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SURFICIAL GEOLOGY OF THE ALBANY COUNTY PORTION OF THE TROY NORTH 7.5-MINUTE QUADRANGLE, NEW YORK

prepared by
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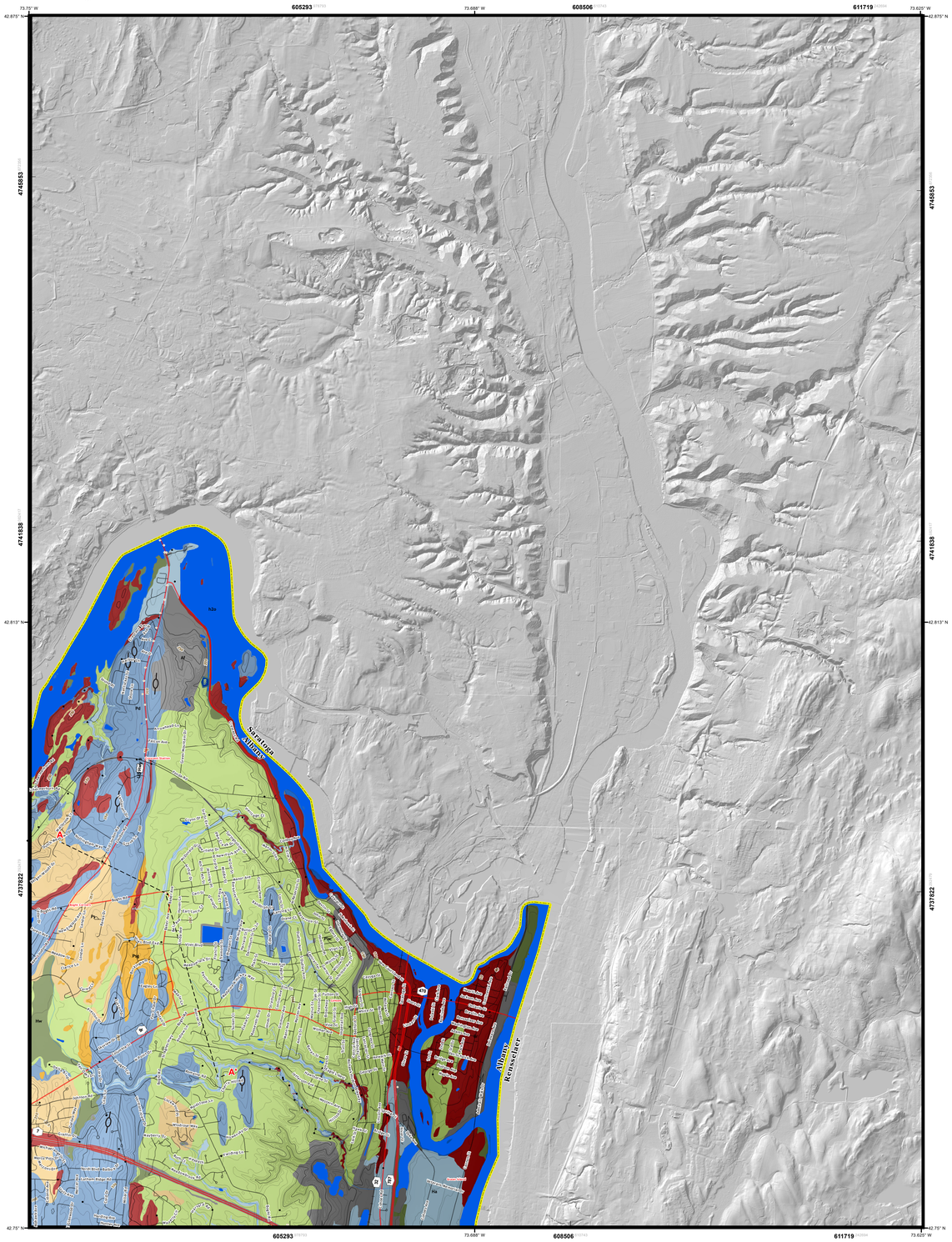
Supported in part by the U.S Geological Survey Cooperative Agreement Number G19AC00249
National Cooperative Geologic Mapping Program (STATEMAP)



