V-4.0 EARTH RESOURCES

V-4.1 Topography

The proposed Kibby Substation is considered Milepost 0.0 of the 115 kV transmission line ROW, as shown on Figure V-1-1. TransCanada chose the transmission corridor to Bigelow Substation in part to minimize extremes of elevation (steep slopes, wetlands); however, because of the rough topography in this part of Maine, the route must climb to cross several ridges and saddles, and descend to traverse valleys and streams, as it covers the 27.7 mile (44.6 km) distance between Kibby and Bigelow Substations. The elevation at Kibby Substation is 1,807 feet (550.9 m) above mean sea level (msl). The highest point on the ROW is 2,175 feet (663.1 m) above msl, at Pole 118, between Mileposts 14 and 15, as the route crosses the Lookout Hills. The lowest point on the route is 1,154 feet (351.8 m), at Pole 172 in Coplin Plantation near Milepost 22, just outside of Stratton and adjacent to Stratton Brook. The 115 kV transmission line ROW ends at the existing Bigelow Substation at 1,416 feet (431.7 m) above msl, for an overall descent of 391 feet (119.2 m). Drawings that illustrate elevations along the 115 kV transmission line ROW are provided in Exhibit V-D.

The transmission line starts by heading southeast from Kibby Substation in Kibby Township, adjacent to and south of the Kibby Stream valley, and turns south-southwest at Pole 14 to lead around the southeasterly base of Kibby Range. The route then climbs to pass between Kibby Range and Antler Hill near Milepost 3, reaching approximately 1,960 feet (597.6 m) above msl, as it enters Jim Pond Township.

The route turns west between Milepost 4 and 5, and heads downhill to cross the Northwest Inlet (tributary to Jim Pond) between Poles 39 and 40, just past Milepost 5, descending to approximately 1,390 feet (423.8 m). The route climbs slightly, turns southwest, and then descends again to about 1,220 feet (372.0 m) as it traverses the North Branch of the Dead River and Route 27 at Poles 58 and 59 (between Mileposts 7 and 8). Upon reaching the boundary of Jim Pond Township with Alder Stream Township, near Milepost 8, the route turns south-southeast and maintains this general orientation for the next 8 miles (12.9 km).

The transmission route proceeds south along the Jim Pond Township line to Milepost 9, crossing an unnamed hill at approximately 1,620 feet (493.9 m) (Pole 68), crossing Alder Stream at about 1,210 feet (368 m) (Pole 72-73), and briefly diverting from the township line in the Barnard Mountains between Mileposts 10 and 11 to avoid a wetland area tributary to Alder Stream. Upon returning to the township line, the ROW continues into the town of Eustis across rolling hills, crosses Sawyer Brook, Tim Pond Road, and Tim Brook near Milepost 13, and then begins to ascend the Lookout Hills. Between Mileposts 14 and 15, the route reaches its maximum elevation along its entire length, approximately 2,175 feet (663.1 m), at Pole 118. The transmission line route then descends to elevations of approximately 1,600 feet (487.8 m) before reaching Lutton Brook (Pole 127 at 1,610 feet [490.0 m]) and then turning to the southeast at Pole 129 near Milepost 16.

The route is somewhat smoother here, descending from about 1,600 feet (487.8 m) to about 1,400 feet (426.8 m) as it approaches the floodplain of the Dead River. The route crosses the South Branch of the Dead River at about 1,200 feet (365.9 m), and continues southeasterly towards the Eustis/Coplin Plantation line, which it meets at Pole 157 near Milepost 20. The route turns east-northeast and follows the town boundary, crosses Nash Stream (1,180 feet [359.8 m]), climbs slightly, and then descends again to cross a small stream and Route 16 (about 1,190 feet [362.8 m]) at Pole 167, just past Milepost 21 outside the town of Stratton.

Just before reaching Stratton Brook, at Pole 172, the route reaches the lowest elevation of its entire distance, 1,154 feet (351.8 m). The ROW turns due south at Milepost 22, and then heads southeast to cut diagonally across the northeast corner of Coplin Plantation. While paralleling the existing Boralex ROW, the route climbs the side of Hedgehog Hill to 1,830 feet (557.9 m). The route then descends to the southeast, to Wyman Township in Somerset County, which it reaches at Milepost 24.

