maps (contained in **Attachment 2** of the Site Law application) provide a more accurate and detailed depiction of wetland boundaries than can be estimated from SSURGO hydric soil mapping.

11.3.2 Segment 2

Soils located along this Segment are depicted on the Floodplain and Soils Series Maps (**Appendix 4**). Mapped hydric soils along this line corridor include Biddeford, Brayton, Bucksport, Charles, Leicester, Limerick, Mixed Alluvial Sand, Monarda, Naumberg, Pillsbury, Roundabout, Scantic, Scarboro, Swanton, Swanville, Whalpole, and Whately series. The Peat and Muck map unit is also hydric and found within this line corridor. On-site wetland delineations have been completed within this transmission line corridor, and the resultant wetland delineation maps (contained in **Attachment 2** of the Site Law application) provide a more accurate and detailed depiction of wetland boundaries than can be estimated from SSURGO hydric soil mapping.

11.3.3 Segment 3

Soils located along this Segment are depicted on the Floodplain and Soils Series Maps (**Appendix 4**). Mapped hydric soils along this line corridor include Biddeford, Brayton, Bucksport, Charles, Leicester, Limerick, Mixed Alluvial Sand, Monarda, Naumberg, Pillsbury, Roundabout, Scantic, Scarboro, Swanton, Swanville, Whalpole, and Whately series. The Peat and Muck map unit is also hydric and found within this line corridor. Verifications of water resource surveys previously conducted by CMP have been completed within this rebuild transmission line corridor, and the resultant wetland delineation maps (contained in **Attachment 2** of the Site Law application) provide a more accurate and detailed depiction of wetland boundaries than can be estimated from SSURGO hydric soil mapping.

11.3.4 Segment 4

Soils located along this Segment are depicted on the Floodplain and Soils Series Maps (**Appendix 4**). Hydric soils along this rebuild transmission line corridor include the Biddeford, Leicester, Limerick, Scantic, Scarboro, Swanton, Walpole, and Whately series. The Peat and Muck map unit is also hydric and found within these line sections. Verifications of water resource surveys previously conducted by CMP have been completed within this rebuild transmission line corridor, and the resultant wetland delineation maps (contained in **Attachment 2** of the Site Law application) provide a more accurate and detailed depiction of wetland boundaries than can be estimated from SSURGO hydric soil mapping.

11.3.5 Segment 5

Soils located along this Segment are depicted on the Floodplain and Soils Series Maps (**Appendix 4**). Mapped hydric soils along this transmission line corridor include the Biddeford, Brayton, Ridgebury, Scantic, Sulfihemists, Sulfaquents, and Swanville series. Verifications of water resource surveys previously conducted by CMP have been completed within this 345kV transmission line corridor, and the resultant wetland delineation maps (contained in **Attachment 2** of the Site Law application) provide a more accurate and detailed depiction of wetland boundaries than can be estimated from SSURGO hydric soil mapping.

11.4 Soils and Transmission Line Structures

Typically, the installation of transmission line structures requires the embedded depth to be 10% of the pole length plus two feet for wood structures, which is easily supported by nearly all soil types across the project, and 20% +/- of structure length for steel structures. In some instances where unconsolidated soils (e.g., peat and mucky soils) exist, additional methods of structural support may be required. Generally, in these instances pole butts or companion poles are installed below ground and immediately adjacent to the pole to be installed, and are then bolted to the pole. Additionally, guy wires with anchors may be installed around structures to provide additional support.

11.5 Soils at Proposed Substations

CMP completed Class B high intensity soil surveys for the Merrill Road Converter Station and the Fickett Road Substation sites. Soil surveys for the existing substation facilities (Coopers Mills, Crowley's, Larrabee Road, Maine Yankee, Surowiec, and Raven Farm) were not completed because all upgrades will be located within the existing fence lines.

11.5.1 Merrill Road Converter Station

A Class B high intensity soil survey was conducted at the proposed Merrill Road Converter Station on June 2 and 14, 2017. The soil report indicated that the parcel is bedrock controlled. Four different soil series were identified on the parcel: Peru, Tunbridge, Lyman, and Brayton. Brayton soils are considered hydric, while Peru, Tunbridge, and Lyman are non-hydric.

Reports and mapping in accordance with the standards of the Maine Association of Professional Soil Scientists and the Maine Site Location of Development Act are included in **Exhibit 11-2**.

11.5.2 Fickett Road Substation

A Class B high intensity soil survey was conducted at the proposed Fickett Road Substation on June 2 and 14, 2017. Three soil series were identified on the parcel: Peru, Lamoine, and Scantic. Peru soils are generally classified as non-hydric, while Lamoine and Scantic are hydric soils. Reports and mapping in accordance with the standards of the Maine Association of Professional Soil Scientists and the Maine Site Location of Development Act are included in **Exhibit 11-3**.

Exhibit 11-1: Merrill Road Converter Station Class B High Intensity Soil Survey

Class B High Intensity Soil Survey

For

Central Maine Power Company Proposed Converter Site

Perron Lot , Merrill road
Lewiston, ME

Soil Survey completed by Robert Vile Soil Consulting Inc

June 19, 2017

Robert Vile
Licensed Site Evaluator
Certified Soil Scientist

P.O. Box 114, Cates Rd.
Dixmont, ME 04932

Telephone:
(207)234-2451

Date: June 19, 2017

To: Sackett & Brake Survey, Inc.
P.O. Box 207
Skowhegan, Me. 04976

Re: Class B High Intensity Soil Survey of a +- 10 acre parcel of land located off the Merrill Rd in Lewiston,Me. N/F Perron ; for a Central Maine Power Company Proposed Converter Site.

Findings: On June 2.and June 14, 2014 I investigated the above captioned parcel. The purpose of the investigation was to conduct a Class B High Intensity Soil of the property. Soils were described by backhoe excavated test pits to a depth of four feet or ledge refusal and many soil auger borings throughout the parcel. The soil test pit locations as well as a two foot contour map at a scale of 1"=50' were provided by Sackett & Brake Survey, Inc. This soil survey was conducted for the use in the planning of a Central Maine Power Company Converter Site. This Class B High Intensity Soil Survey was mapped following these minimum standards described in Guidelines For Maine Certified Soil Scientists For Soil Identification And Mapping:
Class B (High Inttensity)

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.
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.

This parcel is bedrock controlled. Four different Soil Series were identified on the parcel. Peru, Tunbridge, Lyman and Brayton soil series.
The Peru soils are classified as Coarse-loamy, isotic, frigid Aquic Hapllorthods by Soil Taxonomy. These soils are moderately well drained soils that formed in lodgment till on the upland portions of this parcel. Peru soils are deeper than 48" to bedrock These soils exist in hardwood forested uplands on this property with slopes ranging from 3 to 10%. Firm basil till was found between 30 to 36 inches below the mineral surface. Seasonal water table depths were found 27 to 30 inches below the surface . A typical pedon for this

series is described at Test Pit # 2. Please see attached test pit logs. Peru soils are a Class C Hydrologic Soil Group. Surface run-off is medium and permeability is moderate in the upper horizons and moderately slow in the lower horizons. There is no hazard to flooding in the areas mapped Peru on this parcel. Inclusions within the mapping units may include the Tunbridge Soil Series which will have bedrock between 20 to 48 inches. Also Lyman soils may be inclusions within the soil units mapped where ledge may be near the surface. The Peru soils will have a very little negative impact on the proposed development of a converter site.

The Tunbridge soils are classified Coarse-loamy, isotic, frigid Typic Haplorthods by Soil Taxonomy.These soils are moderately deep, well drained soils formed in supraglacial till on the forested upland portions of this parcel. Tunbridge soils have bedrock between 20" to 40" on this site. They exist on slopes ranging from 4 to 30% on this parcel. No restrictive layers or seasonal water table was observed in these soils. A typical pedon for this series is described at Test Pit # 1. Please see attached test pit logs. Tunbridge soils are a Class C Hydrologic Soil Group. Surface run-off is medium and permeability is moderately high or high throughout the profile. There is no hazard of flooding on these soils. Inclusions within the Tunbridge mapping unit include the Lyman series and the Peru soil series. The limiting factor of the Tunbridge soils for this project will be the depth to ledge. Blasting may be required .

The Lyman soils are classified Loamy, isotic, frigid Lithic Haplorthods by Soil Taxonomy. These soils are somewhat excessively drained , shallow to bedrock and formed in loamy supraglacial till. They occur on the forested upland portions of the parcel. These soils have bedrock between 6 to 19" on this parcel as well as several bedrock outcrops. There is no seasonal water table associated with these soils. They exist on slopes ranging from 3 to 30 % on this site. A typical pedon for this series is described at Test Pit # 4. Please see attached test pit logs. Lyman soils are a Class C/D Hydrologic Soil Group. Surface run-off is very high to high within these map units. Permeability is moderately high to high in the Lyman soils. There is no hazard of flooding with this series. Inclusions within the Lyman map units include the Tunbridge series where bedrock is found 20" or deeper below the mineral surface. The limiting factor of the Lyman soils for this project is depth to bedrock as blasting may be required.

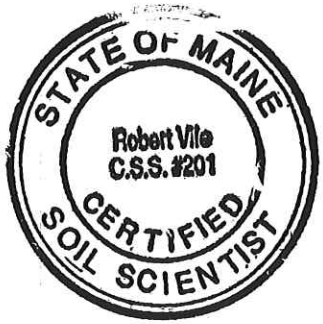
The Brayton soils are classified Loamy, mixed, active, nonacid, frigid, shallow Aeric Endoaquepts by Soil Taxonomy. These soils are deep , poorly drained glacial till found in the lowland depressions on this parcel. Brayton soils are hydric soils and occur within the wetland areas on this parcel. A detailed wetland delineation was previously done by another scientist on this parcel. Seasonal water tables are at the mineral surface and ponding was observed in these wetland areas. Brayton soils occur on 0-3% slopes on this parcel. A typical pedon for this series is described at Test Pit # 12. Please see attached test pit logs. Brayton soils are a Class C Hydrologic Soil Group. Surface run-off is slow to none on this parcel. The areas mapped Brayton have a flooding hazard as ponded water was evident. Inclusions within the Brayton map units may be the somewhat poorly drained Colonel Soil Series and the very poorly drained Peachem Soil Series. The limiting factor of the Brayton soils for this project is the high water table and they are found in the forested wetland areas.

