New York State Museum
Mark Schaming, Director

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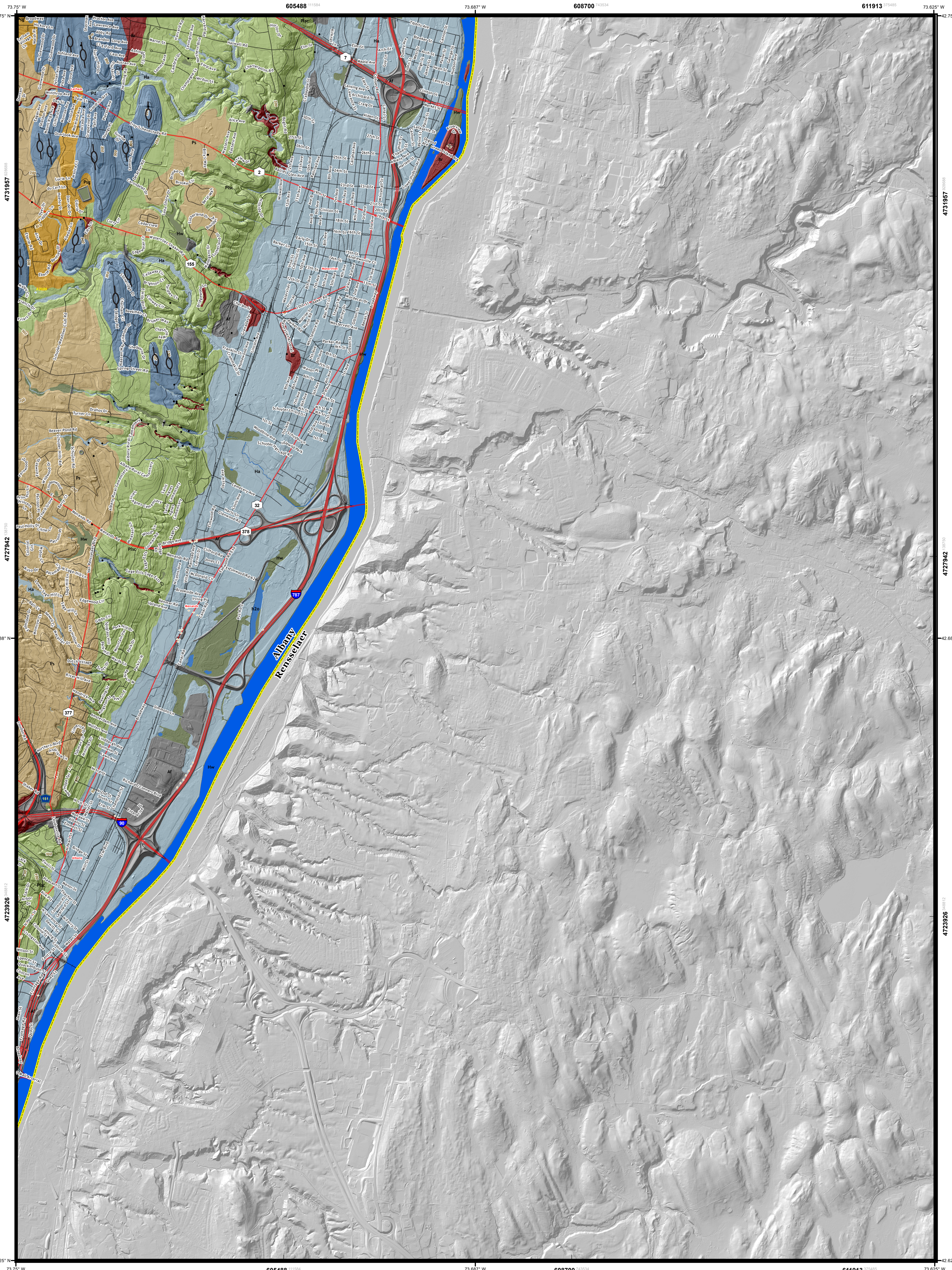


Universal Transverse Mercator, Zone 18 N
North American Datum of 1983

Hygrology, 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 hydrograpghy
(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)

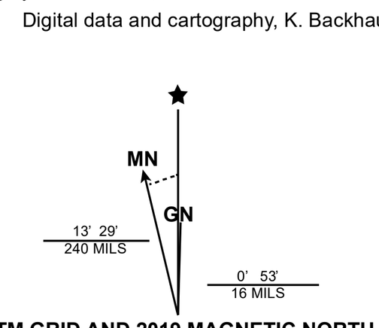
Magnetic declination from the NOAA online Declination Calculator:
http://www.ngdc.noaa.gov/geomag-web/#declination