The route then climbs again and turns south at Mile 25. It reaches about 1,700 feet (518.3 m) at Pole 207 just before Milepost 26, then heads due east again. The route then descends to cross Stoney Brook, and approaches Route 27 and the Appalachian Trail, which it crosses at about 1,380 feet (420. 7 m). The route finally turns south after crossing Route 27, and ends at Bigelow Substation at an elevation of 1,416 feet (431.7 m) above msl.

V-4.2 Soils

A Class D Medium-Intensity soil survey was conducted for the proposed transmission line corridor, and is provided in Exhibit V-E. The purpose of the soil survey was to identify and describe the soil types (where soil map data exist) that would be encountered along the proposed transmission line route. The soil survey discussion includes information on the ability and limitations of each soil type to support the construction and maintenance access to the proposed transmission line.

A preliminary plan of the proposed wind energy project was presented to the LURC on September 13, 2006. Ms. Marcia-Spencer Famous (LURC Land Use Planner), Mr. Robert Marvinney (State Geologist and Director of the Maine Geological Survey), and Mr. David Rocque (State Soil Scientist) identified potential environmental issues to be addressed for the proposed project.

Consultation with Mr. Rocque determined that a high intensity soil survey would not be required along the proposed transmission corridor unless new roadway or other subsurface work were planned beyond the pole installation and, therefore, existing soil data would suffice to provide information for the site soil survey. However, additional soil mapping could be required in the future should any permanent impact from new road construction be determined necessary. Since construction and operation of the 115 kV transmission line does not require the construction of new roads, the Class D Medium Intensity Soil Survey is consistent with agency needs.

The purpose of the soil survey was to review, identify, and describe the mapped soils (where soil map data exist) along the planned route for the transmission line between the proposed Kibby Substation and Bigelow Substation. The soil information was used to evaluate soil suitability for development of the proposed 115 kV transmission line. The soil survey information also provides hydrological grouping ratings to assist in the calculations for stormwater runoff curve values as required by DEP under the Site Law, 38 MRSA §§481-490; Section 12. Additionally, the soil information has been used to address LURC standards for erosion and sediment control.

V-4.2.1 Soil Investigation

The soil survey was based on existing United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) soil surveys of Franklin and Oxford Counties. Soil data were obtained from published soil surveys and maps, personal communications with county soil scientists, and data available on the NRCS website. All soil descriptions in the Class D soil survey were based directly upon published soil maps and the respective official soils descriptions. Although no soil observations were made as a part of this Class D soil survey, wetland areas were delineated in the field in a separate effort, and hydric soils were observed in areas mapped as wetlands.

The soil survey maps (contained in the Soil Survey in Exhibit V-E) depict the location and types of soils mapped by the NRCS in the proposed transmission line corridor. The NRCS Soil Maps for Franklin and Oxford County were produced by two different soil survey efforts. Survey Area ME-610 includes Eustis and Coplin Plantation; and Survey Area ME-619 includes Kibby Township, Jim Pond Township and Wyman Township. Site-specific soil mapping was obtained on-line from the NRCS website. Additional information was obtained via communications with the state USDA NRCS office. The soil map data provide descriptions of soil properties, drainage classifications, rock outcrops, surface conditions, and slope ranges.

V-4.2.2 Soil Characteristics

The soils along the proposed route were primarily formed in glacial till on uplands, and glaciofluvial deposits in lower elevations and adjacent to water bodies. Glacial till is unconsolidated material deposited directly by contact with the glacial ice, with little or no transportation by water. Till generally consists of an unstratified mixture of clay, silt, sand, gravel, and boulders. Glaciofluvial deposits consist of materials carried, sorted, and deposited by glacial meltwater.

The NRCS soil maps also identified alluvial and organic soils in several areas along the route. Alluvial soils formed in materials deposited by flowing water such as at the mouth of a stream river, or on a floodplain. Organic soils occur where organic materials accumulate more rapidly than they can decompose, normally because of prolonged saturation or inundation causing a chemically reducing environment.

Generally, the soil map units were “mapped” as associations and complexes, with a few individual soils. An individual soil unit is a defined, named taxonomic unit with specific properties. In comparison, a soil association is a group of named soil units occurring together in a characteristic and definable (mappable) pattern. A soil complex is a mapping unit consisting of two or more named soil units intimately mixed geographically such that it is not practical to map them separately.

The soil series, soil associations, and soil complexes mapped by NRCS have properties that match the official soil series descriptions, and can be expected to respond to use and management as described in the Soil Series of Maine Soil Interpretations.

