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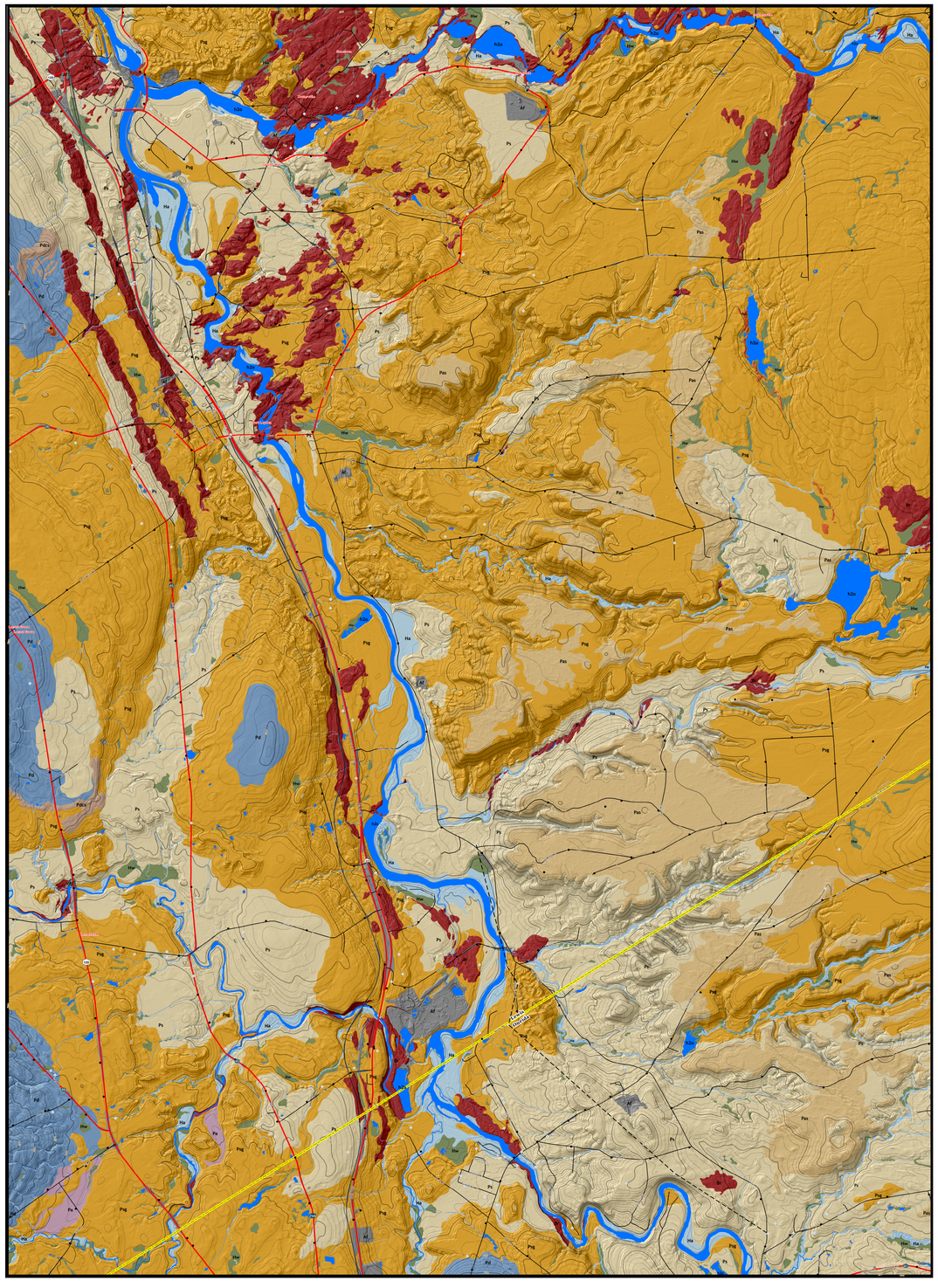


