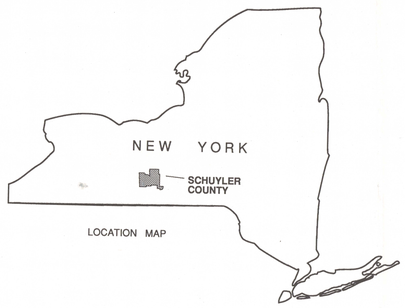
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
SCHUYLER COUNTY

WATER-RESOURCES INVESTIGATIONS REPORT 90-4073
SHEET 1



LOCATION MAP

INTRODUCTION

Some sand and gravel aquifers in Schuyler County may be capable of supplying large quantities of drinking water. To obtain information needed for proper management and protection of the aquifers and to ensure an adequate water supply for the future, the U.S. Geological Survey, in cooperation with the county, compiled geohydrologic data to delineate and characterize the unconsolidated aquifers.

Purpose and Scope

This map provides a regional view of the extent of unconsolidated deposits, including sand and gravel aquifers, in Schuyler County; it is not intended for detailed site evaluations because precise location of hydrogeologic unit boundaries and detailed hydrogeologic information would require site-specific information.

This map shows the well numbers, locations of wells for which data were entered into the U.S. Geological Survey Ground Water Site Inventory (GWSI), and the extent of unconsolidated deposits in Schuyler County. The explanation includes a brief description of the hydrogeologic setting and characteristics of each unit. The New York State Department of Transportation base map (scale 1:48,000), with U.S. Geological Survey topographic contours, shows features such as urban, industrial, and agricultural areas; individual homes; and geomorphic features (river valleys, bedrock hills, terraces, and so forth) that are important considerations to ground-water and land-use managers.

Methods

This study, conducted during 1988-89, entailed compilation of data from the files of several government agencies, including the U.S. Geological Survey office in Ithaca; Schuyler County Watershed Department at Montour Falls; New York State Department of Transportation at Hornell; and the New York State Department of Health at Albany. Geohydrologic data were reviewed and entered into GWSI, a computer data base, where numbers were assigned to wells and the data tabulated. The boundaries of unconsolidated deposits that form the aquifers were delineated and aquifer characteristics summarized according to the surficial geology as described in Muller and Cadwell (1986) and well data.

Tabulated well records can be obtained from the U.S. Geological Survey, 343 U.S. Post Office and Courthouse, Post Office Box 1669, Albany, N.Y. 12201.

Acknowledgments

Special thanks are given to Jim Howell, Schuyler County Watershed Department, who aided in the collection of well data.

GEOLOGIC SETTING

Schuyler County was overridden by continental glaciers at various times from about 1 million years ago to about 12,000 years ago. Approximately 25,000 years ago, the ice sheet that covered New York began to melt, and its southern margin retreated northward (Muller and Cadwell, 1986). The last remnants of the glacier within the county probably disappeared 12,000 years ago. The glaciers deposited unconsolidated sediments on bedrock in most places. The unconsolidated deposits are thin, typically 1 to 30 ft (feet) thick, in the uplands and are thickest (100 to 360 ft thick) in the major valleys.

Bedrock consists of nearly flat-lying Devonian sedimentary rocks such as shale, siltstone, and fine-grained sandstone. Bedrock is at or near (less than 3 ft below) land surface in some stream channels where the unconsolidated deposits have been eroded by recent streams, and on north-facing slopes in uplands and along oversteepened valley walls of north-south valleys that underwent extensive erosion by moving ice.

A mantle of till (poorly sorted clay, silt, sand and cobbles deposited by ice) that is typically 1 to 35 ft thick covers the uplands (except where bedrock is exposed at land surface as noted above) and possibly the bottom of partly drift-filled valleys. The till is mixed with some valley-fill deposits, especially in moraine areas.

SAND AND GRAVEL AQUIFERS

Most of the sand and gravel aquifers in Schuyler County are in the major river and stream valleys, although some small, isolated water-bearing sediments are found in the uplands and along the hillslopes of valleys; these are likely to be thin or saturated only seasonally, however. Sand and gravel aquifers consist of alluvial fans and flood-plain deposits, deltas, outwash, kames, and undifferentiated sand and gravel as indicated on the map. Meltwater that flowed on top of, beneath, within, and in front of the ice transported and deposited sand and gravel mostly in the valleys that sloped or drained southward from the ice sheet. Valleys that drained to the north, toward the ice sheet, contain mostly till and fine-grained sediments such as till, and lacustrine fine sand, silt, and clay, with lesser amounts of sand and gravel. Because till is relatively impermeable, most wells must be drilled deep enough to reach more permeable underlying deposits such as sand or gravel or to bedrock to obtain a sufficient supply of water. In some valleys, postglacial streams subsequently deposited alluvial sand and gravel on top of the glacial drift and, in some areas, these materials form thin aquifers.

SELECTED REFERENCES

Crain, L. J., 1974, Ground-water resources of the western Oswego River Basin, New York: New York State Department of Environmental Conservation Basin Planning Report ORB-5, 136 p.

Muller, E. H., and Cadwell, D. H., 1986, Quaternary geology of New York, Finger Lakes sheet: New York State Museum and Science Service Map and Chart Series no. 40, 1 sheet, scale 1:250,000.

Randall, A. D., 1972, Records of wells and test borings in the Susquehanna River Basin, New York: New York State Department of Environmental Conservation Bulletin 69, 92 p.

Randall, A. D., Snavely, D. S., Holecek, T. J., and Waller, R. M., 1988, Alternative sources of large seasonal ground-water supplies in the headwaters of the Susquehanna River Basin, New York: U.S. Geological Survey Water-Resources Investigations Report 85-4127, 121 p.

