INTRODUCTION

Utica is a city in New York state, located in Oneida County. The Utica region is characterized by its geologic history, which includes layers of sedimentary rock and glacial deposits. This geologic framework has influenced the development of aquifers and ground water conditions.

The stratified-drift aquifer system forms an important source of ground water in the Utica area. These aquifers are situated in glacial drift deposits that cover parts of the region. The aquifers are recharge areas for streams and rivers, and they provide water for municipal and industrial purposes.

The hydrogeology of the Utica region is complex, with multiple aquifers present. These aquifers are subject to natural and human-influenced factors that affect their quality and quantity.

BACKGROUND

The hydrogeological studies in the Utica region began in the 1960s, with initial work by Halberg and others (1962). Since then, numerous studies have been conducted, including those by Casey and Reynolds (1989), Waller and Finch (1982), and others.

These studies have involved the collection of hydrogeologic data from various sources, including published reports, unpublished reports, and field investigations. The results of these studies have been compiled on eight sheets, covering the hydrogeology of the Utica region.

The hydrogeologic investigations in the Utica area have focused on the stratified-drift aquifers, which are the main sources of ground water. These aquifers consist of unconsolidated glacial and alluvial deposits that partly fill bedrock valleys and their tributaries. Ground water in these aquifers is under either water-table (unconfined) or artesian (confined) conditions.

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Depositional Chronology

The area was covered by the deposit of the Glacial Lake Ontario which drained to the east through the Mohawk valley and then eventually drained to the east through the Mohawk valley. As a result of this drainage, the land was left with a low relief surface and the Glacial Lake Ontario was formed in the area and drained in the late Wisconsinan period. The deposits left behind by the melting of the ice sheets were a series of till, kame, and outwash deposits known as the "Frankfort Hill Moraine." This moraine is composed of till, kame, and outwash deposits and is a major feature in the study area.

The deposits between the retreating ice lobes and the northern margin of the Appalachian Escarpment consist of outwash sand and gravel; lacustrine clay, silt, and sand; ice-contact deposits; and lake deposits. These deposits were formed in and along the edge of the Mohawk Valley where glacial meltwater streams drained into the lake. As the lake drained, the deposits were left behind and formed a series of deposits known as the "Lake Mohawk Delta." These deposits were formed in and along the edge of the Mohawk Valley where glacial meltwater streams drained into the lake.

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STRATIFIED-DRAF'T AQUIFERS


REFERENCE CITED

This map shows the configuration and average altitude of the water table, in feet above sea level, in the surficial stratified-drift aquifer. The map is based on water levels measured at wells that were inventoried by the U.S. Geological Survey during the late 1940's and late 1960's. The elevations of perennial streams were used to augment well data, mainly in the tributary valleys. In some areas, potentiometric head data from wells finished in bedrock were used to estimate the approximate position of the water table in the surficial sand and gravel aquifer. Water-table contours are drawn with a 10-ft contour interval where water-level and stream altitude data is adequate, while a contour interval of 20 feet was used in areas where data are lacking.

Direction of Ground-Water Flow
Ground water in valley aquifers generally flows downvalley along natural gradients and toward major streams under relatively steep cross-valley gradients. Ground water in the Mohawk River valley in the Utica area flows predominantly cross-valley (toward the river), with only a small gradient downvalley.

EXPLANATION
- **WELL** Shallow well that taps stratified-drift aquifer and yielded water-level data. Number is water-table altitude, in feet above sea level.
- **WELL** Well that taps bedrock aquifer and yielded potentiometric head data. Number is altitude of potentiometric surface of bedrock aquifer, in feet above sea level.
- **WATER-TABLE CONTOUR** Shows water-table altitude in the stratified-drift (water-table) aquifer. Contour interval 10 feet where data permit, otherwise 20 feet. Datum is sea level.
- **DIRECTION OF GROUND-WATER FLOW** Shows general direction of ground-water flow in the surficial stratified-drift aquifer.
- **AQUIFER BOUNDARY** Approximate limit of stratified-drift aquifer.
GENERALIZED BEDROCK TOPOGRAPHY

Bedrock in the Utica area consists primarily of two units, the Utica shale and Frankfort Shale, both of Late Ordovician age, which dip gently to the south-southwest. The Utica Shale is overlain by the Frankfort Shale. North of the Mohawk River, the Frankfort Shale is the caprock on Smith Hill, Bell Hill, and Hasenclever Hill, all part of a discontinuous north-facing cuesta collectively called the Deerfield Hills (Kay, 1953). The uplands are covered by a veneer of glacial sediments that generally thicken toward the Mohawk River valley. South of the Mohawk River, these Ordovician shales are overlain by sandstones and shales of Silurian age that form the northern margin of the Allegheny Plateau (Kay, 1953).

The Clinton Group, which includes the Oneida conglomerate is composed of shale, sandstone, dolomite, conglomerate, and red iron ore. This group is overlain by the Lockport Dolomite, then the Vernon and Camillus Shales (Halberg and others, 1962).

The area was uplifted and tilted before the onset of glacia- tion and has been glacially eroded into the major relief features of the region, the principal ranges of hills, and the Mohawk valley (Kay, 1953).