The accompanying soil profile descriptions , soil survey map and this soil narrative report dated June 19, 2017were done in accordance with the standards adopted by the Maine

Association of Professional Soil Scientists and presented in the " Guidelines for Maine Certified Soil Scientists for Soil Identification and Mapping " latest revision and prepared by Robert G Vile jr. " Certified Soil Scientist # 201.
If you have any questions regarding the investigation or the soil survey please feel free to contact me at the above number.

Sincerely,

Robert G. Vile jr.
C.S.S. # 201
L.S.E. S204



FORM F 1/01

SOIL PROFILE / CLASSIFICATION INFORMATION

DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project Name: Perron Lot - Converter Site

Applicant Name: Central Maine Power Co.

Project Location (municipality): Merrill Rd. Lewiston

Exploration Symbol: T.P.#1 ■ Test Pit ☐ Boring

2 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	Fine	Friable	Dark Brown	None
6–12	Sandy		Strong Brown	
12–18	Loam		Yellowish Brown	
18–24				
24–30	27" Bedrock			
30–36				
36–42				
42–48				

soil data by	Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	Groundwater / Restrictive Layer / Bedrock
S.E.	2	A III	5	27	☐ ☐ ■
S.S.	Soil series/phase name: Tunbridge	☐ Hydric ■ Non-hydric	Hydrologic Soil Group: C		

Exploration Symbol: T.P.#2 ■ Test Pit ☐ Boring

2 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	Fine	Friable	Dark Brown	None
6–12	Sandy		Strong Brown	
12–18	Loam		Yellowish Brown	
18–24	Sandy Loam		Light olive Brown	Common distinct
24–30	Gravelly Loamy Sand	Firm		
30–36				
36–42				
42–48				

soil data by	Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	Groundwater / Restrictive Layer / Bedrock
S.E.	3	C		28	■ ☐ ☐
S.S.	Soil series/phase name: Peru	☐ Hydric ■ Non-hydric	Hydrologic Soil Group: C		

Exploration Symbol: T.P.#3 ■ Test Pit ☐ Boring

2 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	Fine	Friable	Dark Brown	None
6–12	Sandy		Strong Brown	
12–18	Loam		Yellowish Brown	
18–24				
24–30	20" Bedrock			
30–36				
36–42				
42–48				

soil data by	Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	Groundwater / Restrictive Layer / Bedrock
S.E.	2	A III		20	☐ ☐ ■
S.S.	Soil series/phase name: Tunbridge	☐ Hydric ■ Non-hydric	Hydrologic Soil Group: C		

Exploration Symbol: T.P.#4 ■ Test Pit ☐ Boring

_____ " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	Fine Sandy Loam	Friable	Reddish Brown	None
6–12				
12–18	6" Bedrock			
18–24				
24–30				
30–36				
36–42				
42–48				

soil data by	Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	Groundwater / Restrictive Layer / Bedrock
S.E.	2	A I		6	☐ ☐ ■
S.S.	Soil series/phase name: Lyman	☐ Hydric ■ Non-hydric	Hydrologic Soil Group: C		

INVESTIGATOR INFORMATION AND SIGNATURE

Signature: Robert G Vile Jr. Date: 6-17-17

Name Printed/typed: Robert G. Vile Jr. Cert/Lic/Reg. # 201

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

STATE OF MAINE — Robert Vile C.S.S. #201 — CERTIFIED SOIL SCIENTIST — affix professional seal

FORM F 1/01

SOIL PROFILE / CLASSIFICATION INFORMATION

DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project Name: Perron Lot - Converter Site

Applicant Name: Central Maine Power Co.

Project Location (municipality): Merrill Rd. Lewiston

Exploration Symbol: T.P.#5 ■ Test Pit ☐ Boring

2" Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	Fine Sandy Loam		Dark Brown	
6–12			Strong Brown	
12–18		Friable	Yellowish Brown	None
18–24	Gravelly Sandy Loam			
24–30				
30–36	Gravelly Loamy Sand	Firm	Light Olive Brown	Common Distinct
36–42				
42–48				

soil data by S.E.: Soil Profile 3; Classification Condition C; Slope ____ Percent; Limiting Factor 27" Depth; ■ Groundwater ☐ Restrictive Layer ☐ Bedrock

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

Exploration Symbol: T.P.#6 ■ Test Pit ☐ Boring

2" Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6			Dark Brown	
6–12	Fine Sandy Loam	Friable	Strong Brown	None
12–18			Yellowish Brown	
18–24				
24–30			Light Olive Brown	Common Distinct
30–36	Gravelly Sandy Loam	Firm		
36–42				
42–48				

soil data by S.E.: Soil Profile 3; Classification Condition C; Slope ____ Percent; Limiting Factor 28" Depth; ■ Groundwater ☐ Restrictive Layer ☐ Bedrock

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

Exploration Symbol: T.P.#7 ■ Test Pit ☐ Boring

2" Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6			Dark Brown	
6–12	Fine Sandy Loam	Friable	Strong Brown	None
12–18			Yellowish Brown	
18–24				
24–30	/	24" Bedrock	/	
30–36		/		
36–42				
42–48				

soil data by S.E.: Soil Profile 2; Classification Condition AIII; Slope ____ Percent; Limiting Factor 24" Depth; ☐ Groundwater ☐ Restrictive Layer ■ Bedrock

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

Exploration Symbol: T.P.# 8 ■ Test Pit ☐ Boring

2" Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6			Dark Yellowish Brown	
6–12	Fine Sandy Loam	Friable	Strong Brown	None
12–18			Yellowish Brown	
18–24				
24–30	/	24" Bedrock	/	
30–36		/		
36–42				
42–48				

soil data by S.E.: Soil Profile 2; Classification Condition AIII; Slope ____ Percent; Limiting Factor 24" Depth; ☐ Groundwater ☐ Restrictive Layer ■ Bedrock

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

INVESTIGATOR INFORMATION AND SIGNATURE

Signature: Robert G Vile jr Date: 6-17-17

Name Printed/typed: Robert G. Vile jr. Cert/Lic/Reg. # 201

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

STATE OF MAINE — Robert Vile C.S.S. #201 — CERTIFIED SOIL SCIENTIST — Professional Seal

FORM F 1/01

SOIL PROFILE / CLASSIFICATION INFORMATION

DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project Name: Perron Lot - Converter Site | Applicant Name: Central Maine Power Co. | Project Location (municipality): Merrill Rd. Lewiston

Exploration Symbol: TP#9 ■ Test Pit ☐ Boring

2 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	Fine Sandy Loam	Friable	Dark Brown	
6–12			Strong Brown	None
12–18	Bedrock			
18–24			4" - 22"	
24–30				
30–36				
36–42				
42–48				

soil data by	Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	Groundwater / Restrictive Layer / Bedrock
S.E.	2	A I		4	☐ ☐ ■
soil data by S.S.	Soil series/phase name: Lyman		☐ Hydric ■ Non-hydric	Hydrologic Soil Group: C/D	

Exploration Symbol: TP#10 ■ Test Pit ☐ Boring

2 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6			Dark Yellowish Brown	
6–12	Fine Sandy Loam		Strong Brown	None
12–18		Friable		
18–24				
24–30	Very Gravelly Loamy Sand		Yellowish Brown	
30–36				
36–42				
42–48			40" Refusal	

soil data by	Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	Groundwater / Restrictive Layer / Bedrock
S.E.	2	A III		40	☐ ☐ ■
soil data by S.S.	Soil series/phase name: Tunbridge		☐ Hydric ■ Non-hydric	Hydrologic Soil Group: C	

Exploration Symbol: TP#11 ■ Test Pit ☐ Boring

2 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	Fine		Dark Brown	
6–12			Strong	
12–18	Sandy Loam	Friable	Brown	None
18–24			Yellowish Brown	
24–30				
30–36	Gravelly Sandy Loam	Firm	Light Olive Brown	Common Faint
36–42				
42–48				

soil data by	Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	Groundwater / Restrictive Layer / Bedrock
S.E.	3	C		30	■ ■ ☐
soil data by S.S.	Soil series/phase name: Peru		☐ Hydric ■ Non-hydric	Hydrologic Soil Group: C	

Exploration Symbol: TB#12 ☐ Test Pit ■ Boring

5 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	Fine		Very Dark Grey	Common Faint
6–12	Sandy	Friable		
12–18			Greyish Brown	Common Distinct
18–24	Loam			
24–30		Firm	Olive	Many Prominent
30–36				
36–42				
42–48				

soil data by	Soil Profile	Classification Condition	Slope Percent	Limiting Factor Depth	Groundwater / Restrictive Layer / Bedrock
S.E.	3	E		0	■ ☐ ☐
soil data by S.S.	Soil series/phase name: Brayton		■ Hydric ☐ Non-hydric	Hydrologic Soil Group: C	

INVESTIGATOR INFORMATION AND SIGNATURE

Signature: Robert G Vile jr | Date: 6-17-17

Name Printed/typed: Robert G. Vile jr. | Cert/Lic/Reg. #: 201

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

STATE OF MAINE — Robert Vile C.S.S. #201 — CERTIFIED SOIL SCIENTIST

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 fri ble 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 TUNBRIDGE VT+MA ME NH NY

Established Series
Rev. RLM-SHG-RFL
01/2016

TUNBRIDGE SERIES

The Tunbridge series consists of moderately deep, well drained soils on glaciated uplands. They formed in loamy supraglacial till. Saturated hydraulic conductivity is moderately high or high throughout the mineral soil. Slope ranges from 0 to 80 percent. Mean annual precipitation is about 1180 mm, and mean annual temperature is about 6 degrees C.

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

TYPICAL PEDON: Tunbridge fine sandy loam, on a west-facing, 58 percent slope under mixed northern hardwoods. (Colors are for moist soil.)