0 1 2 3 4 MILES
0 1 2 3 4 KILOMETERS

EXPLANATION

NOTE: Permeability of geologic deposits in this report are defined as follows:

Classification	Hydraulic conductivity, in feet per day
Low	0.0000001 to 0.1
Moderate	0.1 to 10
High	10 to 100

1 ALLUVIAL FANS.--Silty sand and gravel deposited where upland streams flow into a gently sloping valley; typically 10 to 35 feet thick; unconfined conditions; receive recharge primarily from the fan-building tributaries that lose water by infiltration through the channel bed to the underlying water table. Recharge and saturation may be seasonal, especially in small fans built by intermittent streams that have small drainage areas; moderate permeability.

2 ALLUVIAL FLOOD-PLAIN DEPOSITS.--Silt and coarse sand and gravel in small tributary valleys (several hundred feet wide) and silty sand and gravel in larger stream valleys, typically 1 to 10 feet thick; generally unconfined except in some areas where the coarse alluvium is overlain by silt deposited during flooding; low to moderate permeability.

3 SWAMP DEPOSITS.--Peat, muck, organic silt and sand deposited in poorly drained areas, typically 3 to 50 feet thick; water typically contains iron as a result of reduced conditions due to organic matter; low permeability.

4 DELTA.--Sand and gravel deposited by streams along a lake shore; typically 10 to 50 feet thick; unconfined conditions; most recharge is from a delta-building stream that loses water through infiltration through the channel bed to the water table; moderate permeability.

5 HANGING DELTA.--Sand and gravel above the valley floor and on sides of valleys; deposited by streams along former shores of proglacial lakes; typically 5 to 30 feet thick. Streams have typically eroded through the delta and, therefore, have little or no interaction with ground water, generally saturated seasonally; moderate to high permeability.

6 LAKE DEPOSITS AND TILL WITH SOME SAND AND GRAVEL.--Mostly lacustrine fine sand, silt and clay; some till (poorly sorted clay to cobble-sized sediments), and some small, isolated deposits or lenses of sand and gravel that were deposited at the ice front and formed a moraine. Sand and gravel deposits are discontinuous aquifers; typically under confined conditions; variable permeability.

7 OUTWASH.--Coarse to fine gravel deposited in valleys by glacial meltwaters; typically 10 to 80 feet thick; unconfined conditions; high permeability.

8 KAME DEPOSITS.--Includes kames, eskers, and kame deltas; coarse sand to cobble gravel with some silt lenses; deposited on the glacier and later deposited on the ground as the ice melted; unconfined conditions; thickness could not be estimated because deep-well records were insufficient; moderate to high permeability.

9 KAME TERRACE.--Sand and gravel deposited by meltwaters between the ice and adjacent valley walls; typically 5 to 40 feet thick; seasonally saturated in the upper parts but may be perennially saturated in lower parts where deposits are at or below the valley floor; moderate to high permeability.

10 KAME MORAINE.--Clean to silty sand and gravel deposited by meltwaters at the ice margin during deglaciation; typically 20 to 100 feet thick; moderate to high permeability.

11 TILL MORAINE.--Mixed clay, silt, sand, and stones, subordinate amounts of stratified sand and gravel deposited at the ice margin. These deposits contain smaller amounts of coarse, stratified material than kame moraines (and therefore are less permeable) and are found in uplands and in some valleys where the ice had stagnated. In some areas, the till moraine contains small isolated deposits or lenses of sand and gravel or overlies kame or outwash deposits under confined conditions; typically 10 to 35 feet thick; the till fraction of the moraine is a poor aquifer, but the lenses or buried sand and gravel zones would supply sufficient amounts of water to supply homes, farms, and small commercial facilities; generally low permeability.

12 UNDIFFERENTIATED SAND AND GRAVEL.--Sand and gravel of unknown origin that is overlain by till or lake deposits; thickness is unknown; under confined conditions; variable permeability.

13 PRESENCE OF AQUIFERS IS UNKNOWN.--These areas commonly contain valley-fill deposits, but geohydrologic data were insufficient to determine whether an aquifer was present.

14 UNDIFFERENTIATED DRIFT.--Areas where recent streams eroded steep-sided gorges whose sides have become covered by slumped material or where several thin layers of sediment were exposed but too small to show at this scale; permeability unknown.

15 BEDROCK.--Devonian sedimentary rocks; mostly shale, siltstone, and fine-grained sandstone; water available in fractures; typically has low permeability but can supply water to meet needs for small farms and homes.

TILL OVERLYING BEDROCK.--Consists of semicompacted, poorly sorted clay, silt, sand, and cobbles; typically 2 to 30 feet thick; mantles bedrock in most of the uplands; low permeability.

7/6 OUTWASH OVERLYING LAKE DEPOSITS AND TILL WITH SOME SAND AND GRAVEL

AQUIFER BOUNDARY.--Dashed where approximately located.

296 WELL THAT TAPS BEDROCK

294 WELL THAT TAPS UNCONSOLIDATED MATERIAL

239 TEST BORING

1 SPRING

31 PUBLIC OR COMMUNITY WATER SUPPLY WELL

NOTE: Well numbers correspond to those wells and test borings in the U.S. Geological Survey computer files (Ground Water Site Inventory). The wells and test borings are numbered sequentially within each county in the New York district of the U.S. Geological Survey.

Base from New York State Department of Transportation, 1:24,000 scale, 1978

SAND AND GRAVEL AQUIFERS OF SCHUYLER COUNTY, NEW YORK

By
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