Universal Transverse Mercator, Zone 18 N
North American Datum of 1983

Hydrology, and planimetry layers from the New York State DOT Raster Quadrangle separates for Lewis, and Oneida Counties (https://gis.ny.gov/gisdata/inventories/member.cfm?OrganizationID=108)

Geographic data layers from 2023 TIGER/Line shapes for transportation and hydrography: (https://www.census.gov/cgi-bin/geo/shapefiles/index.php)

Shaded relief from the 2019 FEMA and 2022 USGS Lake Ontario-Hudson River 1m lidar data sets (http://gis.ny.gov/elevation/index.cfm)

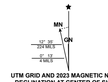
Magnetic declination from the NOAA online Declination Calculator: (http://www.ngdc.noaa.gov/geomag-web/#declination)

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 and H. Forgeng, 2023
Digital data and cartography, Karl J. Backhaus, 2023



UTM GRID AND 2023 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SURFICIAL GEOLOGY OF THE PORT LEYDEN 7.5-MINUTE QUADRANGLE, LEWIS AND ONEIDA COUNTIES, NEW YORK

Karl J. Backhaus and Hailey M. Forgeng
2023

SURFICIAL GEOLOGY OF THE PORT LEYDEN 7.5-MINUTE QUADRANGLE, LEWIS AND ONEIDA COUNTIES, NEW YORK

prepared by
Karl J. Backhaus

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National Cooperative Geologic Mapping Program Great Lakes Mapping Coalition Award Number G22AC00529

INTRODUCTION:
The Port Leyden 7.5-Minute Quadrangle was mapped as part of the National Cooperative Geologic Mapping Program's Great Lakes Geologic Mapping Coalition projects in 2023, funded by awards #G22AC00386. This quadrangle is one of 34 that have been mapped under the Lewis County Surficial Geologic Mapping Project, which the NYSGS initiated in 2023 and aims to conclude in the late-2020s. The purpose of this map is to identify and delineate various surficial and geologic materials with the intent to inform and guide municipalities in land-use, environmental, and natural resource decisions across its approximately 54-square-mile area.

The Port Leyden quadrangle is located within the Black River Valley region of New York State, along the two county boundaries. It encompasses the southern border of Lewis County, and the northern border of Oneida County. The primary municipalities within the Port Leyden Quadrangle are the Village of Lyons Falls, Village of Port Leyden, and Town of Boonville. The Sand Flats State Forest, and is largely forested on the eastern side and private agricultural farms on the western side of the quadrangle.

The quadrangle is part of the Adirondack and Tug Hill Plateau physiographic provinces and features generally flat-lying multi-tiered hilltops, separated by the meandering Black and Moose River Valleys between them. The elevation varies by approximately 630 feet (192 meters at along the western boundary near Cone Road at 1,738 feet above mean sea level (530 meters-amsl) to the base of Lyons Falls floor at 738 feet-amsl (225 meters-amsl). Major water bodies in the area include the Black River, Moose River, and the Sugar River.

Bedrock in the Port Leyden Quadrangle predominantly consists of black shale/sandstones, limestone and crystalline gneisses, which are Devonian to Proterozoic in age, respectively (Isachsen and Fisher, 1970). According to the Adirondack sheet of the Geologic Map of New York State, the quadrangle's bedrock comprises, from youngest to oldest, the Utica Shale, Trenton and Black River Groups overlying the Middle Proterozoic undifferentiated gneisses.

The surficial geologic units in this quadrangle were previously mapped at 1:250,000 scale and were reported to be swamp deposits, alluvium, kame, till, thin till over rock, and lacustrine sand and deltas (Cadwell and Pair, 1991). The only higher resolution geologic map in this area was created by Waller (1976) mapping the Black River Basin at a scale of 1:125,000.