Oe--0 to 8 cm; black (7.5YR 2.5/1) moderately decomposed plant material; many very fine and fine roots; clear wavy boundary.

Oa--8 to 13 cm; black (10YR 2/1) highly decomposed plant material; many very fine and fine and common medium roots; abrupt wavy boundary. (Combined thickness of the O horizons is 0 to 15 cm.)

E--13 to 20 cm; dark gray (10YR 4/1) fine sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; 5 percent gravel and 5 percent cobbles; very strongly acid (pH 4.8); abrupt wavy boundary. (0 to 20 cm thick)

Bhs--20 to 28 cm; dark reddish brown (5YR 2.5/2) fine sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; 10 percent gravel and 2 percent cobbles; very strongly acid (pH 4.8); gradual wavy boundary.

Bs--28 to 66 cm; dark reddish brown (5YR 3/3) and reddish brown (5YR 4/4) fine sandy loam; weak fine subangular blocky structure; friable; common fine, many medium, and common coarse roots; 10 percent gravel and 3 percent cobbles; strongly acid (pH 5.2); abrupt smooth boundary. (Combined thickness of the Bhs and Bs horizons is 10 to 60 cm.)

BC--66 to 71 cm; dark yellowish brown (10YR 3/4) fine sandy loam; weak fine subangular blocky structure; friable; few medium roots; 5 percent gravel; strongly acid (pH 5.4); abrupt wavy boundary. (0 to 40 cm thick)

R--71 cm; granite bedrock.

to bedrock ranges from 50 to 100 cm. Reaction ranges from extremely acid to moderately acid in the solum and from strongly acid to slightly acid in the substratum. Rock fragments range from 5 to 35 percent throughout the mineral soil. They are mostly gravel, channers, and cobbles, but the range includes stones. The weighted average of clay in the particle-size control section is 1 to 10 percent. The silt content in the solum and substratum is typically less than 50 percent. Stony and bouldery phases of the Tunbridge series are recognized.

The O horizons, where present, consist of slightly, intermediately, and/or highly decomposed plant material.

Some pedons have an A or Ap horizon that is neutral or has hue of 5YR to 10YR, value of 2 to 5, and chroma of 0 to 4. It is typically loam, very fine sandy loam, fine sandy loam, or sandy loam in the fine-earth fraction, but the range includes silt loam. It is up to 15 cm thick.

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

Some pedons have a BE horizon that has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 4. Textures are similar to the E horizon.

The Bhs horizon has hue of 5YR to 10YR, with value and chroma of 3 or less.

The Bs horizon has hue of 5YR to 2.5Y, value of 3 or more and chroma of 4 or more.

The BC horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 3 to 8.

The B horizons are typically loam, very fine sandy loam, fine sandy loam, or sandy loam in the fine-earth fraction, but the range includes silt loam. Some BC horizons have a texture of loamy sand.

Some pedons have a C horizon that has hue of 10YR to 5Y, value of 3 to 6, and chroma of 2 to 6. It is typically loam, very fine sandy loam, fine sandy loam, or sandy loam in the fine-earth fraction, but the range includes silt loam and loamy sand. It is up to 45 cm thick.

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

COMPETING SERIES: These are the Bangor, Berkshire, Dekapen, Elliottsville, Groveton, Houghtonville, Penquis, Potsdam, Revel, and Welcome series. Bangor, Berkshire, Dekapen, Groveton, Houghtonville, Potsdam, and Welcome soils have a depth to bedrock greater than 100 cm below the mineral soil surface. Elliottsville soils have a weighted average of more than 10 percent clay in the particle-size control section. Revel soils have a paralithic contact between 50 and 100 cm and average 35 to 65 percent weathered gravel in the

particle-size control section. Penquis soils contain pararock fragments of calcareous metasiltstone and metasandstone, or metalimestone throughout the soil.

GEOGRAPHIC SETTING: Tunbridge soils are on nearly level to very steep glaciated uplands. They are on the tops and sides of hills and mountains. Slope ranges from 0 to 80 percent. The soils formed in loamy supraglacial till of Wisconsin age derived mainly from micaceous schist, gneiss, phyllite, granite, and meta-anorthosite. The mean annual precipitation is 790 to 2420 mm, and the mean annual temperature is -3 to 7 degrees C. The frost-free period is from 60 to 160 days. Elevation ranges from about 2 to 800 meters above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the [illegible], Rawsonville, Marlow, Peru, and Sunapee soils. The very deep to bedrock Becket, Berkshire, Colonel, Marlow, Peru, and Sunapee soils are typically on footslopes and backslopes in lower positions than nearby Tunbridge soils. Additionally, Becket, Colonel, Marlow, and Peru soils formed in loamy lodgment till. Rawsonville soils are in positions similar to Tunbridge soils and have 6 percent or more organic carbon in a layer 10 cm or more thick within the spodic horizon. Tunbridge soils are often closely intermingled with shallow Lyman soils in places where local relief is controlled by the underlying bedrock.

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

USE AND VEGETATION: Most areas are wooded. The common trees are American beech, white ash, yellow birch, paper birch, northern red oak, sugar maple, eastern white pine, eastern hemlock, red spruce, white spruce, and balsam fir. Some areas have been cleared and are primarily used for hay and pasture. A few cleared areas are used for cultivated crops.

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

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

SERIES ESTABLISHED: Orange County, Vermont, 1975.

REMARKS: 1. Tunbridge is the official State Soil of Vermont.

2. Albic horizons may be difficult to locate because tree throws and other disturbances have destroyed them in many areas of Tunbridge soils. Albic horizons are often thin, may be discontinuous, and located within 10 cm of the soil surface.

3. The use of the Tunbridge series in MLRA 144A is in question. Tunbridge has a frigid temperature regime which is not typical in 144A.

4. The diagnostic horizons and features recognized in this pedon are:
a. Ochric epipedon - the zone from 0 to 20 cm (Oe, Oa, E horizons).
b. Albic horizon - the zone from 13 to 20 cm (E horizon).

c. Spodic horizon - the zone from 20 to 66 cm (Bhs, Bs horizons).

ADDITIONAL DATA: Laboratory characterization data for Tunbridge 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 LYMAN MA+ME NH NY VT

Established Series
Rev. WHT-CAW-RFL-GWS
02/2016

LYMAN SERIES

The Lyman series consists of shallow, somewhat excessively drained soils on glaciated uplands. They formed in loamy supraglacial till. Estimated saturated hydraulic conductivity is moderately high or high throughout the mineral soil. Slope ranges from 0 to 80 percent. Mean annual precipitation is about 1175 mm, and mean annual temperature is about 5 degrees C.

TAXONOMIC CLASS: Loamy, isotic, frigid Lithic Haplorthods

TYPICAL PEDON: Lyman loam, on a northwest facing, 55 percent slope in a very rocky forested area. (Colors are for moist soil.)

Oe --0 to 3 cm; moderately decomposed plant material. (O horizon thickness is 0 to 15 cm.)

A--3 to 8 cm; black (N 2/0) loam; weak fine granular structure; very friable; many fine and medium roots; extremely acid; abrupt wavy boundary. (0 to 10 cm thick)

E--8 to 13 cm; reddish gray (5YR 5/2) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; 10 percent gravel; extremely acid; abrupt broken boundary. (0 to 25 cm thick)

Bhs--13 to 18 cm; very dusky red (2.5YR 2.5/2) loam; weak fine granular structure; friable; many fine and medium roots; 10 percent fine gravel; extremely acid; abrupt broken boundary.

Bs1--18 to 28 cm; dark red (2.5YR 3/6) loam; weak fine and medium granular structure; friable; many fine and medium roots; 10 percent fine gravel; few mica flakes; very strongly acid; clear wavy boundary.

Bs2--28 to 46 cm; brown (7.5YR 4/4) grading with depth to brown (10YR 5/3) channery loam; weak coarse subangular blocky structure parting to medium and fine granular; friable; many fine and medium roots; 15 percent channers of schist and quartzite; common flakes of mica; very strongly acid; abrupt smooth boundary. (Combined thickness of the Bhs and Bs horizons is 10 to 43 cm.)

R--46 cm; dark gray mica schist bedrock.

TYPE LOCATION: Franklin County, Massachusetts; Town of Monroe; located about 550 meters west southwest of the village of Monroe Bridge and about 55 meters south of the Deerfield River; USGS Rowe, MA topographic quadrangle; lat. 42 degrees 43 minutes 12.53 seconds N. and long. 72 degrees 56 minutes 52.71

seconds W., NAD 83.

RANGE IN CHARACTERISTICS: The thickness of the mineral solum ranges from 25 to 50 cm, and corresponds to the depth to bedrock. The weighted average of clay in the particle-size control section is 1 to 10 percent. Reaction ranges from moderately acid to extremely acid throughout, unless limed. Rock fragments range from 0 to 35 percent throughout the mineral soil. They are mostly gravel and channers, but the range includes cobbles and stones.

Some pedons have Oi, Oe, and/or Oa horizons that consist of slightly, moderately, or highly decomposed organic material, respectively.

The A horizon is neutral or has hue of 5YR to10YR, value of 2, 2.5, or 3, and chroma of 0 t0 2. Some pedons have an Ap horizon with value and chroma of 2 to 4. Ap horizons are typically 15 cm or more thick. The A or Ap horizon is sandy loam, fine sandy loam, very fine sandy loam, loam, or silt loam in the fine-earth fraction.

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

The Bhs horizon has hue of 2.5YR to 10YR, with 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.

Some pedons have a BC horizon with hue of 10YR to 5Y, value of 3 to 5, and chroma of 3 or 4. Texture of the B and BC horizons is sandy loam, fine sandy loam, very fine sandy loam, loam or silt loam in the fine-earth fraction. Some pedons have a loamy sand BC horizon.

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

COMPETING SERIES: These are the , , and series. Abram soils have bedrock at a depth of less than 25 cm from the mineral soil surface. Creasey soils have sandstone or conglomerate bedrock. Monson soils average more than 10 percent clay in the particle-size control section.