Universal Transverse Mercator, Zone 18 N
North American Datum of 1983

Hydrology, and planimetry layers from the New York State DOT Raster Quadrangle separates for Albany County (https://gis.ny.gov/gisdata/inventories/member.cfm?OrganizationID=108). Geographic data layers from 2019 TIGER/Line shapes for transportation and hydrography (https://www.census.gov/cgi-bin/geo/shapefiles/index.php)

Shaded relief from 2008 Albany County 2m, 2014 Hudson Hoosick 2m, 2010 Rensselaer Hoosick 2m and NYS 10m DEM (http://gis.ny.gov/elevation/index.cfm)

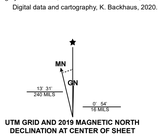
Magnetic declination from the NOAA online Declination Calculator: http://www.ngdc.noaa.gov/geomag-web/#declination

SCALE 1:24,000

1 0.5 0 KILOMETERS 1 2
1000 500 0 METERS 1000 2000
1 0.5 0 1
MILES
1000 500 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000
FEET

CONTOUR INTERVAL: 10 FEET

Geologic mapping by K. Backhaus, A. Kozwlowski and J. Leone, 2020
Digital data and cartography, K. Backhaus, 2020.



UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

INTRODUCTION:
The Troy North 7.5-Minute Quadrangle was mapped as part of the 2019 National Cooperative Geologic Mapping Program funded STATEMAP project (award #G19AC00249). This quadrangle was one of eighteen partial and full quadrangles mapped as part of the Albany County Surficial Geologic mapping project being undertaken by the New York State Geological Survey. This county-wide mapping project started in 2016 and is scheduled to conclude sometime in the early to mid-2020's. The purpose of this map was to identify and delineate various surficial and geologic materials with the intent that this geologic information may serve as a guide to municipalities when making decisions regarding land use, environmental and natural resource considerations across its roughly 12 square mile area.

The Troy North quadrangle is in northeastern Albany County in the Capital District Region of New York State along the western and southern shores of the Hudson and Mohawk Rivers, respectively. The northern section of the City of Watervliet and Town of Green Island, the City Of Cohoes, Towns of Colonie and Latham are the main municipalities within this portion of the quadrangle. This portion of Albany County is mostly urban and suburban with highly urbanized and large housing developments in areas along the shorelines of the Hudson and Mohawk Rivers and just outside of the City of Cohoes. Towards the south-west and south-central portions of the quadrangles there is a large gravel mine and it is highly industrialized along the current Canadian Pacific Railway tracks. This quadrangle is situated within the Hudson-Mohawk Lowlands physiographic province is generally a flay-lying floodplain just above sea-level to an elevated region rising steeply to gradual from the shores of the Mohawk river towards the south and west. This region is covered in rolling hills, flat-wetland rich plains and has been cross-cut by many tributary creeks. There is roughly 390 feet (119 meters) of elevation change between the highest peak atop a drumlin along the southern border of the quadrangle at 391 feet (119 meters) above mean sea level (amsl) to the Hudson River 0 feet-amsl (0 meters-amsl). Littles Lake and the Hudson River are the largest water bodies in this portion of the quadrangle.

Bedrock in the area is grey and black shales and with some sandstone interbeds that are Ordovician age (Rickard and Fisher, 1970). The bedrock in this quadrangle is highly deformed, fractured and folded, some horizontal to vertical and angled beds. According to the Hudson-Mohawk sheet of the Geologic Map of New York State, the bedrock in the quadrangle is comprised of the Austin Glen formation, Taconic Mélange and Normanskill shale. The Austin Glen formation consists of greywacke and shale, the Taconic Mélange is a chaotic mixture of pelitic matrix of pebbles and rounded clasts of Early Cambrian to Middle Ordovician age clasts, evidence of gravity slides from the Taconic Orogeny and lastly the Normanskill shale is comprised of mudstones and sand-stones (Rickard and Fisher, 1970).