METHODOLOGY:
To create the surficial geology map of the Port Leyden quadrangle, preliminary field maps were generated using ESRI ArcMap 10.8 software. These maps incorporated all available topographic data, including roads, lidar surface terrain, and hydrography, to serve as a base for plotting field data. These data comprised field stops, bedrock outcrops, and other important site information. For surficial soil sampling, a five-and-a-half-foot hand auger was used to enable sampling below the variably thick organic soil horizon, which is situated beneath the topsoil. An entrenching shovel and pick were also used to remove topsoil and/or eroded sediments from outcrops or exposures, thereby exposing fresh sediments for analysis. At each field stop, various details were logged into a field notebook. These details included the coordinates, captured using a Garmin GPS 66st, descriptive notes on the sediment encountered, any samples taken, the time of stop, and any high-resolution photographs that were taken.

At most of the field sampling sites, soil samples were collected for grain-size analysis. This involved the use of either one of two methods: dry-sieve or wet-sieve analysis. Both methods followed the procedure outlined by Bowles (1978), but utilized a seven-tiered sieve stack (#5, #10, #18, #35, #60, #120, #230, and Pan) for both dry (mechanical) and wet (hydrometer) sieve analysis. Predominantly cohesive samples, which are fine-grain dominant, were analyzed using wet-sieve methods, while cohesionless samples, which are coarse-grain dominant, were analyzed using dry-sieve methods.

The final surficial geologic map, along with cross sections and elevation maps, were generated using ESRI ArcMap and Adobe Illustrator CS6 software. Cross sections were initially created in ArcMap utilizing the XArto Cross Section 10 Tool. These cross sections were then exported to Adobe Illustrator for the correlation of stratigraphic units. The surficial geologic map was developed by scanning mylar sheets that had been drafted based on the geologic field maps. Polygons were then created by digitizing these scanned maps in ArcMap and color-coding them to represent different surficial geologic units within the quadrangle. The final map was assembled in Adobe Illustrator and exported as a PDF file.

RESULTS:
A total of 341 field stops were conducted within the quadrangle, yielding 110 samples for grain-size analysis (Appendix A). Some stops produced more than one sample, as they exhibited stratigraphy either in surface exposures or at depths accessible via the hand auger. The final tally of lithologies discovered during field sampling is as follows: 134 were sand and gravel, 125 were sand, 54 were exposed bedrock, 12 were diamicton, 14 were glaciolacustrine silt and clay, one was swamp deposits, and one was alluvium. The surficial geologic units identified within the quadrangle are as follows:

Artificial Fill (Af)
This unit generally consists of coarse-to-fine materials such as large cement mounds and crushed rock, which have been transported anthropogenically for construction purposes. These materials are commonly used in large artificial dams designed to retain water, elevated roadbeds, bridge abutments, quarries and large mill facilities within the quadrangle that are raised above the surface.

Holocene Alluvium (Ha) and Holocene Wetland Deposits (Hw)
Post-glacial sediments are found in low-lying areas or land depressions throughout the quadrangle. Holocene alluvium is associated with fluvial processes in creek valleys across the area and primarily consists of stratified silt, sand, and gravel. Holocene wetland occurs in low areas and depressions in the highlands of the quadrangle, where wetlands form due to limited drainage capacity. The lithology in these areas generally comprises peat, marl, clay, or sand.

Pleistocene Alluvium (Pa)
Pro-glacial sediments found in low-lying areas mainly consisting of stratified silt, fine sand to gravel. These deposits are associated with fluvial processes and represent a temporary, localized higher base level associated with a period of glaciation that preceded Holocene floodplains. Typically lying within a meter above bedrock, they include subrounded to angular gravels. In the Port Leyden quadrangle this alluvium indicative of meltwater deposits from higher elevations of the Tug Hill Plateau.