GEOGRAPHIC SETTING: Lyman soils are on nearly level to very steep glaciated uplands. They are on the tops and sides of hills and mountains. Slope ranges from 0 to 80 percent. The soils formed in loamy supraglacial till of Wisconsin age derived mainly from micaceous schist, gneiss, phyllite, and granite. The mean annual precipitation is 790 to 2420 mm, and the mean annual temperature is -3 to 9 degrees C. The frost-free period is from 60 to 160 days. Elevation ranges from about 2 to 800 meters above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the , , , , Marlow, Peru, Skerry, Sunapee, and Tunbridge soils. The very deep to bedrock Becket, Berkshire, Colonel, Marlow, Peru, Skerry, and Sunapee soils are typically on footslopes and backslopes in lower positions than nearby Lyman soils. In addition, Becket, Colonel, Marlow, Peru, and Skerry soils are formed in loamy lodgment till. Hogback soils are in positions similar to Lyman soils and have 6 percent or more organic carbon in a layer 10 cm or more thick within the spodic horizon. Lyman soils are often closely intermingled with the moderately deep Tunbridge soils in places where local relief is controlled by the underlying bedrock.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Somewhat excessively drained. Potential runoff is very high. Estimated saturated hydraulic conductivity is moderately high or high in the mineral soil.

USE AND VEGETATION: Most areas are wooded. The common trees are American beech, white ash, yellow birch, paper birch, northern red oak, sugar maple, eastern white pine, eastern hemlock, red spruce, white spruce, and balsam fir. Some areas have been cleared and are primarily used for hay and pasture. A few cleared areas are used for cultivated crops.

DISTRIBUTION AND EXTENT: Northern New England, western Massachusetts, and northern New York. Principally in the Green and White Mountains, the Adirondack Mountains, the Berkshire uplands, and eastern and western Maine. MLRAs 143, 144A, and 144B. The series is extensive.

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

SERIES ESTABLISHED: Grafton County, New Hampshire, 1935.

REMARKS: 1. The use of the Lyman series in MLRA 144A is in question. Lyman has a frigid temperature regime which is not typical in 144A.

2. Diagnostic horizons and features recognized in this pedon are:
a. Ochric epipedon - the zone from 0 to 13 cm (Oe, A, and E horizons).
b. Albic horizon - the zone from 8 to 13 cm (E horizon).
c. Spodic horizon - the zone from 13 to 46 cm (Bhs, Bs1, and Bs2 horizons).
d. Lithic feature - bedrock at 43 cm from the mineral soil surface.

ADDITIONAL DATA: Characterization data for Lyman 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 BRAYTON ME+CT MA NY VT

Established Series
Rev. KJL-DEW-ANA
09/2013

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 [illegible] 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, Dixfield, Fullam, Hubbardton, Lyman, Macomber, Marlow, Peru, Skerry, Taconic, Tunbridge, and Peacham soils. The Colonel, Dixfield, 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.

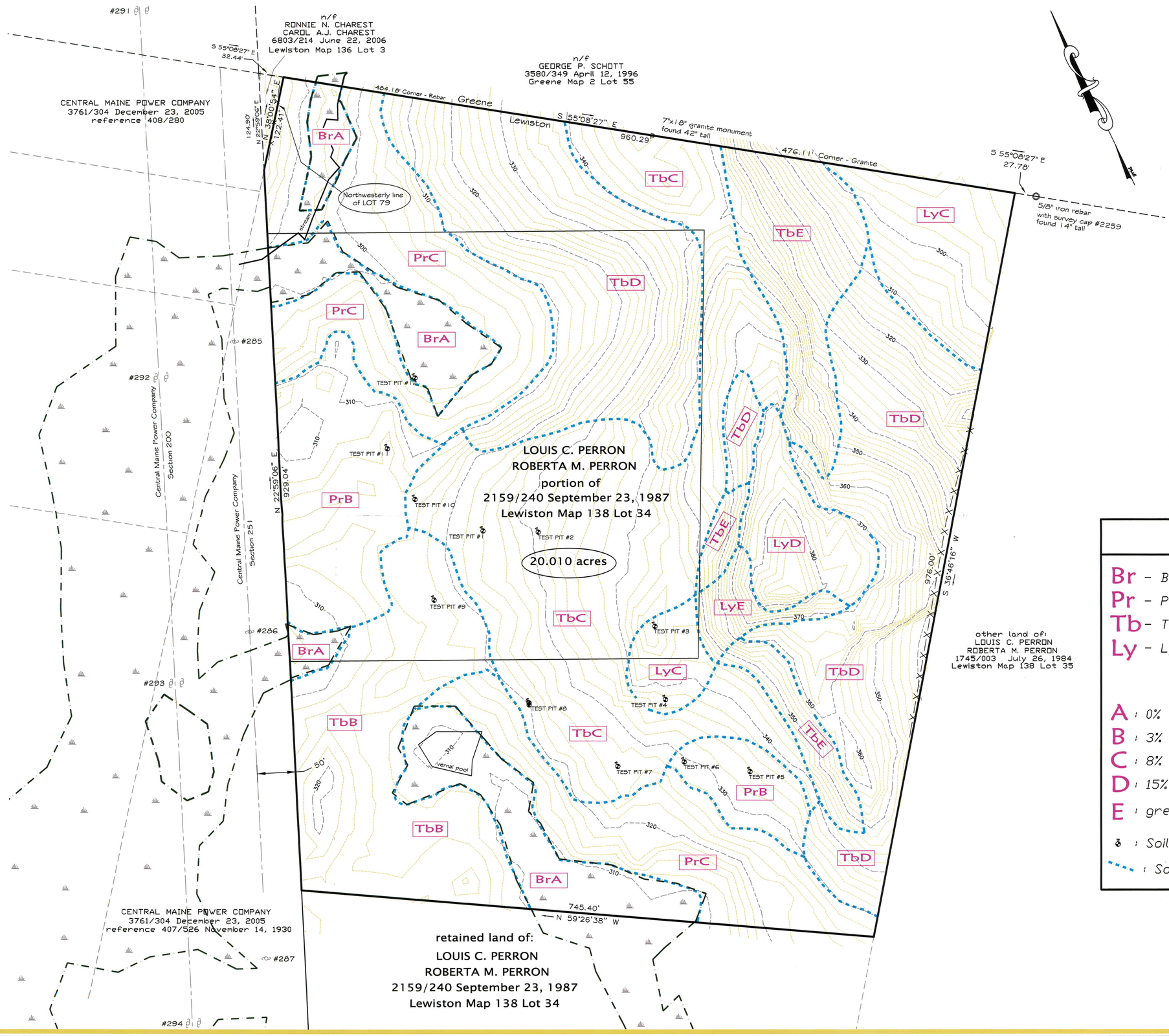
Diagnostic horizons and features recognized in this pedon include:
1. Ochric epipedon - the zone from 0 to 18 cm (Oi, Oa and A horizons).
2. Cambic horizon - the zone from 25 to 58 cm (Bg and BC horizons).
3. Densic contact - very firm, dense basal till at a depth of 58 cm.
4. Aeric Feature - both value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



ROBERT VILE SOIL CONSULTING, INC.
P.O. BOX 114 DIXMONT, MAINE 04932

CLASS B HIGH INTENSITY SOIL SURVEY

FOR:

CENTRAL MAINE POWER COMPANY

"PERRON PARCEL"

LOCATION: northerly of MERRILL ROAD
LEWISTON, ANDROSCOGGIN COUNTY, MAINE

FIELD SURVEY: ROBERT VILE	JUNE 12, 2017
CERTIFIED SOIL SCIENTIST #201	SCALE 1"=60'

GRAPHIC SCALE

60 0 30 60 120 240

(IN FEET)
1 inch = 60 ft.

LEGEND

- = 3/4" IRON REBAR SET WITH RED PLASTIC CAP INSCRIBED S.W. GOULD PLS 2318 (unless otherwise noted).
- = INTERMEDIATE CONTOUR (NAVD88 FEET)
- = INDEX CONTOUR (NAVD88 FEET)
- = WETLAND BOUNDARY
- = WETLAND

NOTES

NOTE...1 BOUNDARY SURVEY AND TOPOGRAPHIC INFORMATION PROVIDED BY SACKETT & BRAKE SURVEY, INC.

NOTE...2 WETLAND LOCATION WAS PROVIDED BY CENTRAL MAINE POWER COMPANY

SOILS LEGEND

- Br - Brayton Series - Poorly Drained
- Pr - Peru Series - Moderatly Well Drained
- Tb - Tunbridge Series - Well Drained
- Ly - Lyman Series - Somewhat Excessively Drained

Slope Phases

- A : 0% TO 3% Slope
- B : 3% to 8% Slope
- C : 8% to 15% Slope
- D : 15% to 25% Slope
- E : greater than 25% Slope
- : Soil Test Pit
- : Soil Boundary

Tb/C
Soil Series / Slope Phase

STATE OF MAINE
Robert Vile
C.S.S. #201
CERTIFIED SOIL SCIENTIST

ROBERT VILE
CSS#201
2017085-SOILS

Exhibit 11-2: Merrill Road Converter Station Soil Suitability Findings Letter

Robert Vile
Licensed Site Evaluator
Certified Soil Scientist

P.O. Box 114, Cates Rd.
Dixmont, ME 04932

Telephone:
(207)234-2451

Date: August 11, 2017

To: Sackett & Brake Survey, Inc.
P.O. Box 207
Skowhegan, Me. 04976

Re: Soil Suitability for the proposed CMP Converter site off the Merrill Rd. in Lewiston, Me.

Findings: On June 2, and June 14, 2017 I conducted a Class B High Intensity Soil Survey on the above captioned parcel. Four different Soil Series were identified on the parcel. The Peru soils are moderately well drained glacial till soils and I would consider them excellent for the proposed development. The Tunbridge and Lyman soils are shallow to moderately deep to bedrock. Because of the natural slopes found on the parcel it will be largely a cut and fill site. The shallow to ledge areas will require some blasting but will produce some excellent material to fill the lower areas. The wetland areas on the parcel contained the Brayton soil series. These are poorly drained till soils and will require proper permitting if they are to be filled.
If you have any questions regarding the investigation please feel free to contact me at the above number.