SCALE 1:24,000

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

CONTOUR INTERVAL: 10 FEET

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



UTM GRID AND 2019 MAGNETIC NORTH
DECLINATION AT CENTER OF SHEET

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

Karl J. Backhaus, James R. Leone, Andrew L. Kozlowski, and Robert J. Dineen
2020

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

prepared by
Karl J. Backhaus and Andrew L. Kozlowski

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

INTRODUCTION:
The Troy South 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 15 square mile area.

The Troy South quadrangle is in eastern Albany County in the Capital District Region of New York State along the western shore of the Hudson River. The northern section of the City of Albany, the City of Watervliet, Town of Green Island and Villages of Menands and Latham are the main municipalities within this portion of the quadrangle. This portion of Albany County is mostly urban and suburban with highly industrialized areas along in the floodplains of the Hudson River to large suburban developments along the hills along the quadrangle's western boundary. This quadrangle is situated within the Hudson-Mohawk Lowlands physiographic province is generally a flay-lying floodplain just above sea-level to a long North-South running ridge cut into by small tributary creeks. There is roughly 370 feet (112 meters) of elevation change between the highest peak atop a drumlin on the N-S ridge at 372 feet 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 with 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 sandstones (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, lacustrine delta, recent deposits (alluvium), till and lacustrine silt and clays (Cadwell and Dineen, 1987). Geologic mapping at a 1:24,000 scale has previous been completed by Lafleur (1965) and Dineen (1976). Their mapping refined the distribution of lithologies, provided geomorphic characteristics to each lithology and the extent of bedrock outcrops in the quadrangle. Lafleur separated the different sand, till and clay units based on their deposition, age and bedding characteristics, respectively. Dineen (1976) drafted the quadrangle and lumped many of these units together based on grain-size or deposition. What all these studies have in common is that the clays were deposited while this area was entrained by glacial Lake Albany and upon the draining of the lake, aeolian sands were deposited as dunes and large sand plains in the former lakebed.

METHODOLOGY:
To create the surficial geology map of the Troy South 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 and processed using either wet sieve or dry sieve methods, following the procedure outlined by Bowles (1978). 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. Sedimentological data from sieve analysis of field samples is available upon request.

The final surficial geologic map, cross-section and elevation maps were produced using the ESRI ArcMap and Adobe Illustrator CS6 programs. The subsurface and surface units were compiled using two water wells from the New York State Department of Environmental Conservation and 35 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 its symbol was colored according to its respective RGB color value in the NYSGS Surficial Geologic Unit Legend. The final map was drafted in Adobe Illustrator and exported as a PDF file.

RESULTS:
A total of 84 field stops were taken, with 19 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: 29 stops were glaciolacustrine silt and clay, 22 were diamicton, 20 were bedrock, eight were sand, three were sand and gravel, two were alluvium and one stop for artificial fill. 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 floodpain 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 along the N-S ridge along the western boundary of the quadrangle.

Pleistocene Sand (Ps)
Well sorted and stratified sand, deposited by fluvial, lacustrine or eolian processes. Inferred as deposits associated with distal glacial environments. Well-sorted 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 beach front or deltaic 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 in the northwest corner of the quadrangle and as a small sliver atop the N-S ridge along the western boundary of the quadrangle.

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 to 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 South quadrangle are consistent with a full glacial cycle. The diamicton found throughout this area was deposited beneath the advancing Hudson Lobe, forming the drumlins along the western boundary atop the N-S ridge. Upon the retreat of the Hudson Lobe, meltwater began eroding out the bedrock gorges found along the eastern edge of the N-S trending ridge while also depositing sand and gravel deposits known as kames and fluvial sands between the drumlins. This retreat also caused for isostatic rebound of previously glaciated areas 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) found along the N-S ridge. Deltaic sands and beach sands (Ps) were deposited in the shallow waters around 300 feet and then at lower elevations as Lake Albany receded. During the low stages of Lake Albany, episodical catastrophic 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.

