

APPENDIX H: Geology, Soil and Topology Technical Report

H.1 Existing Conditions

Pennsylvania

Geology

In Pennsylvania the existing rail alignment is located within five physiographic provinces known as the Great Valley, Blue Mountain, Glaciated Low Plateau, Glaciated Pocono Plateau and Anthracite Valley sections within Northampton, Monroe, Wayne and Lackawanna counties. The proposed rail alignment is an existing maintained right-of-way and operating freight rail line from Slateford Junction in Northampton County to Scranton in Lackawanna County.

Northampton County consists of Ordovician geologic formation, which includes shale, limestone, dolomite, sandstone, shale quartzite and phyllite. Monroe County consists of the Devonian and Silurian geologic formations. The Devonian formation, which includes red sandstone, gray shale, black shale, limestone and chert makes up most of the states geological formation. The Silurian formation, which forms a small band in the southern part of the county, consists of red and gray sandstone, conglomerate, shale and limestone.

Lackawanna County has three types of geologic formations that include Devonian, Mississippian and Pennsylvanian. The Devonian formation consists of red sandstone, gray shale, black shale, limestone and chert. The Mississippian geologic series includes red and gray sandstone, shale and limestone. The Pennsylvanian formation consists of cyclic sequences of sandstone, red and gray shale, conglomerate, clay, coal and limestone. Generally, Wayne County consists of the Devonian geologic formation consisting of red sandstone, gray shale, black shale, limestone and chert.

Soils

The general, soils in Northampton County in the vicinity of the railroad alignment consist of the Conotton-red hook-urban land association. The general soil association description includes extremely stony soils on ridges, less rocky, well-drained soils in lowland areas. In Monroe County, the Wyoming-Chenango-Pope association is found on nearly level to slightly sloping lands adjacent to the right-of-way and tend to be deep and well to excessively drained underlain by glacial outwash and alluvium. The Wellsboro-Lackawanna-Morris soil association is also adjacent to the right-of-way and is characterized by deep, well drained to somewhat poorly drained soils in level and gently sloping areas. The soils in Wayne County consist of Wellsboro-Lackawanna-Morris and Volusia-Mardin-Lordstown. These soils are in the vicinity of the proposed alignment. Lackawanna County Wellsboro-Morris-Oquaga association consisting of soils formed in glacial till derived from sandstone and shale on broad rolling uplands. Specific soil descriptions located at each proposed station location are as follows.

- Scranton Station Area - Ur - Urban Land – urban structures cover more that 85 percent of the soils. Soils are variable and require onsite investigation.
- Tobyhanna Station Area - Cy - Cut and Fill land – disturbed or altered land.
- Pocono Mountain Station Area – WxB - Wurtzboro extremely stony loam, 0 to 8 percent slopes and CnB - Chippewa and Norwich extremely stony soils 0 to 8 percent slopes.
- Analomink Station Area – Cy - Cut and Fill land - disturbed or altered land.
- East Stroudsburg Station Area - WyB – Wyoming gravelly sandy loam, 3 to 8 percent slope.
- Delaware Water Gap Station Area - Cy - Cut and Fill land- disturbed or altered land.

Topography - Land Formation

The mountainous terrain in Pennsylvania where the rail alignment is located was covered during the last glacial period with glacial till and stratified drift. The underlying landforms from glacial activity include kames, kame terraces and eskers. The topography along the project corridor in Pennsylvania consists of elevations ranging from 320 feet to 1,940 feet. The approximate elevations at the proposed stations areas are:

- Scranton: 740 feet
- Tobyhanna: 1,940 feet
- Pocono Mountain: 1,760 feet
- Analomink: 520 feet
- East Stroudsburg: 420 feet

New Jersey

In New Jersey, the rail alignment is located within two physiographic provinces known as the Highlands and the Valley and Ridge province within Morris, Sussex and Warren counties. The Highlands province is approximately 980 square miles consisting of mountainous terrain and deep valleys ranging from 10 to 25 miles in width. The Valley and Ridge province is approximately 17 miles wide consisting of steep slopes, ridges and broad valleys.

In New Jersey, the Lackawanna Cut-Off was built using a combination of construction techniques. Fill material from the surrounding landscape was used when necessary to create large embankments. Soil and rock was also excavated cutting through areas where mountainous terrain existed. The Paulins Kill and the Delaware River bridges are two large concrete viaducts along the alignment. These viaducts span the Paulins Kill River, in Knowlton Township and the Delaware River connecting New Jersey to Pennsylvania.