Sincerely,

Robert G. Vile jr.
C.S.S. # 201
L.S.E. S204

Exhibit 11-3: Fickett Road Substation Class B High Intensity Soil Survey

Class B High Intensity Soil Survey

For

Central Maine Power Company Proposed Substation

Fickett Rd. & Allen Rd.
Pownal, ME

Soil Survey completed by Robert Vile Soil Consulting Inc

June 19, 2017

Robert Vile
Licensed Site Evaluator
Certified Soil Scientist

P.O. Box 114, Cates Rd.
Dixmont, ME 04932

Telephone:
(207)234-2451

Date: June 19, 2017

To: Sackett & Brake Survey, Inc.
P.O. Box 207
Skowhegan, Me. 04976

Re: Class B High Intensity Soil Survey of a +- 10 acre parcel of land located off the Fickett and Allen roads in Pownal Maine for a Central Maine Power Company Quebec-Maine Interconnect Surdwiec Substation..

Findings: On June 2.and June 14, 2014 I investigated the above captioned parcel. The purpose of the investigation was to conduct a Class B High Intensity Soil of the property. Soils were described by backhoe excavated test pits to a depth of four feet and many soil auger borings throughout the parcel. The soil test pit locations as well as a two foot contour map at a scale of 1"=50' were provided by Sackett & Brake Survey, Inc. This soil survey was conducted for the use in the planning of a Central Maine Power Substation. This Class B High Intensity Soil Survey was mapped following these minimum standards described in Guidelines For Maine Certified Soil Scientists For Soil Identification And Mapping:
Class B (High Inttensity)

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.
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.

Three Soil Series were identified on the parcel. Peru, Lamoine, and Scantic soil series. The Peru soils are classified as Coarse-loamy, isotic, frigid Aquic Hapllorthods by Soil Taxonomy. These soils are moderately well drained soils that formed in lodgment till on the upland portions of this parcel. Peru soils are deeper than 48" to bedrock These soils are found on two separate wooded knowls on this property with slopes ranging from 3 to 20%. Several huge boulders are common in these areas as well. Firm basil till was found between 20 to 30 inches below the mineral surface. Seasonal water table depths were found 17 to 24 inches below the surface . A typical pedon for this series is described at

Test Pit # 3. Please see attached test pit logs. Peru soils are a Class C Hydrologic Soil Group. Surface run-off is medium and permeability is moderate in the upper horizons and moderately slow in the lower horizons. There is very little hazard to flooding in the areas mapped Peru on this parcel. Inclusions within the mapping units may include the Tunbridge Soil Series which will have bedrock between 20 to 48 inches. Also Lamoine soils may be inclusions within the soil units mapped. The Peru soils will have a very little negative impact on the proposed development of a substation.

The Lamoine soils are classified as Fine, illitic, nonacid, frigid Aeric Epiaquepts by Soil Taxonomy. These soils are very deep, somewhat poorly drained soils formed in glaciolacustrine or glaciomarine deposits found on the flat to gently sloping portions of the property. Lamoine soils on this parcel have firm silt loam to silty clay sub horizons that occur between 14 to 20 inches below the mineral surface. A small portion of the Lamoine soils were found within the woodline but most occur in the dryer parts of the field area on this site. Seasonal water tables were observed in the test pits between 7 to 9 inches below the mineral surface. A typical pedon of the Lamoine series was described at test pit # 10. Please see attached test pit logs. Lamoine soils are a Class D Hydrologic Soil Group. Surface Run-off is medium and permeability is moderate or moderately slow in the surface horizon, moderately slow or slow in the upper part of the subsoil , and slow or very slow in the lower part of the subsoil. The Lamoine soils on this lot are found on 0-3% slopes. There is little hazard of flooding on the Lamoine soils. Inclusions within the map units may include the Scantic or Peru series. The Lamoine soils are not hydric soils however the high seasonal water table and silty clay subsoil are not optimum for development on this parcel.

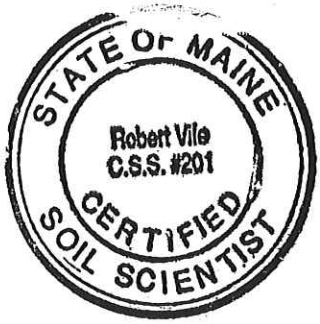
The lower elevations and largest areas on the parcel were found to consist of the Scantic Soil Series. The Scantic soils are classified as Fine, illitic, nonacid, frigid Typic Epiaquepts by Soil Taxonomy. These soils are very deep , poorly drained soils formed in glaciomarine or glaciolacustrine deposits on the lowland / wetland portions of the property. The slopes that the Scantic soils were found on the lot were 0-3 %. These soils have silt loam upper horizons underlain by firm silty clay loam to silty clay subsoil. The seasonal water table is at the mineral surface and ponding of surface water was identified in a portion of the map unit. A typical pedon for this series was described at test pit # 5. Please see attached test pit logs. Scantic soils are hydric soils and usually associated with wetlands. This parcel was previously wetland delineated by another scientist. The Scantic soils are a Class D Hydrologic Soil Group. Surface Run-off slow on this parcel. Permeability is moderately slow in the upper horizons and slow in the lower horizons. Flooding is possible on the Scantic soils as standing water was evident the day of the investigation. Inclusions within the Scantic map unit is the Lamoine soil series. The poorly drained Scantic soils are not optimum for this development and may be associated with the wetlands on the parcel.

The accompanying soil profile descriptions , soil survey map and this soil narrative report dated June 19, 2017were done in accordance with the standards adopted by the Maine Association of Professional Soil Scientists and presented in the " Guidelines for Maine Certified Soil Scientists for Soil Identification and Mapping " latest revision and prepared by Robert G Vile jr. " Certified Soil Scientist # 201.

If you have any questions regarding the investigation or the soil survey please feel free to contact me at the above number.

Sincerely,

Robert G. Vile jr.
C.S.S. # 201
L.S.E. S204



FORM F 1/01

SOIL PROFILE / CLASSIFICATION INFORMATION

DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project Name: Quebec – Maine Interconnect Surdwicc Substation | Applicant Name: Central Maine Power Co | Project Location (municipality): Fickett + Allen Rd. Pownal

Exploration Symbol: TP #1 ■ Test Pit ☐ Boring

0 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)

Depth	Texture	Consistency	Color	Mottling
0				
6	Silt Loam	Friable	Dark Brown	None
12			Light olive Brown	Common Distinct
18				
24	Silty Clay Loam	Firm	Light olive Grey	many prominent
30			olive Grey	
36				
42				
48				

soil data by S.E.: Soil Profile 9 | Classification Condition E | Slope Percent | Limiting Factor 8 Depth | ■ Groundwater ☐ Restrictive Layer ☐ Bedrock

soil data by S.S.: Soil series/phase name: Lamoine | ☐ Hydric ■ Non-hydric | Hydrologic Soil Group D

Exploration Symbol: TP #2 ■ Test Pit ☐ Boring

2 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)

Depth	Texture	Consistency	Color	Mottling
0				
6			Dark Yellowish Brown	
12	Fine Sandy Loam	Friable	Yellowish Brown	None
18				
24	Sandy Loam	Firm	Light olive Brown	common Distinct
30			olive Brown	
36				
42				
48				

soil data by S.E.: Soil Profile 3 | Classification Condition C | Slope Percent | Limiting Factor 13 Depth | ■ Groundwater ☐ Restrictive Layer ☐ Bedrock

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

Exploration Symbol: TP #3 ■ Test Pit ☐ Boring

2 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)

Depth	Texture	Consistency	Color	Mottling
0				
6			Dark Yellowish Brown	
12	Fine Sandy Loam	Friable	Strong Brown Yellowish Brown	None
18				
24	gravelly Sandy Loam	Firm	Light olive Brown	common Distinct
30				
36				
42				
48	144" Refusal		possible	Ledge

soil data by S.E.: Soil Profile 3 | Classification Condition C/D | Slope Percent | Limiting Factor 18 Depth | ● Groundwater ☐ Restrictive Layer ☐ Bedrock

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

Exploration Symbol: TP #4 ■ Test Pit ☐ Boring

0 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)

Depth	Texture	Consistency	Color	Mottling
0				
6	Silt Loam	Friable	Dark Brown	None
12				
18			light olive Brown	common distinct
24				
30	Silty Clay Loam	Firm	olive Grey	many prominent
36				
42				
48				

soil data by S.E.: Soil Profile 9 | Classification Condition D | Slope Percent | Limiting Factor 9 Depth | ■ Groundwater ☐ Restrictive Layer ☐ Bedrock

soil data by S.S.: Soil series/phase name: Lamoine | ☐ Hydric ■ Non-hydric | Hydrologic Soil Group D

INVESTIGATOR INFORMATION AND SIGNATURE

Signature: Robert G Vile | Date: 6-17-17

Name Printed/typed: Robert G. Vile jr. | Cert/Lic/Reg. # 201

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

STATE OF MAINE — Robert Vile C.S.S. #201 — CERTIFIED SOIL SCIENTIST

DEP Form F Rev. 1/01

FORM F 1/01

SOIL PROFILE / CLASSIFICATION INFORMATION

DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project Name: Quebec – Maine Interconnect Surdwicc Substation | Applicant Name: Central Maine Power Co | Project Location (municipality): Fickett + Allen Rd. Pownal

Exploration Symbol: T.P.#5 ■ Test Pit ☐ Boring

1 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)

	Texture	Consistency	Color	Mottling
0–6	Silt Loam	Friable	Dark Greyish Brown	Common Distinct
6–12			Olive	Many
12–18	Silty Clay Loam	Firm	Gray	Prominent
18–24				
24–30	Silty Clay	Very Firm	Light olive gray	
30–42				
42–48				

soil data by S.E.: Soil Profile 9 | Classification Condition E | Slope Percent | Limiting Factor 0 Depth | ■ Groundwater ☐ Restrictive Layer ☐ Bedrock

soil data by S.S.: Soil series/phase name: Scantic | ■ Hydric ☐ Non-hydric | Hydrologic Soil Group D

Exploration Symbol: T.P.#6 ■ Test Pit ☐ Boring

1 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)