SUMMARY AND CONCLUSIONS: Continued...
. al., 2008). This erosion wiped out most the glaciolacustrine deposits (Plsc) in this channel and exposed bedrock within the channel. Today, this channel has a few outcrops of bedrock in this quadrangle but is mainly alluvium (Ha) and 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 as drumlins are formed beneath a glacial ice sheet but the >20-foot-thick deposits of glaciolacustrine silt and clay represent a distal, glacial lake deposit. The delta deposits of sand show areas of flowing water into the glacial Lake Albany basin. Their wide distribution over a range of elevations show the deposition during the recession the lake. The wide-flat lying Hudson River floodplain was formed because of the large outburst flood with the release of water from glacial Lake Iroquois.

Upon completion of field mapping within the Troy South quadrangle, the evidence discovered in this area suggests that multiple glacial episodes as seen in exposures with multiple diamicton layers interbedded with either outwash and/or glaciolacustrine deposits. These exposures suggest at least two advances and one retreat of the ice sheet. Further work is to be done in the other tributary creeks north of the Albany Rural Cemetery and find deposits where OSL samples can be taken to constrain the age of the deposits in this area.

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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.

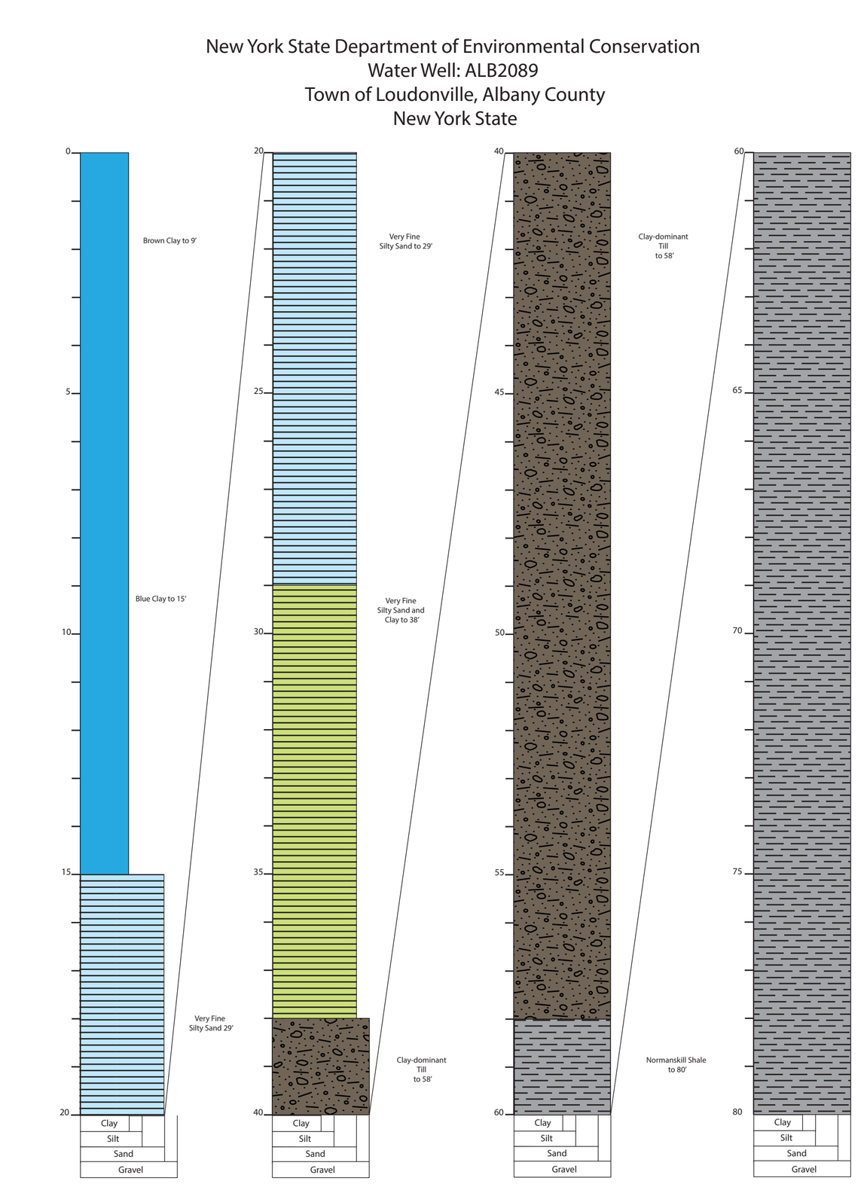
Psg — **Stratified sand and gravel (Psg)**
Well-sorted and stratified sand and gravel. May include cobbles and boulders. Inferred to be delta, fan or lag deposits in glacial channels or near former ice margins.