Pleistocene Silt and Clay (Plsc)
This stratified, fine-grained sediment is composed of fine sand, silt, and clay-sized particles. It is inferred to have been deposited in mid-shore to deep-water settings of glacial lakes and may include marl, rhythmites, and varves. The Plsc units are primarily found as isolated deposits of former glacial lakes and possible buried ice-walled lake plains under Pleistocene Sand.

Pleistocene Sand (Ps)
Well-sorted and stratified sand is deposited through fluvial, lacustrine, or aeolian processes. These are inferred to be deposits associated with distal glacial environments. Observations indicate that these well-sorted sand deposits often overlie coarser sand and gravel deposits (Psg), likely because of a decrease in depositional energy or potential aeolian activity. Ps deposits are predominantly located east of New York State Route 96, situated atop layers of stratified sand and gravel.

Pleistocene Aeolian Sand (Pas)
Characterized by well-sorted, cross-bedded to stratified fine to medium sand with a minor silt component. These deposits are associated with aeolian transportation of sediment grains and are usually found as dunes. In this quadrangle, aeolian sands are found as multiple types of dunes on the east side of the Black River.

Pleistocene Sand and Gravel (Psg)
Characterized by well-sorted and stratified sand and gravel, this unit is believed to have been deposited by glacial meltwater at or very near the glacier's edge. It is often found at elevations several meters higher than the floors of present-day river valleys. The Psg unit is found throughout the quadrangle with the majority of the deposits lying within and around the Black River Valley.

Pleistocene Diamicton (Pd)
This unit consists of a heterogeneous mixture of sediment grains, ranging in size from clay to boulders. In this quadrangle, all diamicton is interpreted as glacial till, which is sediment deposited directly beneath a glacier. It is generally matrix-supported and dominated by sand, featuring a color spectrum that includes both tan and reddish-brown hues. Diamicton is primarily found on the western part of the quadrangle at higher elevation or right above Paleozoic bedrock ridges.

Pleistocene Diamicton (Clast Supported) (Pdcs)
This unit is an admixture of unsorted sediment, ranging in size from clay to boulders. It is generally clast-supported, massive, and clast-rich, and is interpreted as till. Within this quadrangle, identified moraines consist of clast-supported till that can be gravel-rich, with some areas exhibiting hummocky topography along the morainal boundary. Pdcs is only found in the northwestern part of the quadrangle as part of the Collinsville Moraine along East Road (County Route 43).

SUMMARY AND CONCLUSIONS:
The Port Leyden quadrangle is divided by the northward flowing Black River, with the Black River Group's Paleozoic shales, limestones, and sandstones on the western side up through the Utica Shale, and Middle Proterozoic gneisses on the eastern side. Bedrock outcrops vary across the quadrangle, from small outcroppings a few meters in size to larger, miles-long outcroppings along the Moose and Black Rivers. The predominant bedrock in the eastern portion is the red to white gneisses, which are highly foliated and fractured, many showing striations from previous glaciations. The Paleozoic rocks on the western side form a bench-like topography and are also highly fractured, with some outcroppings so weathered they appear like laminated lacustrine sediment. Notable Paleozoic outcroppings can be found along State Route 12 between Port Leyden and Boonville, and at Talcottville Falls on State Route 12D.

Overlying the bedrock in the Port Leyden quadrangle are coarse sediment grain units of sand and gravel (Psg, Pics) and sand (Pas, Ps). Sand and gravel deposits, found throughout the quadrangle at varying elevations, range from fine sand to boulder-sized grains. Predominantly, these deposits are medium sand to gravel, with a fine sand component. These are interpreted as proximal meltwater deposits from the retreating Oneida lobe, as indicated by the high energy needed to transport the clasts. Ice-contact sand and gravel deposits (Pics) were found in the higher elevations on the east side of the quadrangle and consists of medium sand to cobbles in sediment size. Ice-contact sand and gravel deposits (Pics), consisting of medium sand to cobbles, are found in the higher elevations on the east side and are often stratified, forming eskers or kame deposits.

