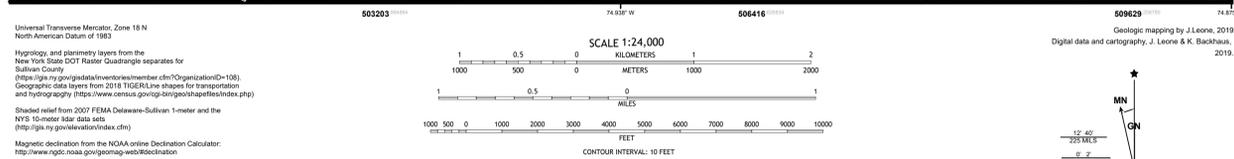
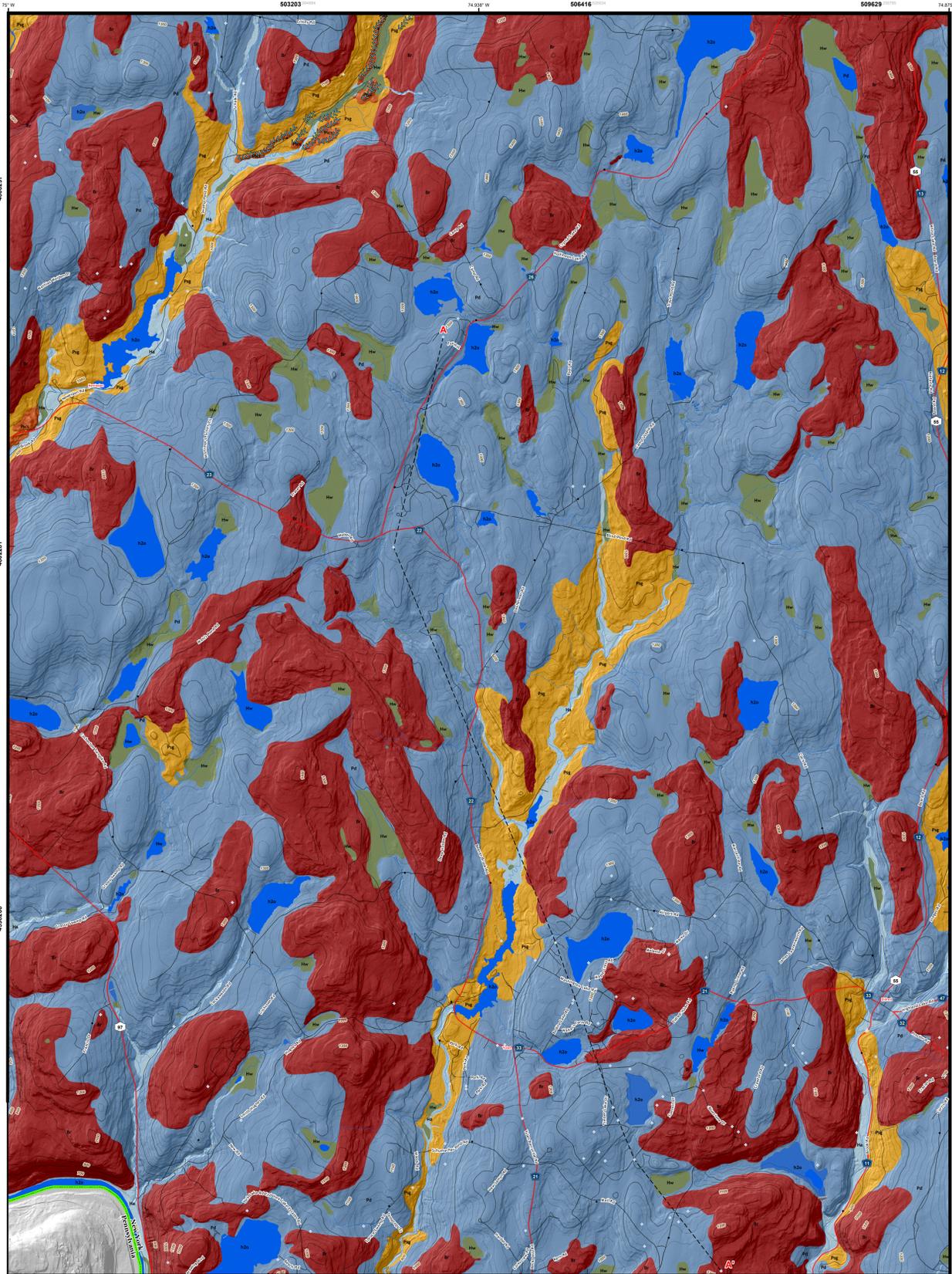