Well logs suggest a buried drainage channel within the broader Mohawk valley that was eroded deeply into the soft, underlying Ordovician-age shales.

SELECTED REFERENCES


This map depicts the total saturated thickness of the unconsolidated valley-fill material, which includes sand, gravel, lacustrine silt, clay, and till. The saturated thickness shown here includes deeper outwash deposits in the Mohawk River valley, which are separated from the upper aquifer by a layer of till. In many areas, the extent and distribution of permeable and impermeable materials are uncertain due to a lack of data; consequently lines of equal thickness in these areas are inferred.

The Mohawk River valley contains two stratified-drift aquifer systems: a confined aquifer that consists of clean sand and gravel overlain by a till, and a surficial unconfined aquifer composed of outwash sand, gravel, and lacustrine and fluviatile sand that is interbedded with lacustrine silt and clay. The confined aquifer has an average thickness of about 75 feet; it is thickest in the center of the valley and thins toward the valley walls. The unconfined aquifer, which is the aquifer of primary interest in this area, ranges from 20 to 75 feet in thickness.

On the Mohawk River flood plain, it is covered by a veneer of recent alluvium. This flood plain was once covered by a proglacial lake; tributary streams now enter it where meltwater streams once dropped sand to form deposits that range from 20 to 100 feet in thickness.
GENERALIZED SOIL PERMEABILITY

This map classifies the soils of the area as to the approximate rate at which water passes vertically through the A and B horizons (generally less than 30 inches) of the soil profile. The values are given in relation to the less permeable soil horizon (A or B) as determined from infiltration rates obtained in recent soil surveys of Oneida and Herkimer Counties.

Soil permeability does not always coincide with surficial geologic units. Soils that developed on the valley floor of the Mohawk River are derived mainly from fine-grained flood-plain alluvium and, although moderately permeable, they may retard infiltration into the more permeable underlying outwash deposits. The outwash deposits that form high terraces and have not been covered with a fine-grained alluvium typically have higher permeability than those on the flood plain. Steep, narrow valleys may contain soils with a wide range of permeability, but the area covered by each type may be too small to show at this scale. The upland areas are generally covered with a virtually impermeable, clay-rich till. Steep slopes that have only a very thin soil cover allow most precipitation to run off as surface flow, and, thus, have extremely low infiltration rates.

SELECTED REFERENCES
Person, C. S., Feuer, R., and Cline, M. G., 1960, Oneida County Soils: New York State College of Agriculture, 1 sheet, 1:125,000 scale.

EXPLANATION

- **Infiltration-rate classification**: low, moderate, high
- **Infiltration rate in inches per hour**: 0.06 - 0.2, 0.2 - 6, 6 - 20

**HYDROGEOLOGY OF THE STRATIFIED-DRIFT AQUIFERS IN THE UTICA AREA, ONEIDA AND HERKIMER COUNTIES, NEW YORK—PART 2 (EAST)**

By George D. Casey and Richard J. Reynolds
1988
Sheet 7. Generalized Soil Permeability
Land outside the urbanized areas in or near the Mohawk River valley and its larger tributaries is used mainly for farming, although some forest remains. Scattered throughout the rural area are small hamlets, wetlands, and areas excavated for sand and gravel. The villages of Ilion, Frankfort, Mohawk, and Herkimer are predominantly residential with some industrial, commercial, and open lands. The city of Utica is principally residential but uses a larger percentage of land for industrial and commercial use than the other developed areas. The Mohawk River valley is a major transportation corridor and contains a section of the New York State Thruway (I-90), the New York State Barge Canal, and the main east-west rail line. The Mohawk River at Utica has a mean annual discharge of approximately 1,000 cubic feet per second (G. D. Firda, U.S. Geological Survey, oral commun., 1986).

Land use is an important consideration in the development of a ground-water-protection program for this area. The high permeability of the surficial aquifer and relatively shallow depth to water in most places makes ground water in this area susceptible to contamination from surface sources such as landfills, salt-storage stockpiles, hydrocarbon-fuel storage, chemical plants, and other facilities having a potential for contaminant leakage.

The land-use classification shown here is based primarily on 1967-68 data that were published as Land Use and Natural Resources Inventory (LUNR) maps by Cornell University (1968) and updated from New York State Department of Transportation 1:24,000-scale topographic maps.

### EXPLANATION
- **INDUSTRIAL** incl. light and heavy manufacturing, petrochemical and petroleum-processing industries
- **MINERAL-EXTRACTION** incl. mining and quarrying, exploration, and processing and distribution activities
- **OPEN LAND** incl. open recreation areas and open public areas such as parks, golf courses, hospital grounds, school and college campuses, correctional facilities, and cemeteries
- **TRANSPORTATION** incl. limited-access highways, airports, truck and train terminals and yards
- **FARMLAND** incl. land used for crops and pasture
- **WATER AND WETLANDS** incl. natural or manmade ponds, lakes, or reservoirs, streams and rivers averaging 100 feet wide or more, bogs and shrub wetlands, wooded wetlands, and marine wetlands

**REFERENCE CITED**
Cornell University, 1968, Land use and natural resources inventory (LUNR) map series, Utica west, Clinton, Rome, and Oriskany quadrangle: New York State Cooperative Extension, 4 sheets, 1:24,000 scale.