	Texture	Consistency	Color	Mottling
0–6	Silt Loam	Friable	Dark Brown	None
6–12			Dark greyish Brown	Common Distinct
12–18	Silty Clay Loam	Firm	Olive	Many
18–24				Prominent
24–30	Silty Clay	Very Firm	Gray	
30–42				
42–48				

soil data by S.E.: Soil Profile 9 | Classification Condition E | Slope Percent | Limiting Factor 6 Depth | ■ Groundwater ☐ Restrictive Layer ☐ Bedrock

soil data by S.S.: Soil series/phase name: Scantic | ■ Hydric ☐ Non-hydric | Hydrologic Soil Group D

Exploration Symbol: T.P.#7 ■ Test Pit ☐ Boring

0 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)

	Texture	Consistency	Color	Mottling
0–6	Silt Loam	Friable	Brown	None
6–12			Light olive Brown	Common Distinct
12–18	Silty Clay Loam	Firm	light olive gray	Many Prominent
18–24				
24–30	Silty Clay	Very Firm	olive Gray	
30–36				
36–42				
42–48				

soil data by S.E.: Soil Profile 9 | Classification Condition E | Slope Percent | Limiting Factor 7 Depth | ■ Groundwater ☐ Restrictive Layer ☐ Bedrock

soil data by S.S.: Soil series/phase name: Lamoine | ☐ Hydric ■ Non-hydric | Hydrologic Soil Group D

Exploration Symbol: T.P.#8 ■ Test Pit ☐ Boring

2 " Organic horizon thickness Ground surface elev. _____

Depth below mineral soil surface (inches)

	Texture	Consistency	Color	Mottling
0–6	Fine Sandy Loam	Friable	Dark Yellowish Brown	None
6–12			Yellowish Brown	
12–18			Brown	
18–24				
24–30			Light olive Brown	Common Faint
30–36	gravelly Sandy Loam	Firm		
36–42				
42–48				

soil data by S.E.: Soil Profile 3 | Classification Condition C | Slope Percent | Limiting Factor 24 Depth | ■ Groundwater ☐ Restrictive Layer ☐ Bedrock

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

INVESTIGATOR INFORMATION AND SIGNATURE

Signature: Robert G Vile jr | Date: 6-17-17

Name Printed/typed: Robert G. Vile jr. | Cert/Lic/Reg. # 201

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

STATE OF MAINE — Robert Vile C.S.S. #201 — CERTIFIED SOIL SCIENTIST

affix professional seal

FORM F 1/01

SOIL PROFILE / CLASSIFICATION INFORMATION

DETAILED DESCRIPTION OF SUBSURFACE CONDITIONS AT PROJECT SITES

Project Name: Quebec – Maine Interconnect Surdwicc Substation | Applicant Name: Central Maine Power Co | Project Location (municipality): Fickett + Allen Rd. Pownal

Exploration Symbol: TP #9 ■ Test Pit ☐ Boring

0 " Organic horizon thickness | Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	Silt Loam	Friable	Dark Grayish Brown	None
6–12				Common Distinct
12–18	Silty Clay Loam	Firm	Light olive gray	many
18–24				Prominent
24–30	Silty Clay	Very Firm	olive gray	
30–42				
42–48				

soil data by S.E.: Soil Profile 9 | Classification Condition E | Slope Percent | Limiting Factor 5 Depth | ■ Groundwater ☐ Restrictive Layer ☐ Bedrock

soil data by S.S.: Soil series/phase name: Scantic | ■ Hydric ☐ Non-hydric | Hydrologic Soil Group D

Exploration Symbol: TP #10 ■ Test Pit ☐ Boring

0 " Organic horizon thickness | Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	Silt Loam	Friable	Dark Brown	None
6–12				
12–18	Silty Clay Loam	Firm	Light olive brown	common Distinct
18–24			olive gray	many prominent
24–30	Silty Clay	Very Firm		
30–42				
42–48				

soil data by S.E.: Soil Profile 9 | Classification Condition D | Slope Percent | Limiting Factor 9 Depth | ■ Groundwater ☐ Restrictive Layer ☐ Bedrock

soil data by S.S.: Soil series/phase name: Lamoine | ☐ Hydric ■ Non-hydric | Hydrologic Soil Group D

Exploration Symbol: TP #11 ■ Test Pit ☐ Boring

0 " Organic horizon thickness | Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6	Silt Loam	Friable	Dark Brown	None
6–12			Light olive Brown	common Distinct
12–18	Silty Clay Loam	Firm	Light olive gray	many
18–24				Prominent
24–30	Silty Clay	Very Firm	olive gray	
30–36				
36–42				
42–48				

soil data by S.E.: Soil Profile 9 | Classification Condition E | Slope Percent | Limiting Factor 3 Depth | ■ Groundwater ☐ Restrictive Layer ☐ Bedrock

soil data by S.S.: Soil series/phase name: Scantic | ■ Hydric ☐ Non-hydric | Hydrologic Soil Group D

Exploration Symbol: _____ ☐ Test Pit ☐ Boring

_____ " Organic horizon thickness | Ground surface elev. _____

Depth below mineral soil surface (inches)	Texture	Consistency	Color	Mottling
0–6				
6–12				
12–18				
18–24				
24–30				
30–36				
36–42				
42–48				

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

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

INVESTIGATOR INFORMATION AND SIGNATURE

Signature: Robert G Vile Jr | Date: 6-17-17

Name Printed/typed: Robert G. Vile Jr. | Cert/Lic/Reg. # 201

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

MAINE Robert Vile C.S.S. #201 CERTIFIED SOIL SCIENTIST

affix professional seal

DEP Form F Rev. 1/01

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 fri ble 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 LAMOINE ME+MA VT

Established Series
Rev. GBJ-PAH-WDH-NRB
04/2016

LAMOINE SERIES

The Lamoine series consists of very deep, somewhat poorly drained soils formed in glaciolacustrine or glaciomarine deposits on coastal lowlands and river valleys. Slope ranges from 0 to 15 percent. Permeability is moderate or moderately slow in the surface horizon, moderately slow or slow in the upper part of the subsoil, and slow or very slow in the lower part of the subsoil and in the substratum. Mean annual temperature is about 7 degrees C, and mean annual precipitation is about 1118 mm at the type location.

TAXONOMIC CLASS: Fine, illitic, nonacid, frigid Aeric Epiaquepts

TYPICAL PEDON: Lamoine silt loam, on a 3 percent slope in an abandoned hayfield. (Colors are for moist soil unless otherwise noted.)

Ap--0 to 18 cm; dark brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many very fine and common fine roots; moderately acid; abrupt smooth boundary. (13 to 31 cm thick)

Bw1--18 to 23 cm; light olive brown (2.5Y 5/4) silt loam; weak fine granular structure; friable; many very fine and few fine roots; few fine prominent light olive gray (5Y 6/2) iron depletions, and common fine and medium distinct olive (5Y 5/3) and common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation; moderately acid; abrupt wavy boundary.

Bw2--23 to 30 cm; light yellowish brown (2.5Y 6/4) silt loam; weak very fine subangular blocky structure; friable; many very fine roots; common fine prominent yellowish red (5YR 5/6) masses of iron accumulation, and common medium prominent light olive gray (5Y 6/2) iron depletions; olive (5Y 5/3) faces of peds; moderately acid; abrupt wavy boundary.

Bw3--30 to 43 cm; light olive brown (2.5Y 5/4) silty clay loam; moderate very fine and fine subangular blocky structure; firm; common very fine roots between peds; few medium prominent yellowish red (5YR 5/6) masses of iron accumulation, and common medium prominent gray (5Y 6/1) and many coarse prominent light olive gray (5Y 6/2) iron depletions; light olive gray (5Y 6/2) faces of peds; few prominent dark reddish brown (5YR 2/2) manganese coats on faces of peds; moderately acid; clear wavy boundary. (Combined thickness of the Bw horizons is 23 to 71 cm.)

BCg--43 to 53 cm; olive (5Y 4/3) silty clay loam; strong very coarse prismatic structure parting to weak thin and medium platy; firm; few very fine roots between peds; common medium faint olive gray (5Y 5/2) iron

manganese coats on faces of peds within prisms; common fine prominent yellowish brown (10YR 5/6) masses of iron accumulations associated with the manganese coats; neutral; gradual wavy boundary.

Cg2--81 to 127 cm; olive (5Y 5/3) silty clay; weak thin platy structure; firm; common coarse distinct gray (5Y 5/1) iron depletions and common coarse prominent yellowish brown (10YR 5/6) masses of iron accumulation; olive gray (5Y 5/2) faces of peds; many prominent black (5YR 2/1) manganese coats on faces of peds; common fine prominent yellowish brown (10YR 5/6) masses of iron accumulations associated with the manganese coats; neutral; diffuse wavy boundary.

Cg3--127 to 165 cm; olive (5Y 5/3) silty clay; weak thin platy structure; firm; common medium faint olive gray (5Y 5/2) iron depletions; olive (5Y 4/3) faces of peds; many prominent black (5YR 2/1) manganese coats on faces of peds; common fine prominent yellowish brown (10YR 5/6) masses of iron accumulations associated with the manganese coats; neutral.

TYPE LOCATION: Hancock County, Maine; City of Ellsworth; west of Union River, 1,300 feet north of junction of U.S. Route 1A and Gilpatrick Brook, in an abandoned hayfield between a gravel road and the railroad track; USGS Ellsworth topographic quadrangle; lat. 44 degrees 34 minutes 25 seconds N. and long. 68 degrees 27 minutes and 24 seconds W., NAD 27.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 41 to 140 cm. Depth to bedrock is more than 152 cm. Rock fragment content throughout the soil is less than 5 percent by volume. Stones cover from 0 to 3 percent of the surface. Reaction ranges from very strongly acid to slightly acid in the surface, unless limed, from strongly acid to neutral in the subsoil, and from moderately acid to neutral in the substratum.

Some pedons have an O horizon.