SURFICIAL GEOLOGY OF THE ELDRED 7.5-MINUTE QUADRANGLE, SULLIVAN COUNTY, NEW YORK

prepared by
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Introduction

The geology of the Eldred 7.5-minute Quadrangle was mapped during the Fall of 2018 through the Winter of 2019 as part of the National Parks Service Task Agreement P17AC01044 for Geologic Mapping of the Upper Delaware Scenic and Recreational River (UDSRR). This map is part of Phase II of the mapping project in Sullivan and Orange Counties, New York. The purpose of this map was to identify and delineate various geologic formations in the Eldred Quadrangle with the intent that this information can guide the National Parks Service and municipalities in land use, environmental, and natural resource decisions. The Eldred Quadrangle is in southeastern New York along the state border with Pennsylvania. Portions of the towns of Tusten and Highland are within the quadrangle. The quadrangle was mainly wooded with large tracts of land for lumber and recreation.

Situated at the southern edge of the Catskill Mountain physiographic province the landscape varies from near flat river in the Upper Delaware River Valley to mountainous topography. The highest elevation is at 1,427 feet or 435 meters above mean sea level (amsl) in the north central portion of the quadrangle with the lowest elevation being 600 feet, or 183 meters, where the Delaware River exits the map to the east. The sediments found in the quadrangle includes sand, gravel, diamicton (till) and bedrock exposed throughout the quadrangle.

Field Mapping

The portions of the Eldred quadrangle within the boundaries of the UDSRR, consist primarily of exposed bedrock, thin diamicton over rock, and alluvium on the floor of the Delaware River Valley. Outside of the UDSRR is made up of mountains and valleys with bedrock exposures on the valley walls and summits. The bedrock is Upper Devonian in age made up of mostly sandstones and mudstones. Many of the continuous bedrock topped ridges are oriented in a north-south trend. Sand and gravel deposits are found in valleys that generally trend continuous through the quadrangle in a northeast to southwest direction.

The western most valley has an esker present that primarily extends parallel along the west side of Swamp Pond Road (Figure 1). An esker is an elongated sinuous ridge of glaciofluvial sand and gravel (Warren and Ashley 1994; Benn and Evans 1998), deposited by glacial meltwater in a channel between ice walls of the glacial ice or in a sub-glacial tunnel. The esker ridge extends northeast to southwest, beginning north of the Eldred Quadrangle boundary about three kilometers into the Lake Huntington 7.5-Minute Quadrangle.

In association with the eskers, stratified kame deposits also are present which also consist of sand and gravel (Figure 2). Kame is a term used to describe hills or mounds of sand and gravel associated with melting stagnant ice blocks. It is likely in this case that stratified ice melting in the valley formed both the eskers and kames simultaneously. This trend continues to the southwest into the previously mapped Narrowsburg Quadrangle and ends along the Delaware River.

Methods

Field mapping for this quadrangle was completed during the Fall of 2018 to 2019. Mapping efforts included traversing the quadrangles primarily by vehicle along roadways, with some mapping taking place on state land parcels and private land. Sample collection was taken by pick and shovel from outcrops in drainage ditches, road and stream cuts or within quarry/sand and gravel pits. Sample collection was also taken with a two-meter long hand auger to collect samples below the soil layer where possible. A total of 63 observation points were made during the mapping process, with 50 samples collected for grain size analysis.

