



EXPLANATION

POTENTIAL YIELD OF WATER FROM WELLS THAT TAP UNCONSOLIDATED AQUIFERS

UNCONFINED AQUIFERS, 10 TO 100 GALLONS PER MINUTE -- Sand and gravel with saturated zone generally less than 10 ft thick or thicker but with less permeable silty sand and gravel. Yields in area adjacent to streams may exceed 100 gal/min (gallons per minute) through pumping-induced infiltration, but these areas are too small to show at this scale.

UNCONFINED AQUIFERS, MORE THAN 100 GALLONS PER MINUTE -- Sand and gravel of high transmissivity and with saturated thickness greater than 10 ft. Many such areas are associated with a surface-water source that can provide additional water through pumping-induced recharge.

CONFINED AQUIFER UNDERLYING UNCONFINED AQUIFER, 5 TO MORE THAN 500 GALLONS PER MINUTE (from confined aquifer) -- Areas where a relatively impermeable till or lacustrine, very fine sand, silt, or clay layer separates the buried sand and gravel aquifer from an overlying surficial aquifer.

CONFINED AQUIFER, 5 TO MORE THAN 500 GALLONS PER MINUTE – Sand and gravel overlain by till, very fine sand, silt, or clay, but without a surficial aquifer.

AQUIFERS OF UNKNOWN POTENTIAL -- Areas of sand and (or) sand and gravel for which little or no well data are on file to determine yield potential. Letter symbols, explained below, indicate the type of deposit .

Lacustrine or eolian deposits – Fine to medium sand that probably yields less than 10 gal/min

Kame, kame terrace, kame moraine, outwash, or alluvium – Sand and gravel of unknown thickness or saturation. Yield potential is greater where streams are present.

Moraine – Mostly till and lacustrine deposits (very fine sand, silt, clay) capped in some places with unsaturated sand and gravel. Thin, scattered confined aquifers of sand and gravel in some places.

Confined aquifer – Areas of lacustrine deposits or till possibly underlain by sand and gravel aquifers. Depth and saturation thickness of aquifer not investigated.

PRIMARY WATER-SUPPLY AQUIFER – A highly productive aquifer that is being used as a source of water supply in major public-supply systems. Number

indicates name of aquifer area (see key below) and report number in list of related publications. Reports and maps cited describe these aquifers in detail.

Primary aquifer <u>Number</u>	<u>Aquifer area</u>
6	Batavia
1	Jamestown
8	Olean
7	Salamanca

POTENTIAL YIELDS OF WELLS IN UNCONSOLIDATED AQUIFERS IN UPSTATE NEW YORK

INTRODUCTION

Development of ground-water-protection and management policies by Federal, State and local agencies requires information at the location and extent of unconsolidated aquifers. (Bedrock aquifers, although a source of water in many areas, are not addressed here.) A review of ground-water- resource maps of many New York State counties and river basins that were prepared by the U.S. Geological survey in cooperation with New York State Department of Environmental Conservation during the 1950's and the 1960's revealed that the maps are inconsistent in scale, format, and amount of detail. Statewide maps that show aquifers at scales of 1:1,000,000 (Heath, 1964) and 1:750,000 (Kantrowitz and Snavey, 1982) have insufficient detail for development of most aquifer protection plans.

In 1986, the U.S. Geological survey, in cooperation with the New York State Department of Environmental conservation, began a study to compile and publish a set of five maps at scale 1:250,000 showing the location and potential well yield of the unconsolidated aquifers in upstate New York (excluding New York City and Long Island). The maps also indicate the parts of those aquifers that are heavily used for public-water supplies and that have been designated as "Primary Water Supply Aquifers" by the State (New York State Department of Environmental Conservation, 1985).

This map is one in that series of five that together shows the distribution of unconsolidated aquifers in upstate New York. TO meet the needs of State and local water resource managers and policymakers, the maps have a uniform scale of 1:250,000, are based on the most recent information publicly available, and use the same symbols to identify the unconsolidated aquifers and potential well yields.

The "primary" aquifers, which were mapped in detail during a study in the early 1980's in cooperation with New York State Department of Health and published at 1:24,000 scale,

are outlined and are keyed by number to the corresponding published references. The small map (at right) shows the major river basins and indicates other areas covered in the ground-water reports used in this data compilation.

The scale of 1:250,000 was selected for this map series because it is the scale of the surficial and bedrock geology maps prepared by the New York State Geological Survey (Muller, 1977, Muller and Cadwell, 1986, and Fisher and others, 1970). Together these maps present a consistent set of geologic and hydrologic information for use in regional management of the ground-water resources of the State.

These maps show the general extent of the unconsolidated aquifers but are not intended to replace detailed site evaluations. Additional information for use in site-specific evaluations is given in the list of related references above, but to determine the precise location and well yield from a given aquifer may require onsite investigations. Ground water also may be obtained from unconsolidated aquifers that are too small to be shown at this scale and from till, from buried unconsolidated aquifers not yet identified, and from the underlying bedrock. Construction of wells that have an adequate yield for domestic use (3 to 5 gallons per minute) may be developed in any of these geologic settings. In some areas, bedrock aquifers are important and warrant consideration in the appraisal of ground-water resources. Several reports cited in the list of related publications include information on bedrock aquifers.

WELL YIELDS

The U.S. Geological Survey, in cooperation with many State and local government agencies, has mapped and appraised several aquifer systems in New York since the mid-1940's. The aquifer boundaries shown here were determined from published hydrogeologic and surficial geology maps, numerous well records, and interpretation of topographic maps. Potential well yields were estimated from information presented in eight published reports and from pumpage data on file with the U.S. Geological Survey.

Well yields represent the range of potential yields from individual wells properly screened and developed in the aquifer. Yields may not represent sustained withdrawals from the aquifer but, rather, the potential short-term withdrawal yields in many areas are based on aquifer and well-capacity-test data and on reported yields from drillers and homeowners. Yields in some areas are estimates based on geologic logs, saturated thickness, and relation between grain size and hydraulic conductivity. Actual yields may differ from those indicated.

Aquifers to which no range of yield is assigned are in areas from which data on wells or hydrogeologic properties were insufficient to estimate the yield. These areas are underlain by coarse granular material, however, (Muller, 1977) and should be considered aquifers of unknown potential.

The colored areas represent unconfined aquifers of sand and gravel. Dark blue indicates aquifers with high potential well yields; green indicates aquifers with moderate potential well yields. High well yields are defined here as greater than 100 gallons per minute (gal/min), and moderate as 10 to 100 gal/min. These aquifers are recharged rapidly by water that infiltrates through the permeable overlying material to the zone of saturation. The stippled pattern indicates the location of confined aquifers of sand and gravel, these aquifers are confined beneath a relatively impermeable layer of till or lacustrine very fine sand, silt, and clay that minimizes direct recharge from land surface. A stippled pattern within a colored area indicates the presence of both an unconfined and confined aquifer. Uncolored areas with a letter designation represent sand and gravel deposits (Muller, 1977) that may be aquifers but have insufficient data to provide estimates of yield. The letters designate the type of material, as indicated in the explanation. Uncolored areas without letter designations are underlain by till, or by lacustrine very fine sand, silt, and clay, or by bedrock. Small patches of unconsolidated aquifers (0.5 square mile or less) may underlie the area but are too small to plot at this scale. Dug wells in till or lacustrine deposits may be capable of yielding 1 to 5 gal/min.

REFERENCES CITED

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- Heath, R. C., 1964, Ground water in New York: New York State Water Resources Commission Bulletin GW-51, 1 Sheet, scale 1: 1,000,000.
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