The Ap horizon has hue of 10YR or 2.5Y, with value and chroma of 2 to 4. Undisturbed areas have an A horizon 3 to 15 cm thick, that has hue of 10YR or 2.5Y, value of 2 to 4 and chroma of 1 to 4. They are silt loam or silty clay loam. They have moderate or strong, very fine to medium granular structure. Consistence is very friable or friable.

The B horizon has hue of 10YR to 5Y, value of 3 to 7 and chroma of 2 to 6. It is silt loam, silty clay loam, or silty clay. It has weak to strong, fine or medium granular, very fine to coarse subangular blocky, or medium or thick platy structure, or has primary structure that is coarse or very coarse prismatic. Consistence is friable or firm.

The BC horizon has hue of 2.5Y or 5Y, value of 4 to 6 and chroma of 1 to 4. It is silt loam, silty clay loam or

silty clay. It has blocky or platy structure or has primary structure that is prismatic. Consistence is firm or very firm.

The C horizon has hue of 2.5Y or 5Y or is neutral, value of 3 to 6 and chroma of 1 to 4. It is silty clay loam, silty clay, or clay. It has blocky, platy, or prismatic structure, all of which are considered inherited, or the horizon is massive. Consistence is firm or very firm. Common or many black to dark reddish brown oxide coats are on faces of peds. Some pedons have films on faces of peds that appear to be fine silt.

COMPETING SERIES: There are currently no other series in the same family. The [illegible], [illegible] and Swanville series are similar soils in related families. Roundabout soils have a coarse-silty particle-size class. Swanton soils have a coarse-loamy over clayey particle-size class, and Swanville soils have a fine-silty particle-size class.

GEOGRAPHIC SETTING: Lamoine soils are on coastal lowlands and river valleys. Slope ranges from 0 to 15 percent. The soils formed in medium, moderately fine and fine textured glaciolacustrine or glaciomarine sediments. The climate is humid and cool temperate. The mean annual precipitation ranges from 864 to 1219 mm, and mean annual temperature ranges from 6 to 8 degrees C. The frost-free season ranges from 90 to 160 days. Elevation ranges from 2 to 274 meters above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Biddeford, Boothbay, Buxton, Scantic, and Swanville soils. The very poorly drained Biddeford soils are in depressions on the landscape. The moderately well or somewhat poorly drained Boothbay soils are in similar and higher positions on the landscape and have a fine-silty particle-size class. The moderately well drained Buxton soils are in higher positions on the landscape. The poorly drained Scantic and Swanville soils are in lower positions on the landscape.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Somewhat poorly drained. Surface runoff is medium. Saturated hydraulic conductivity is moderately high in the surface horizon, moderately low to moderately high throughout the remainder of the solum, and low to moderately low in the substratum.

USE AND VEGETATION: Cleared areas are used mainly for hay or pasture. The remaining areas are forested. Common tree species include eastern white pine, balsam fir, red spruce, white spruce, eastern hemlock, red maple, yellow birch, gray birch, paper birch, sugar maple, alders and aspen.

DISTRIBUTION AND EXTENT: Maine and Vermont. (MLRAs 142, 143, 144A, 144B and 145) The series is of large extent.

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

SERIES ESTABLISHED: Hancock County, Maine, 1988.

REMARKS: 1. This revision reflects a change in classification from Aeric Haplaquepts to Aeric Epiaquepts to conform with Keys to Taxonomy, sixth edition, 1994.
2. Some soils formerly mapped as Buxton will now be included with the Lamoine series.
3. Some pedons have been described with a bisequum profile.
4. Diagnostic horizons and features recognized in this pedon are:

a. Ochric epipedon - the zone from 0 to 18 cm (Ap horizon).
b. Cambic horizon - the zone from 18 to 43 cm (Bw1, Bw2, and Bw3 horizons).
c. Aeric feature - matrix with chroma of 3 or more between the A or Ap horizon and 76 cm.
d. Aquic conditions-Redoximorphic features at 18 cm.
e. Episaturation - a perched water table.

ADDITIONAL DATA: Soil interpretation record numbers for the Lamoine series are: Lamoine, ME0108; Lamoine, stony, ME0130.

National Cooperative Soil Survey
U.S.A.

LOCATION SCANTIC ME+MA NH NY VT

Established Series
Rev. KJL-GBJ-WDH
06/2016

SCANTIC SERIES

The Scantic series consists of very deep, poorly drained soils formed in glaciomarine or glaciolacustrine deposits on coastal lowlands and river valleys. Slope ranges from 0 to 8 percent. Saturated hydraulic conductivity of the surface and subsurface horizons is moderately high or high and low or moderately slow in the subsoil and substratum. Mean annual temperature is about 7 degrees C, and mean annual precipitation is about 1168 mm inches at the type location.

TAXONOMIC CLASS: Fine, illitic, nonacid, frigid Typic Epiaquepts

TYPICAL PEDON: Scantic silt loam, on a 1 percent slope in an idle field. (Colors are for moist soil unless otherwise noted.)

Ap1--0 to 10 cm; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak very fine granular structure; very friable; many very fine, fine, medium and coarse roots; moderately acid; abrupt smooth boundary.

Ap2--10 to 23 cm; dark grayish brown (2.5Y 4/2) silt loam, light brownish gray (2.5Y 6/2) dry; moderate very fine granular structure; very friable; common very fine, fine, medium and coarse roots; common medium distinct olive gray (5Y 5/2) irregularly shaped iron depletions throughout; moderately acid; abrupt wavy boundary. (Combined thickness of the Ap horizons is 13 to 23 cm.)

Eg--23 to 28 cm; olive gray (5Y 5/2) silt loam; weak medium platy structure parting to weak very fine subangular blocky; friable; common very fine, fine, medium and coarse roots; common medium prominent light olive brown (2.5Y 5/6) masses of iron accumulation in the matrix and along root channels; moderately acid; abrupt smooth boundary. (0 to 20 cm thick)

Bg1--28 to 41 cm; olive gray (5Y 5/2) silty clay loam; moderate thin platy structure; firm; common very fine, fine, and medium and few coarse roots; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation in the matrix and along pores; many coarse prominent olive brown (2.5Y 4/4) masses of iron accumulation in the matrix and along pores; common medium faint gray (5Y 6/1) irregularly shaped iron depletions in the matrix; light olive gray (5Y 6/2) silt coatings on walls of earthworm channels and on 50 percent of faces of peds; few medium dark gray (5Y 4/1) oxide coats on faces of peds; slightly acid; clear wavy boundary.

Bg2--41 to 56 cm; olive gray (5Y 5/2) silty clay; weak medium platy structure parting to moderate very fine

subangular blocky; firm; few very fine and fine roots; few pores; common medium faint gray (5Y 6/1) irregularly shaped iron depletions in the matrix; common medium prominent light olive brown (2.5Y 5/4) masses of iron accumulation in the matrix and along pores; light olive gray (5Y 6/2) silt coatings on walls of earthworm channels and on 50 percent of faces of peds; few fine prominent dark reddish brown (5YR 2/2) oxide coats on faces of peds; slightly acid; gradual wavy boundary.

Bg3--56 to 74 cm; olive gray (5Y 4/2) silty clay; moderate very fine and fine subangular blocky structure; firm; few pores; common medium prominent light olive brown (2.5Y 5/6) masses of iron accumulation in the matrix and along pores; common medium faint olive gray (5Y 5/2) irregularly shaped iron depletions in the matrix; gray (5Y 6/1) silt coatings on 50 percent of faces of peds and pores; common medium prominent dark reddish brown (5YR 2/2) oxide coats on 10 percent of faces of peds; slightly acid; clear wavy boundary. (Combined thickness of the Bg horizon is 23 to 89 cm.)

Cg--74 to 1165 cm; olive gray (5Y 4/2) clay; weak thick platy structure; firm; few medium prominent light olive brown (2.5Y 5/6) masses of iron accumulation in the matrix; few fine faint gray (5Y 5/1) irregularly shaped iron depletions in the matrix; gray (5Y 6/1) silt coatings on 50 percent of faces of peds; many medium prominent dark reddish brown (5YR 2/2) oxide coats on 30 percent of faces of peds; slightly acid.

TYPE LOCATION: Washington County, Maine; Town of Whitneyville; 0.25 mile south of railroad track on U.S. Route 1A, and 200 feet northwest of the road; USGS Whitneyville topographic quadrangle; lat. 44 degrees 42 minutes 34 seconds N. and long. 67 degrees 31 minutes 29 seconds W., NAD 27.

RANGE IN CHARACTERISTICS: Thickness of the solum ranges from 63 to 127 cm. Depth to bedrock is more than 152 cm. The soil is commonly free of rock fragments but a few pedons contain up to 3 percent gravel. Stones cover from 0 to 3 percent of the surface. Reaction ranges from very strongly acid to slightly acid in the surface and subsurface horizons, unless limed, and from strongly acid to neutral in the upper part of the subsoil. The reaction in the lower part of the subsoil and in the substratum is moderately acid to neutral.

In undisturbed areas some pedons have an O horizon that ranges from 3 to 18 cm thick that is neutral or has a hue of 5YR to 10YR, value of 2 to 3 and a chroma of 0 to 2. It is muck or mucky peat.

The Ap horizon has hue of 10YR to 5Y, value of 3 to 5 and chroma of 1 or 2. It has weak or moderate, very fine to coarse granular structure. Undisturbed areas have an A horizon 5 to 13 cm thick, that has hue of 10YR, value of 3 and chroma of 1 or 2. It is silt loam, silty clay loam, or loam. Consistence is very friable or friable.

The Eg horizon, has hue of 2.5Y or 5Y, value of 4 or 5 and chroma of 1 or 2 and few or common redoximorphic features. It has weak or moderate, thin to thick platy, fine or medium granular or very fine subangular blocky structure. It is silt loam, silty clay loam, or loam. Consistence is very friable or friable.

The Bg horizon has hue of 2.5Y or 5Y, value of 4 to 6 and chroma of 1 or 2 and has faint to prominent redoximorphic features. It is silt loam, silty clay loam, or silty clay. It has subangular blocky or platy structure but some pedons have primary structure that is prismatic. Consistence is friable or firm.