Water wells (110 in total) from the Department of Environmental Conservation were also used to decipher the subsurface geology of the Eldred quadrangle. The subsurface data from these wells were simplified using the drillers descriptions to more standard and uniform descriptions. The location, thickness and depths of all lithologies were also recorded and used to create cross-sections and 3D borings logs within the quadrangle.

Field data were digitized in ArcMap 10.6. Polygons were created based upon the lithology of the surface material and the sample and boring locations were plotted. The boring logs and map data were created using the Adobe Illustrator CS6 using the data created in the ArcMap program.

Surficial Map Units

Artificial Fill (Af)
This material is found throughout as artificial dams built to retain water and a large landfill in the upper part of quadrangle. This lithology is generally composed of coarse/fine, large cement mounds and/or crushed rock anthropogenically transported and used for construction purposes.

Holocene Alluvium (Ha) and Holocene Wetland Deposits (Hw)
Post glacial sediments occupy the low areas or land depression throughout the quadrangle. Ha is associated with fluvial process in areas along the Delaware River and its tributaries. This lithology generally consists of stratified silt, sand, and gravel. Hw is associated with low areas and depressions in the highlands of the quadrangle where wetlands form due to poor drainage. This lithology consists of peat, marl, clay or sand in these areas of poor drainage.

Pleistocene Sand and Gravel (Psg)
Characterized as well-sorted and stratified sand and gravel this unit is interpreted to be deposited by glacial meltwater at or very near the glacier and is upwards of 130ft thick in the valleys. Psg is found within the north-south valleys containing the modern-day tributaries for the Delaware River.

Pleistocene Cobbles to Sand (Pics) – Stratified ice contacted deposits, variable coarse-grained sediment consisting of boulders to sand size particles. Inferred to be deposited with stagnant ice in the form of eskers, and sand and gravel hummocks along valley walls.

Pleistocene Diamicton (Pd)
This unit is a mixture of sediment grains that range from clay to boulders in size. In this quadrangle, all diamicton is interpreted to be glacial till, sediment deposited directly beneath the glacier and can be upwards of 265 feet thick. This material is found throughout and is the most abundant lithology within the quadrangle. It is generally matrix supported, sand-dominant, and tan and reddish brown in color.

Summary and Discussion

The Eldred Quadrangle is located at the southern edge of the Catskill Mountains forming the New York/Pennsylvania border. The region is like the surrounding Catskill Mountains with greenish blue to dark grey sandstones with zones of crossbedding, and red shales of the Devonian Period Catskill Delta making up the bedrock of the mountains. The light brown to reddish brown diamicton, till, is deposited along the slopes of the mountain sides, shorter hillslopes could be till covered as well and valleys that tended to be filled with sand and gravel that has been cut through by present day drainage. Tributary valleys to the Delaware River contain sand and gravel deposits suggesting debris being deposited along the valley walls while glacial ice melted. An esker made up of bedded sand and gravel further downstream and hummocked gravel and sand deposits in the valleys suggesting stagnant glacial ice may have filled the valleys after glacial retreat.



Figure 1: Close-up photo of sample location ELD-JL-26. This sample was mostly sand with some gravel.



Figure 2: Photo of stratified sand and gravel deposits in a quarry along Swamp Pond Road.

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Holocene

Af	Artificial Fill (Af) Surficial sediment composed of coarse/fine and/or crushed rock anthropogenically transported and used for construction purposes.
Ha	Stratified silt, sand and gravel (Ha) Sorted and stratified silt, sand, and gravel, deposited by rivers and streams. May include cobbles and boulders. Inferred as post-glacial alluvium and includes modern channel, over-bank and fan deposits
Hw	Wetland Deposit (Hw) Peat, muck, marl, silt, clay or sand deposited in association with wetland environments. Various sediments can be present at transitional boundaries from one facies to another