The surficial geologic units in this quadrangle were previously mapped at 1:250,000 scale and were reported to be kame, lacustrine sand, recent deposits (alluvium), till and lacustrine silt and clays (Cadwell and Dineen, 1987). Geologic mapping at a 1:62,500 scale has previous been completed by Stoller (1920). The mapping at this scale provided the basis for future mapping as most lithologic units were generalized and only had six units: Till (or ground moraine), sands or clayey sands, clays (brick clays), sands and clays, residual clay and swamp deposits. The low resolution (1:62,500) of this mapping resulted in generalization and combining many lithologically distinct units. Despite the generalization each map showed deposits formed from sediment settling out of glacial Lake Albany and upon the draining of the lake, deltaic sediment deposited by fluvial process on the former lakebed.

METHODOLOGY:
To create the surficial geology map of the Troy North quadrangle, preliminary field maps were created using the ESRI ArcMap 10.7 software and consisted of all available topographic data (roads, lidar surface terrain and hydrography) to plot all field data on including field stops, bedrock outcrops and important site information. Surficial soil sampling employed the use of a five-and-a-half-foot hand auger to allow sampling below the variably thick organic soil horizon (below the topsoil). Another tool used is an entrenching shovel and pick. This tool was used to remove topsoil and/or eroded sediments from outcrops or exposures to expose fresh sediments for analysis. At each field stop, the coordinates (latitude and longitude in decimal degrees) were taken using a Garmin GPS 66st, descriptive notes on the sediment found, whether a sample and/or a high-resolution, scaled photo were taken, and the time at which the stop was taken were logged into a field notebook (TPK_FN7).

At most of the field sampling sites, a soil sample was taken for grain-size analysis. This employee the use of either one or two processes: dry-sieve or wet-sieve analysis. These processes followed the procedure outlined by Bowles (1978), while only using a seven-tiered sieve stack (#5, #10, #18, #35, #60, #120, #230, and Pan) for both dry- (mechanical) and wet- (hydrometer) sieve analysis. The predominantly cohesive (fine-grain dominant) samples were sorted using the wet-sieve analysis, while the cohesionless (coarse-grain dominant) samples were sorted using the dry-sieve analysis.

The final surficial geologic map, cross-section and elevation maps were produced using the ESRI ArcMap and Adobe Illustrator CS6 programs. The subsur-face and surface units were compiled using three water wells from the New York State Department of Environmental Conservation and 29 engineering boreholes by the New York State Department of Transportation. The cross-sections were created in ArcMap using the XActo Cross-section 10 tool developed by Jennifer Carell, formerly of the Illinois Geologic Survey, and then exporting the cross-section into Adobe Illustrator to connect the stratigraphic units. The surficial geologic map was created by producing polygons to digitize the map in ArcMap and colored according to surficial geologic units found within the quadrangle. The final map was drafted in Adobe Illustrator and exported as a PDF file.

RESULTS:
A total of 87 field stops were taken, with 31 samples for grain-size analysis (see Appendix), within the quadrangle. Some stops contained more than one sample as they exhibited stratigraphy either in an exposure or at depth with the hand-auger. The final count for lithologies found during field sampling was: 28 stops were glaciolacustrine silt and clay, 25 were diamicton, 24 were bedrock, six were sand and gravel, three were artificial fill and one was sand. The surficial geologic units found within the quadrangle are as follows:

Artificial Fill (Af)
This unit is generally composed of coarse/fine, large cement mounds and/or crushed rock anthropogenically transported and used for construction purposes. This material is used in artificial dams, built to retain water, large, raised roadbeds for bridges and former factory/railroad shops within the quadrangle.

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 creek valleys and on the Hudson River floodplain throughout the quadrangle. 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 Silt and Clay (Plsc)
Stratified, fine-grained sediment consisting of fine sand, silt and clay size particles. Inferred to be deposited in mid shore to deep-water settings of glacial lakes. May include marl, rhythmites, and varves. Plsc is found within the lowlands of the Hudson River floodplain and draped across bedrock and diamicton throughout the highlands of the quadrangle and along the shoreline of the Mohawk River.