The BCg horizon, where present, has hue of 2.5Y or 5Y, or 5BG value of 4 to 6 and chroma of 1 or 2 with faint to prominent redoximorphic features. It is silty clay loam, silty clay, or clay. It has platy or angular blocky

are less common or lacking in those from lacustrine deposits.

COMPETING SERIES: There are currently no other series in the same family. The [illegible], [illegible], and [illegible] series are similar soils in related families. Lamoine soils have dominant chroma of 3 or more between the A or Ap horizon and 76 cm below the mineral soil surface. Swanton soils have a coarse-loamy over clayey particle-size class. Swanville soils have less clay in the particle-size control section.

GEOGRAPHIC SETTING: Scantic soils are on coastal lowlands and river valleys. Slope ranges from 0 to 8 percent. The soils formed in medium, moderately fine and fine textured glaciomarine or glaciolacustrine deposits. The climate is humid and cool temperate. Mean annual temperature ranges from about 6 to almost 8 degrees C , and mean annual precipitation ranges from 863 to 1219 mm. The frost-free season ranges from 90 to 160 days. Elevation ranges from about 2 to 275 m above mean sea level.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the [illegible], [illegible], [illegible], [illegible], Melrose, Swanton, and Whately soils. The Biddeford, Buxton and Lamoine soils are members of a drainage sequence with Scantic soils on the same landscape, Buxton and Lamoine soils are in higher positions and Biddeford soils are in depressions. The Elmwood, Melrose, Swanton and Whately soils all have a coarse-loamy over clayey particle-size class. Elmwood and Melrose soils are in higher positions on the landscape. Swanton soils are in similar positions and Whately soils are in depressions.

DRAINAGE AND SATURATED HYDRAULIC CONDUCTIVITY: Poorly drained. Surface runoff is slow. Saturated hydraulic conductivity of the surface and subsurface horizons is moderately high or high and low or moderately slow in the subsoil and substratum.

USE AND VEGETATION: Mostly idle or woodland, some areas are used for growing hay and pasture. Common tree species include red maple, elm, gray birch, white ash, balsam fir, red and white spruce, tamarack, and some eastern white pine.

DISTRIBUTION AND EXTENT: MLRAs 142, 143, and 144B in Maine, Massachusetts, New Hampshire, New York, and Vermont. The series is of large extent.

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

SERIES ESTABLISHED: Penobscot County, Maine, 1947.

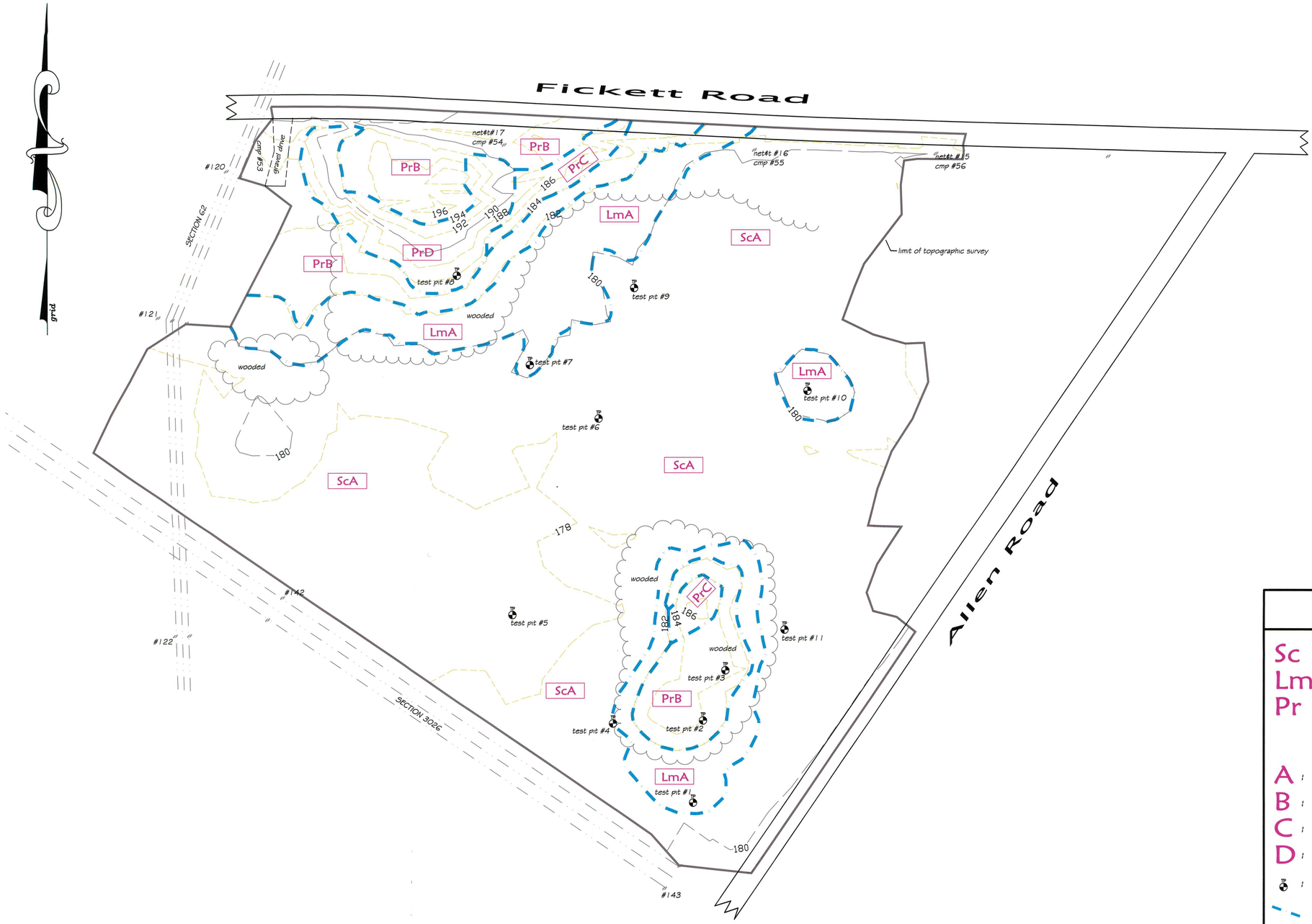
REMARKS: Previous revisions reflect a change in classification from Typic Haplaquepts to conform with Keys To Soil Taxonomy, sixth edition, 1994. Historic correlations of Scantic may have occurred in presumed or isolated frigid areas in MLRAs 144A and 145.

Diagnostic horizons and features recognized in this pedon are:

1. Ochric epipedon - the zone from 0 to 28 cm (Ap and Eg horizons).
2. Cambic horizon - the zone from 28 to 89 cm (Bg horizon).
3. Nonacid - the pH is 5.0 or more in 0.01M calcium chloride in at least some part of the control section (25 to 100 cm).
4. Aquic conditions - redoximorphic features at 10 cm.
5. Episaturation - a perched water table.

ADDITIONAL DATA: Source of 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 Scantic series are: Scantic, ME0044; Scantic, stony, ME0062.

National Cooperative Soil Survey
U.S.A.



ROBERT VILE SOIL CONSULTING, INC.
P.O. BOX 114 DIXMONT, MAINE 04932

CLASS B HIGH INTENSITY SOIL SURVEY

FOR:

CENTRAL MAINE POWER COMPANY

QUEBEC - MAINE INTERCONNECT
SUROWIEC SUBSTATION

LOCATION: FICKETT ROAD and ALLEN ROAD
POWNAL, CUMBERLAND COUNTY, MAINE

FIELD SURVEY: ROBERT VILE	JUNE 19, 2017
CERTIFIED SOIL SCIENTIST #201	SCALE 1"=50'

GRAPHIC SCALE

50 0 25 50 100 200

(IN FEET)
1 inch = 50 ft.

LEGEND

- = 3/4" IRON REBAR SET WITH RED PLASTIC CAP INSCRIBED S.W. GOULD PLS 2318 (unless otherwise noted).
- = INTERMEDIATE CONTOUR (NAVD88 FEET)
- 200 = INDEX CONTOUR (NAVD88 FEET)

NOTES

NOTE...1 BOUNDARY SURVEY AND TOPOGRAPHIC INFORMATION PROVIDED BY SACKETT & BRAKE SURVEY, INC.

SOILS LEGEND

Sc - Scantic Series - Poorly Drained
Lm - Lamoine Series - Somewhat Poorly Drained
Pr - Peru Series - Moderately Well Drained

Slope Phases

A : 0% TO 3% Slope
B : 3% to 8% Slope
C : 8% to 15% Slope
D : 15% to 25% Slope
: Soil Test Pit
: Soil Boundary

Sc/A
Soil Series / Slope Phase

STATE OF MAINE
Robert Vile
C.S.S. #201
CERTIFIED SOIL SCIENTIST

ROBERT VILE
CSS#201

2017085-SOILS

Exhibit 11-4: Fickett Road Substation Soil Suitability Findings Letter

Robert Vile
Licensed Site Evaluator
Certified Soil Scientist

P.O. Box 114, Cates Rd.
Dixmont, ME 04932

Telephone:
(207)234-2451

Date: August 11, 2017

To: Sackett & Brake Survey, Inc.
P.O. Box 207
Skowhegan, Me. 04976

Re: Soil Suitability for the proposed CMP Substation located off the Fickett & Allen Rd. in Pownal, Me.

Findings: On June 2, and June 14, 2017 I conducted a Class B High Intensity Soil Survey on the above captioned parcel. Three different Soil Series were identified on the parcel. The Peru soils are moderately well drained glacial till soils and I would consider them very suitable for the project. The lower elevations of the parcel consist of the Scantic Soil Series and the Lamoine Soil Series . These soils are somewhat poorly and poorly drained silt loam over dense,firm silty clay. Although they are not optimum for development proper filling and drainage projects can improve their suitability. It should be noted that the Scantic soils are hydric soils and usually associated with wetlands. Proper permitting will be required to fill or disturb soils in the wetland areas.
If you have any questions regarding the investigation please feel free to contact me at the above number.

Sincerely,

Robert G. Vile jr.
C.S.S. # 201
L.S.E. S204