Pleistocene

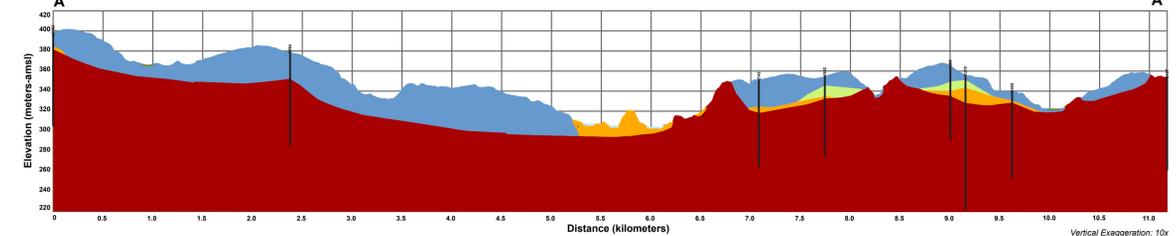
Pics	Cobbles to Sand (Pics) Stratified ice contacted deposits, variable coarse-grained sediment consisting of boulders to sand size particles. Inferred to be deposited along an ice-margin. May include, interbedded coarse lenses of gravel and clast supported diamictons (flow tills).
Psg	Stratified sand and gravel (Psg) Well-sorted and stratified sand and gravel. May include cobbles and boulders. Inferred to be delta, fan or lag deposits in glacial channels or near former ice margins.
Pd	Diamicton (Pd) An admixture of unsorted sediment ranging from clay to boulders. Generally matrix supported, massive and clast-rich.

Pre-Pleistocene

Br	Bedrock (Br) Non-glacially derived, hard rock, pre-pleistocene in age. May be covered up to a meter in diamicton, sand and gravel, or sand and clay in areas marked as Br.
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DESCRIPTION OF MAP UNITS

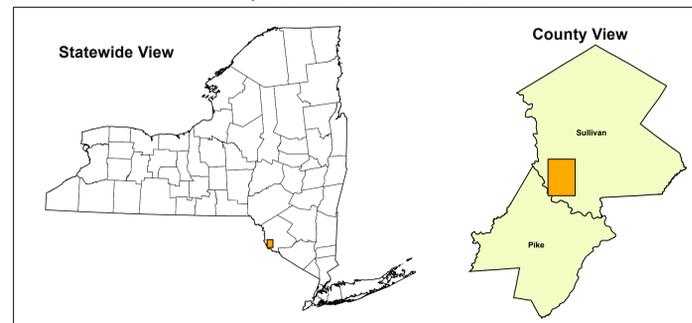
CROSS-SECTION A-A'



SYMBOLS

—	Streets		Water Bodies		NYSGS Soil Sample Location
—	Highways		Streams		NYSDEC Boring Location
—	Railroads		Contours		NYSDEC Water Well Location
—	State Line		Cross-Section Line		Eskers

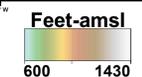
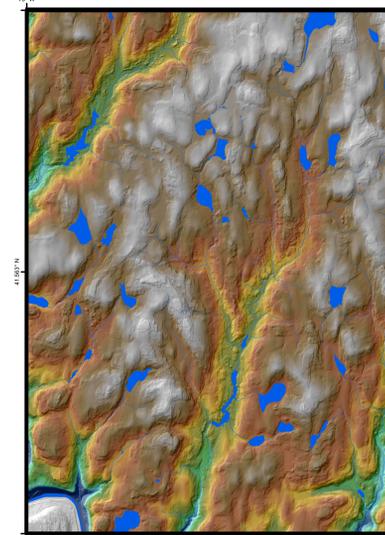
QUADRANGLE LOCATION



ADJOINING QUADRANGLES

Damascus	Lake Huntington	White Lake
Narrowsburg	Eldred	Highland Lake
Roxford	Shohola	Pond Eddy

QUADRANGLE ELEVATION



1:75,000 scale; 2x vertical exaggeration
Shaded relief generated from 2007 Delaware & Sullivan Counties 1-meter lidar data set by the Federal Emergency Management Agency.

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2019

NOTICE

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