Atop these sand and gravel deposits are silty fine to fine sand deposits from Glacial Lake Boonville (Fairchild, 1906). These deposits, massive to rippled, overlay glaciolacustrine and sand and gravel deposits, indicating an energy shift in the lake/fluvial setting. After Glacial Lake Port Leyden receded, katabatic winds transported silt to medium sand through particle and saltation. These aeolian deposits (Pas) are observed as sand dunes or sheet sands at higher elevations on the east side of the quadrangle, indicating west-to-east wind transportation of sediment atop east-to-west flowing meltwater sand and gravel. In the southwestern corner of the mapping area, remnants of former meltwater channels are found within a meter of bedrock. These Pleistocene Alluvium (Pa) deposits, consisting mostly of silty fine gravel with pockets of medium to fine sand and gravel, indicate previous base levels of meltwater channels. The clasts within these deposits are mostly subrounded to angular and include local bedrock clasts.

SUMMARY AND CONCLUSIONS: Continued...
Matrix-supported diamicton (Pd) was identified at higher elevations on the western edge of the county. This diamicton is predominantly medium sand with a range from clay to cobble sizes. It exhibits a grey to tan color that distinguishes it from the blue/grey, clast-supported diamicton (Pdcs) that forms the moraines outside of Lyons Falls. The clast-support diamicton is medium sand dominant and more commonly includes cobbles and boulders in its matrix. On the western walls of the Black River Valley, atop limestone deposits, glaciolacustrine sediment (Plsc) was identified, overlain by silty fine sand. These clayey silt-dominant deposits either represent buried ice-walled lake plains covered by later deposits or are remnants of a larger pro-glacial lake sequence.

There are several notable landform types present within the quadrangle, predominantly shaped by post-glacial processes. The most prominent of these are sand dunes. The Leyden Dune Field is the largest, covering 9 square kilometers. The dunes range from 1 meter to 3 meters in height, with the longest extending nearly a kilometer. Additionally, a remnant shoreline from Glacial Lake Port Leyden, at 1,175 feet-amsl, is visible atop a fine to medium sand delta east of State Route 12D and north of the Sugar River. Other significant landforms within the quadrangle are of ice-contact origin. The Porters Corners Esker system is observed at the higher elevation on the eastern side of the mapping area. This a north-south trending, well-stratified, coarse-grained sinuous landform, occurring in two segments but maintaining the same orientation. This landform is a remnant of a sub-glacial river deposit with steep sides, sinuous sides. Lastly, the Collinsville Moraine, located just east of Lyons Falls, stands out as a solitary morainal feature, measuring over 32 meters in height and 700 meters in length.

Upon the completion of field mapping within the Port Leyden quadrangle, it is apparent that extensive sediment erosion and deposition occurred in this area during the last glacial retreat. This conclusion is supported by the extensive distribution and thickness of delta deposits atop bedrock within the Moose and Black River Valleys. The absence of continuous ice-marginal features and diamicton deposits suggests erosion during retreat, followed by the deposition of coarse-grained meltwater deposits. Additional research is needed to determine the type and genesis of the sand dunes within this mapping area. Post-mapping, an Optically Stimulated Luminescence (OSL) sample was taken from the largest dune, with results still pending at the time of this report.

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Fairchild, H.L., 1906, The Glacial Waters in the Black and Mohawk River Valleys. New York State Museum, Museum Bulletin, No. 160, 47 pgs.

Isachsen, Y. W., and Fisher, D.W., 1970, Geologic Map of New York, Adirondack Sheet: New York State Museum, Map and Chart Series No. 15, Scale 1:250,000.