The soil map contained in the soil survey in Exhibit V-E depicts the size and location of individual soil map units relative to each other and existing site features by use of symbols. The symbols for each soil map unit consist of two or three letters, with the first two letters referring to the soils that make up the map unit, and the third letter describing the slope. For example, AFC indicates the Adams-Croghan Association, strongly sloping.

Some mapped soil units do not indicate a slope and are named with only two letters. These units contained general descriptor terms such as gently rolling, moderately steep, steep, and very steep.

Each soil series represents soil characteristics such as texture, stoniness, drainage, and depth to bedrock, all of which may affect the use and management of the soil. Often small areas of different soils are found within a soil map unit. These inclusions are considered too small to stand as a soil map unit alone for the scale and purpose of the map. The soil survey identifies all soil units along the proposed transmission line route, the mileages at which each unit appears (measured from the presumed starting point at the proposed Kibby Substation), and detailed descriptions of each soil unit.

The soils mapped in Soil Survey Area ME-610 and ME-619 are listed in Tables V-4-1 and V-4-2, respectively.

Table V-4-1. Soils within Soil Survey Area ME-610.

Soil Symbol	Soil Description
AFC	Adams-Croghan Association, glaciofluvial materials, strongly sloping
BkC	Berkshire Soils, glacial till, 8 to 15 percent slopes
BkD	Berkshire Soils, glacial till, 15 to 25 percent slopes
BSB	Brayton-Colonel Association, glacial till, gently sloping
BTB	Brayton-Peacham-Markey Association, glacial till/organic soils, gently sloping
BW	Bucksport-Markey Soils, organic soils (without slope designation)
Ca	Charles silt loam, alluvial soils, (without slope designation)
CG	Charles-Medomak-Cornish Association, alluvial soils, (without slope designation)
CNC	Colonel Soils, glacial till, 8 to 15 % slopes
CPC	Colonel-Dixfield Association, glacial till, strongly sloping
CTC	Colton-Sheepscot Association, glaciofluvial, rolling terrain
DMC	Dixfield-Marlow Association, glacial till, strongly sloping
DTC	Dixfield-Colonel Association, glacial till, strongly sloping
HMC	Hermon-Monadnock Association, glacial till, rolling
HSC	Hermon-Skerry, glacial till, (without slope designation)
LNC	Lyman-Tunbridge-Abram Complex, glacial till, rolling
LNE	Lyman-Tunbridge Association, glacial till, steep
MNC	Monadnock-Berkshire Complex, glacial till, rolling
Nb	Naumburg Soils, glaciofluvial, (without slope designation)
RYE	Rock Outcrop-Abram-Lyman Complex, glacial till, very steep
TRC	Tunbridge-Berkshire-Dixfield Association, glacial till, (without slope designation)
W	Water
WO	Wonsqueak, Organic Soils, (without slope designation)

Table V-4-2. Soils within Soil Survey Area ME-619.

Soil Symbol	Soil Description
CG	Charles Cornish Wonsqueak Complex, alluvial/organic, 0 – 2% slopes
CNC	Colonel Dixfield Pillsbury Association, glacial till, 3 – 15 % slopes
CRB	Colonel Pillsbury Skerry Association, glacial till, 1 - 8% slopes
CTC	Colton Adams Association, glacial till, glaciofluvial, 5 – 15% slopes
CVD	Colton Herman Association, glacial till, 15 - 30% slopes
DMC	Dixfield Colonel Marlow Association, glacial till, 3 - 15% slopes
DTC	Dixfield Colonel Rawsonville Association, glacial till, 3 - 15 % slopes
HTC	Hermon Rawsonville Skerry Association, glacial till, 5 - 15 % slopes
HTD	Hermon Rawsonville Skerry Association, glacial till, 12 - 20 % slopes
LAC	Hogback Abram Complex, glacial till, 4 - 25 % slopes
LAE	Hogback Abram Complex, glacial till, 15 - 60 % slopes
LTC	Hogback Rawsonville Complex, glacial till, 4 - 25 % slopes
LTE	Hogback Rawsonville Complex, glacial till, 20 - 60 % slopes
MDD	Marlow Dixfield Association, glacial till, 12 - 30 % slopes
MED	Marlow Dixfield Rawsonville Association, glacial till, 12 - 30 % slopes
MNC	Monadnock Berkshire Rawsonville Association, glacial till, 5 - 16 % slopes
MND	Monadnock Berkshire Rawsonville Association, glacial till, 10 - 45 % slopes
PPB	Pillsbury Peacham Association, glacial till (without slope designation)
WO	Wonsqueak Bucksport Soils, organic soils (without slope designation)