Pleistocene Sand (Ps)
Well sorted and stratified sand, deposited by fluvial, lacustrine or eolian processes. Inferred as deposits associated with distal glacial environments. Well-sort-ed sand deposits were observed down-slope from deposits of coarser sand and gravel deposits (Psg), likely due to a decrease in energy during deposition. Ps is found at elevations higher than and overlies the Plsc deposits and represents former deltaic and aeolian sand deposits

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 can be found several meters in elevation higher than the present-day river valley floors. Psg is found in small pockets between drumlins and directly above diamic-tons in areas that may have been beach fronts or fluvial deposits.

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. It is generally matrix supported, sand-dominant, and blue and purple brown in color. Diamicton makes up the drumlins and found outcropping in creek beds throughout this portion of the quadrangle.

SUMMARY AND CONCLUSIONS:
This distribution of lithologic units in this portion of the Troy North quadrangle consistent with a full glacial cycle. The diamicton found throughout this area was deposited beneath the advancing Hudson Lobe, forming the drumlins in the highlands in the southwest corner of the quadrangle. Upon the retreat of the Hudson Lobe, meltwater began eroding out the bedrock gorges found along the eastern edge of higher elevation hills in the south central part of the quadran-gle while also depositing sand and gravel deposits known as fluvial sands and gravel between the drumlins in the southwest corner. This retreat also caused the land to the south to isostatically rebound and began to dam the meltwater from the Hudson Lobe. Due to damming of the meltwater Glacial Lake Albany began to fill the Hudson and Mohawk Lowlands in front of the Hudson Lobe. The highest extent of the glacial lake was 360 to 300ft (Lafleur, 1965; Dineen, 1976) which deposited the glaciolacustrine silt and clay (Plsc) that occurs in many locations higher in elevation in the quadrangle. Fluvial sand deposits (Ps)

SUMMARY AND CONCLUSIONS: Continued...
floods from Glacial Lake Iroquois flowed through Glacial Lake Vermont, Lake Coleville and finally Glacial Lake Albany (Rayburn, et. al., 2005). This sudden, high velocity flow eroded out the modern-day Hudson Channel (Desimone, et. al., 2008). Periodic outburst floods from the IroMohawk River caused the erosion of the modern-day Mohawk River Channel as well (Stoller, 1920; Wall, 1995; Desimone, et. al., 2008). This erosion wiped out most the glaciolacustrine deposits (Plsc) in the lowlands of this quadrangle, especially within the Hudson channel and exposed bedrock within the channel. Upon the recession of Glacial Lake Albany, windblown sand, or aeolian sands, were deposited across the former lakebed and formed a large dunefield/sand plain. The eastern most extent of this sand plain is found along the southern and west borders of this quadrangle. Today, only a few areas, mainly near the confluence of the Mohawk and Hudson Rivers have bedrock exposed at the surface. South of this area there are few outcrops of bedrock as Holocene/modern alluvium (Ha) have been deposited and this also led to the formation of wetlands (Hw) within the modern-day floodplain from the Late Pleistocene to the Holocene today.

Glacial landforms found within this quadrangle reflect both proximal and distal deposition. For example, drumlins formed beneath a glacial ice sheet but the >20-foot-thick deposits of glaciolacustrine silt and clay represent distal, sedimentation in the glacial lake basin. Deltaic deposits indicate areas of flowing water into the glacial Lake Albany basin. Their wide distribution over a range of elevations indicate the deposition occurred during fluctuations in lake surface elevation with recession of the glacial ice to the north. The wide-flat lying Hudson River floodplain was formed because of the large outburst flood originating from meltwater releases in the northern Hudson Valley (Rayburn et. al., 2005). Meanwhile the Mohawk River Channel experienced similar outburst floods through the IroMohawk River. Erosion has been ongoing in the Mohawk River since the Late Pleistocene.