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'

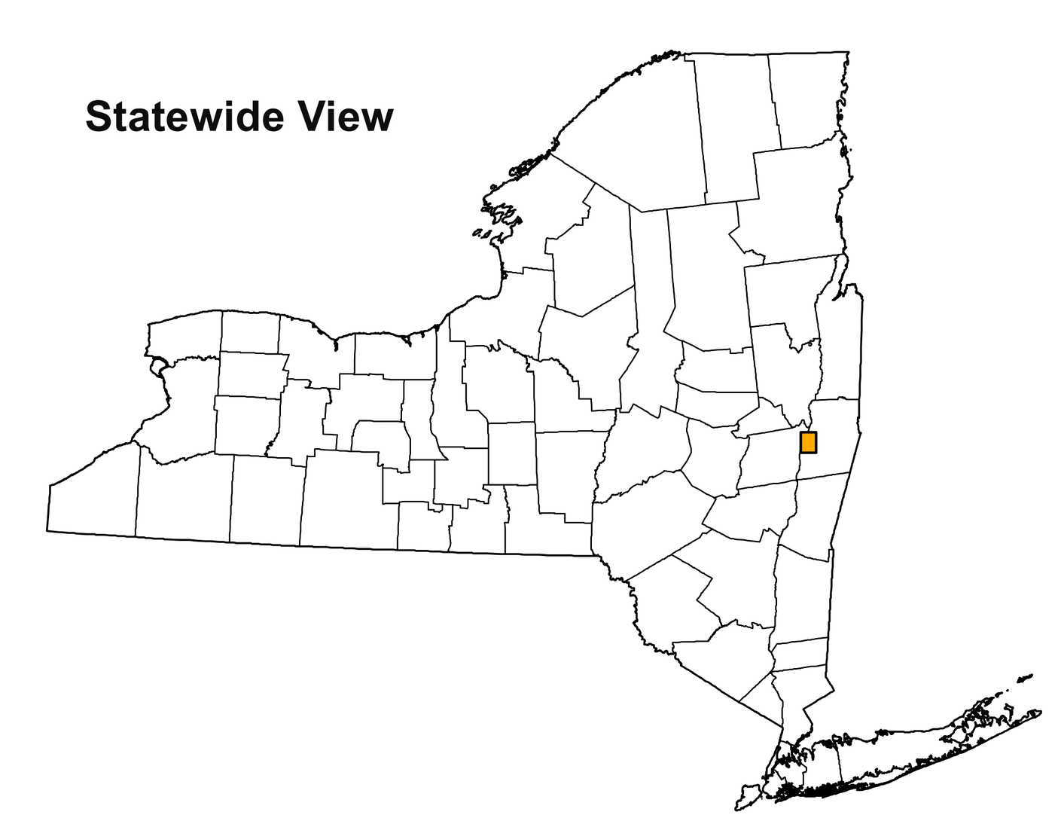


SYMBOLS

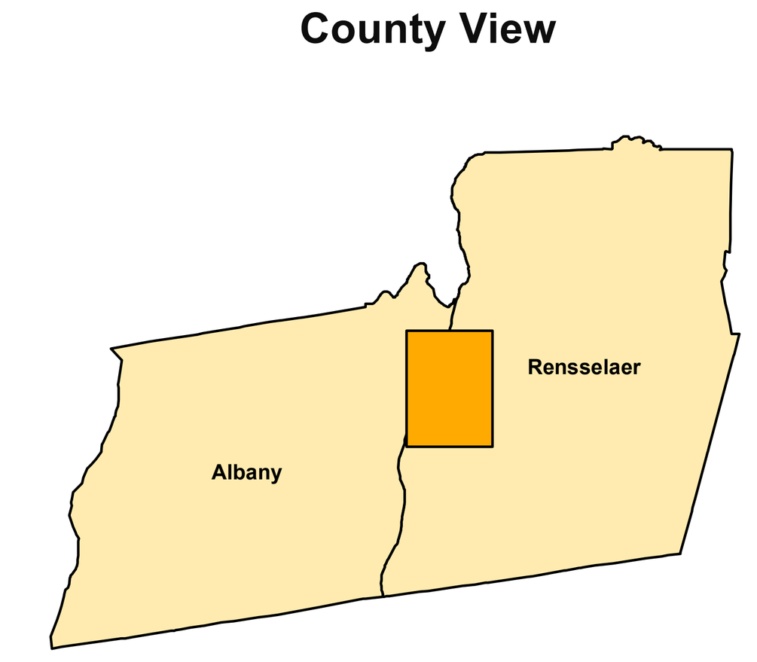
Streets	Water Bodies	NYSGS Soil Sample Location
Highways	Streams	NYSDEC Water Well Location
Railroads	Contours	NYSDOT Boring Location
County Line	Unmapped Area	Drumlins