Other existing physical features within the project corridors right-of-way include railroad ties, signals, signal houses, ballast, old station buildings and concrete platforms. Successional plants and trees have also grown throughout the existing right-of-way given that rail service in New Jersey has been inactive along the alignment for over 25 years.

Geology

In western Morris County the project is located within the Highlands region where the metamorphic, igneous and sedimentary rocks are present. The underlying sedimentary rocks include, Precambrian gneiss and granite, Mesozoic Jurassic siltstone, shall, shale, sandstone conglomerate, Mesozoic Jurassic basalt, Cambrian limestone sandstone, Silurian - conglomerate shale limestone and sandstone.

Sussex County is located in both the Highlands and Valley and Ridge provinces. The sedimentary rock formations include Silurian Rocks, Ordovician, Cambrian, Devonian, Precambrian marble, gneiss and granite.

The project area in Warren County is located in both the Highlands and Valley and Ridge provinces as well, characterized by steep slopes, linear ridges and broad valleys. The sedimentary rocks in Warren County are comprised of Silurian Rocks, Ordovician Marinsburg Formation, Cambrian Ordovician, Pre-Cambrian formations.

Soils

In Morris County, the existing soils were formed from young glacial till where the alignment connects to the existing Morris and Essex line. The general soils in the vicinity of the project are the Rockaway-Hibernia-Urban land soil unit. The units' characteristics include deep, well drained somewhat poorly drained, gently sloping to steep gravelly sandy loams and stony to extremely stony sandy loams and sandy loams that overly granite gneiss on uplands.

The general soils near the project alignment in Sussex County include the Washington-Wassaic-Rock outcrop, Rockaway Rock outcrop-Whitman and Hazen-Palmyra-Fredon associations. The Washington-Wassaic-Rock outcrop is characterized by gently sloping to steep, deep and moderately deep, well drained loamy soils and limestone outcroppings. Rockaway Rock outcrop-Whitman association consists of steep and very steep, deep, well drained gravelly to very stony loamy soils, rock outcrops and nearly level deep, very poorly drained, extremely stony loamy soils. The Hazen Palmyra Fredon association is formed around the Pequest River and associated floodplain area. The soil association consists of nearly level to very steep, deep, well drained and poorly drained loamy soils on terraces, kames and outwash plains.

Warren County's soils were formed from glacial till or weathered bedrock. The general soil unit in the area along the rail alignment is Bath Nassau consisting of gently sloping to very steep, shallow and deep, well drained and somewhat excessively drained loamy soils. Hazen Hero Fredon soils are present surrounding the Paulins Kill and surrounding floodplains. This general soil unit consists of nearly level to very steep, deep, well drained and poorly drained soils, on river terraces, outwash terraces and kames. Specific soil descriptions located at each proposed station location are as follows.

- Andover Station Area – RpD - Rockaway very stony loam, 5 to 25 percent slope. Consists of deep well drained, gently sloping to steep soils that have a fragipan. Permeability is moderately rapid above the fragipan. Very stony loam.
- Blairstown Station Area – NfE - Nassau Rock outcrop complex, 25 to 45 percent slope. Very steep somewhat excessively drained, shallow soil rock outcrop. Found on hills that are inclined in many directions because of irregular bedrock exposure.

Topography-Land Formation

The last glacial period deposited glacial till over Morris, Sussex and Warren counties. Outcroppings of bedrock also exist on steep, sloped areas and ridge land formations. The topography along the project corridor surrounding the alignment in New Jersey ranges from an elevation of 900 feet to an elevation of 300 feet. The actual right-of-way in New Jersey has an 11-foot difference in rise and fall elevation from Port Morris Yard to Slateford Junction, Pennsylvania. The Blairstown station is located at an elevation of approximately 560 feet. The proposed Andover station location is at an elevation of approximately 740 feet.

H.2 Environmental Effects

Geology

No impacts to geological resources are anticipated along the project corridor, yard sites or at the proposed station locations.

Soils

Construction activities along the alignment would not impact existing soil conditions along the project corridor right-of-way. No mitigation measures would be implemented. Soils underlying the project corridor would not be disturbed during construction activities.

Soils at the proposed station and yard sites will be temporarily disturbed due to excavation and grading associated with construction activities. Soil erosion techniques would be implemented including silt fencing and the use of hay bales along the perimeter of the existing right-of-way. Further geotechnical studies would need to be performed prior to construction activities.

Topography – Land Formation

The existing topography along the project corridor would not be impacted do to the rehabilitation of the right-of-way. Therefore, mitigation is unnecessary.