V-4.2.3 Soil Suitability for Transmission Line Construction

Soils along the transmission line route will be used for temporary vehicle access, staging and erection of pole structures, and periodic maintenance access. Prior to any construction activities, appropriate BMPs for erosion and sediment control will be implemented in accordance with the E&S Plan (Appendix V-A), which was prepared in accordance with the guidance document “Maine Erosion and Sediment Control BMPs.” Through the use of the BMPs outlined in the E&S Plan no significant impacts to soil resources are anticipated to be caused by construction of the proposed transmission line. Once construction is complete and soils have been stabilized, no further impacts to earth resources are anticipated. Periodic maintenance

access to the route, including for vegetation management, will be required, but is not anticipated to affect soils.

The major limitations for soil use for the proposed transmission line are:

- depth to bedrock and presence of bedrock outcrops
- potential for frost heaving
- proneness to caving and erosion
- shallow saturation depth, perched water table, or jurisdictional wetland areas

The soils along the route generally have “very deep” (greater than 60 inches) bedrock. Approximately 12 percent of the mapped soils (19,753 linear feet [6,022 m] along the route) have shallow depths to bedrock (less than 60 inches), including the Rock Outcrop, Abram, Hogback, Lyman, Rawsonville, and Tunbridge soils. Areas with shallow bedrock may require drilling and/or blasting in order to install poles. Special attention to effective erosion control will be provided in areas of shallow bedrock.

Jurisdictional wetland areas and hydric soils are present in many areas of the proposed transmission line ROW. Hydric soils in the transmission line route are the Brayton, Bucksport, Charles, Markey, Medomak, Naumburg, Peacham, Pillsbury, and Wonsqueak soils. These areas total 93,512 linear feet (28,510 m) of the mapped area along proposed route, or approximately 55.44 percent of the mapped soils. Formal wetland delineations performed along the proposed transmission line ROW indicate that there are far fewer areas of hydric soils that are jurisdictional wetlands. According to the wetland surveys, there are 66.196 acres of wetlands within the proposed transmission line ROW, which make up approximately 13 percent of the ROW (see Section V-6.0 for more information on wetlands). Impacts to these areas will be avoided to the extent practicable, and proposed wetland pole placement has been avoided to the extent possible. Based on the preliminary design, few structures are proposed in or near wetlands (see Section V-6.0). No structures are within 100 feet (30.5 m) of perennial streams, and only 4 anchors are within 100 feet (30.5 m) of a stream, as discussed in Section V-6.0. There may be some adjustment of pole and anchor locations based on the final detailed design and structural strength analysis, however, it is not anticipated that wetland or stream impacts will be greater than those presented in the current design.

The soil survey concluded that the soils expected to be encountered during construction and maintenance of the proposed transmission line are suitable for the proposed uses. Some of the soils have known limitations, but these limitations can be overcome by proper planning and site preparation, together with appropriate engineering practices and BMPs.

V-4.3 Potential Construction Impacts

Consideration of topography has been included in the selection of the route and the design of the transmission ROW. Where possible, the ROW extends through more level terrain; however, given the nature of topography in this part of Maine, the ROW does traverse higher elevation

areas. Soils also have been considered, particularly in the avoidance of wetland areas and associated hydric soils, where possible. Detailed BMPs have been developed to address construction techniques and stabilization measures to ensure that work within more steeply sloping areas and/or wet soils will be appropriately conducted. The E&S Plan, provided in Appendix V-A, provides narrative and drawings outlining measures to be used for the range of conditions anticipated to be encountered. This E&S Plan will be required to be implemented by the installation contractor, and TransCanada will – as outlined in that document – conduct appropriate training and oversight to ensure measures are properly implemented.

Through the use of the BMPs outlined in the E&S Plan, no significant impact is anticipated to earth resources due to construction of the proposed 115 kV transmission line.

V-4.4 Potential Operational Impacts

Once the 115 kV transmission line has been installed and the ground stabilized following construction, no impacts to earth resources are anticipated. Vegetation management practices, as outlined in Appendix V-B, are not anticipated to require activities that would significantly affect topography or soils.