QUADRANGLE LOCATION

Statewide View



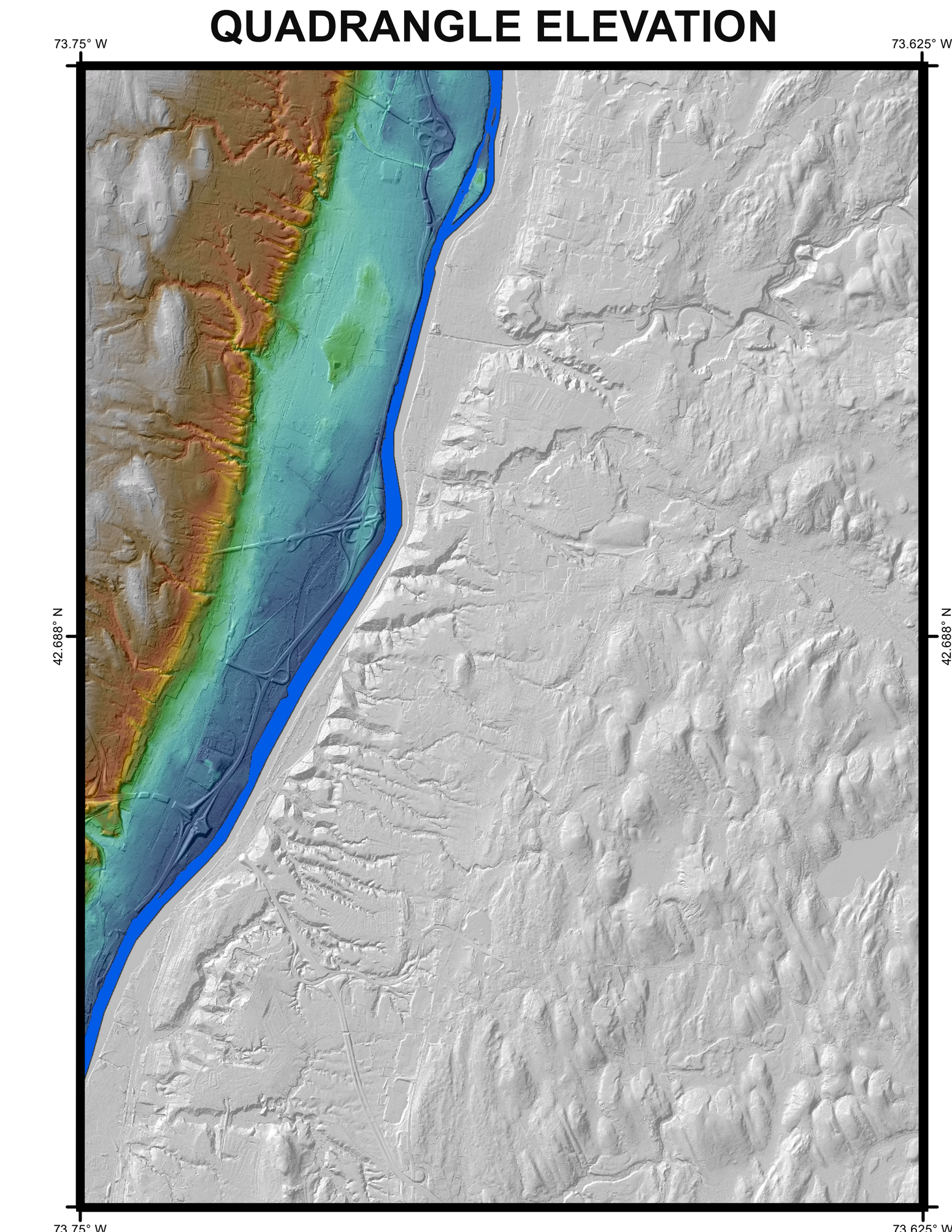
County View



ADJOINING QUADRANGLES

Niskayuna	Troy North	Tomhannock
Albany	Troy South	Averill Park
Delmar	East Greenbush	Nassau

QUADRANGLE ELEVATION



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

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