Upon completion of field mapping within the Troy North quadrangle, the new field evidence discovered in this area suggests that multiple glacial episodes likely impacted the region. Several exposures observed in deep ravines display multiple dimaicton layers interbedded with either outwash and/or glaciolacustrine deposits. The lowest of these diamictons deposits could represent earlier, more subdued drumlin formation that have been buried by later ice advances and were eroded by recessional meltwater flows. The stratigraphic sequence observed from these exposures suggests the possibility that at least two advances and one retreat of the Hudson Lobe Ice Sheet occurred. Ongoing work to determine the burial age of subtill sands with Optically Stimulated Luminescence (OSL) methods will help to better define the chronology of glacial events.

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DESCRIPTION OF MAP UNITS

Holocene

Af — **Artifical 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

Ps — **Stratified Sand (Ps)**
Well sorted and stratified sand, deposited by fluvial, lacustrine or eolian processes. Inferred as deposits associated with distal glacial environments.

Plsc — **Silt and Clay (Psc)**
Stratified, fine-grained sediment consisting of fine sand, silt and clay size particles. Inferred to be deposited in mid shore to deepwater settings of glacial lakes. May include marl, rythmites, and varves.

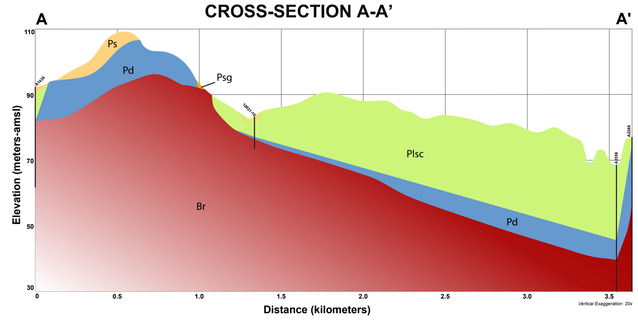
Psg — **Stratified sand and gravel (Psg)**
Well-sorted and stratified sand and gravel. May include cobbles and boulders. Inferred to be delta, fan or lag deposits in glacial channels or near former ice margins.

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, rock, pre-Pleistocene in age. Areas mapped as bedrock may have up to a meter of glacial drift (till, sand, silt) mantling the rock surface in some locations.

CROSS-SECTION A-A'



SYMBOLS

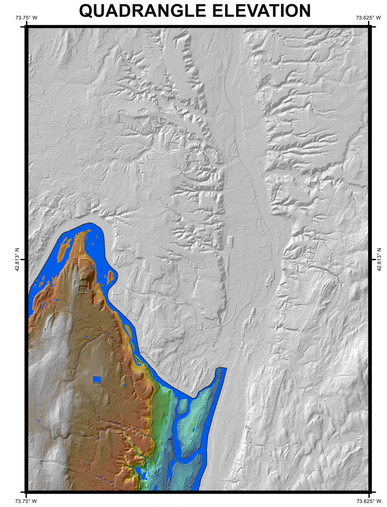
- Streets
- Highways
- Railroads
- County Lines
- Water Bodies
- Streams
- Contours
- Cross-Section Line
- Unmapped Area
- NYSGS Soil Sample Location
- NYSDEC Water Well Location
- NYSDOT Boring Location
- Drumlins

QUADRANGLE LOCATION

ADJOINING QUADRANGLES

Round Lake	Mechanicville	Schaghticoke
Niskayuna	Troy North	Tomhannock
Albany	Troy South	Averill Park

QUADRANGLE ELEVATION



Feet-amsl
0 390

1:75,000 scale; 2x vertical exaggeration
Shaded relief generated from 2008 Captial District 2-meter, 2014 Hudson Hoosick 2m, 2010 Rensselaer Hoosick 2m and NYS 10m lidar data

NOTICE

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program STATEMAP award number ***G19AC00249*** *in the year 2019.*

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New York State Museum Map & Chart No. 133
ISSN:0097-3793 ; ISBN:978-1-55557-367-6