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DESCRIPTION OF MAP UNITS

Holocene

Af — **Artificial Fill (Af)**
This unit is generally composed consists of coarse/-to-fine, materials such as large cement mounds and/or crushed rock , which have been transported 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

Pa — **Stratified Silt, Sand and Gravel (Pa)**
Pro-glacial sediments found in low-lying areas mainly consisting of stratified silt, fine sand to gravel. These deposits are associated with fluvial processes and represent a temporary, localized higher base level associated with a period of glaciation that preceded Holocene floodplains.

Plsc — **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 deepwater settings of glacial lakes. May include marl, rythmites, and varves.

Pas — **Aeolian Sand (Pas)**
Characterized by well-sorted, cross-bedded to stratified fine to medium sand with a minor silt component. These deposits are attributed to the transportation and deposition of sediment grains by wind through suspension and saltation, forming mounds of loose sand of various size and morphology. Generally found as dunes or sheet sands.

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

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.

Pics — **Cobbles to Sand (Pics)**
Stratified, ice contact 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 diamicton (flow till).

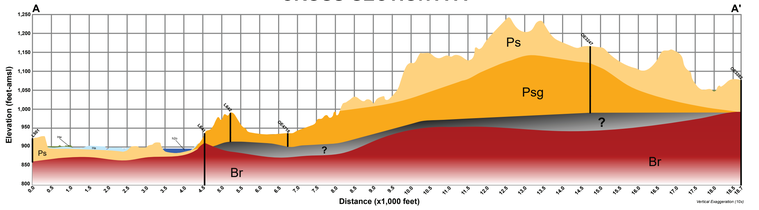
Pd — **Diamicton (Pd)**
An admixture of unsorted sediment ranging from clay to boulders. Generally matrix-supported, massive and clast-rich.

Pdcs — **Diamicton (Pdcs)**
An admixture of unsorted sediment ranging from clay to boulders. Generally clast-supported, massive and clast-rich.

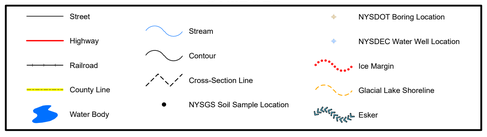
Pre-Pleistocene

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.

CROSS-SECTION A-A'



SYMBOLS



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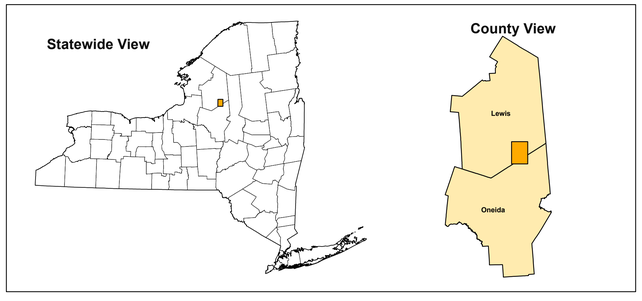
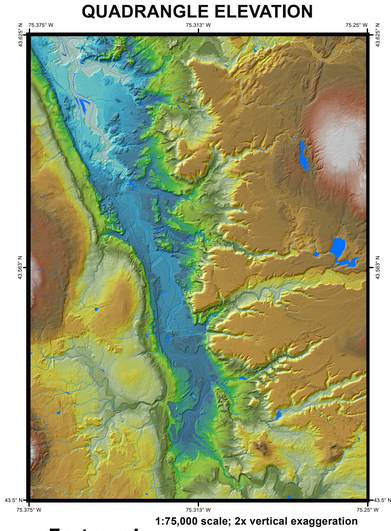


ADJOINING QUADRANGLES

Glenfield	Brantingham	Copper Lake
Constableville	Port Leyden	Woodgate
West Leyden	Boonville	Forestport

QUADRANGLE ELEVATION



1:75,000 scale; 2x vertical exaggeration

Feet-amsl
740 1340

Shaded relief generated from 2022 Lake Ontario-Hudson River and the 2019 FEMA 1-meter lidar data sets.

NOTICE

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program Great Lakes Mapping Coalition award number ***G22AC00529*** *in the year 2023.*

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