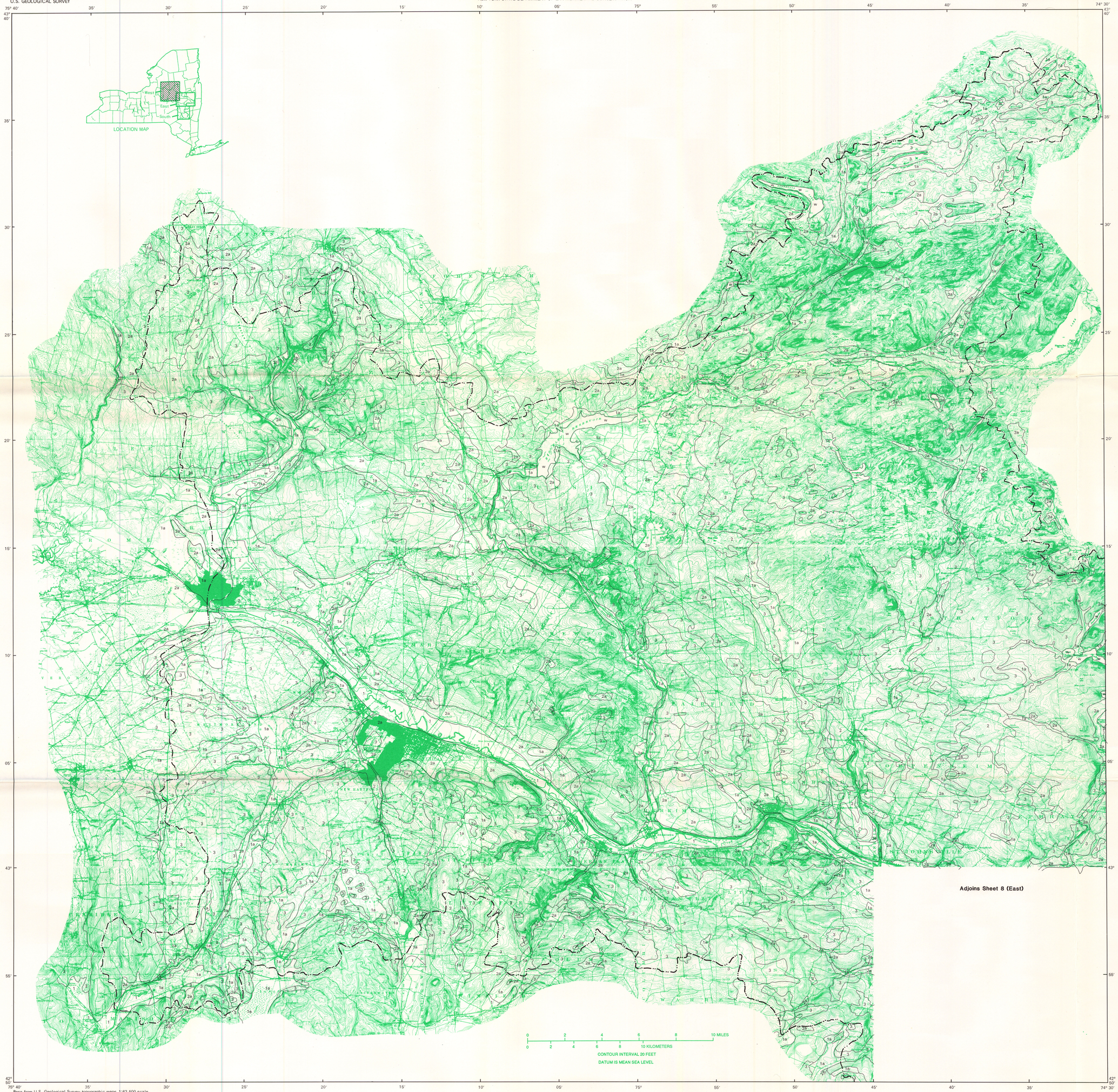
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
HERKIMER-ONEIDA COUNTIES PLANNING COMMISSION
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

WATER-RESOURCES INVESTIGATIONS REPORT 88-4091
SHEET 7 (WEST)--ESTIMATED YIELD TO WELLS



Base from U.S. Geological Survey topographic maps, 1:62,500 scale

ESTIMATED POTENTIAL WELL YIELDS

Sheets 7, 8, 9, show the estimated potential yield to wells from various types of saturated unconsolidated deposits within the Mohawk River basin. The ranges given are based on (1) the reported well-yield data, given on sheets 1, 2 and 3, which represent mainly 6-inch-diameter cased domestic wells, and (2) the type and extent of surficial deposits as shown on plates 4, 5, and 6 (surficial geology). Most of the data were obtained from a well inventory conducted by the U.S. Geological Survey in parts of the Mohawk River basin during 1967-69 as part of a project to evaluate the ground-water resources of the basin. All well data shown on sheets 1, 2, and 3 are stored in the U.S. Geological Survey's Ground Water Site Inventory computer data base or in U.S. Geological Survey files.

The ranges of estimated yields to wells shown on this map are intended only as a general guide to the development of ground-water resources in the Mohawk basin and are not intended to be a substitute for detailed site-specific studies that generally must be undertaken to develop a large-capacity well or well field successfully.

Yields of individual wells that tap unconsolidated, stratified-drift deposits are controlled by several factors, among which are (1) the hydraulic conductivity of the aquifer material, (2) whether the aquifer is confined or unconfined, (3) the saturated thickness of the aquifer, (4) the ability to induce infiltration from nearby surface water sources, (5) the degree of penetration of the well (the percentage of the total saturated thickness that is screened), (6) the diameter of the well and type of construction, (7) the size of the well screen and slot openings, (8) the amount of well development that is performed, and (9) the pump capacity.

The long-term yield of a well, particularly a high-capacity production well, is influenced by several factors, among which are (1) the amount and distribution of annual recharge to the aquifer; (2) the amount of storage in the aquifer (determined partly by the aquifer dimensions, saturated thickness, and specific yield); (3) the geometry of the aquifer; (4) the degree of hydraulic connection between the pumping well and nearby sources of induced infiltration, such as rivers, lakes, and streams; (5) the distance between the pumping well and impermeable boundaries, such as bedrock valley walls; and (6) the effect of interference from nearby pumping wells.

The factor that most severely limits the yield of individual domestic wells is perhaps the construction technique used. Most drilled domestic wells in this region are from 6 to 8 inches in diameter and are finished open ended--that is, without a well screen. Thus, the only area through which water can enter the well is through the bottom. Although wells finished in this manner in sand and gravel deposits commonly yield more than adequate supplies for the average household, a properly screened and developed well of the same diameter would generally have a substantially larger yield, all other things being equal. Consequently, the reported yields from domestic wells (Sheets 1, 2, and 3) are only an approximation of the ground-water potential of a given deposit and are not to be construed as the maximum yields potentially available to wells.

EXPLANATION

The numbered areas of the map indicate where properly screened and developed wells of at least 6-inch diameter would be likely to have yields within the ranges shown. "Estimated yields" are based on geologic evidence (sheets 4, 5, 6) and on reported well yields, depths, and diameters (sheets 1, 2, 3). "Inferred yields" (units 1a and 2a) denote the expected yield in areas where the saturated thickness of aquifer material is unknown but is probably sufficient to support well yields within the ranges shown. These areas are delineated primarily from surficial geologic units (as shown on sheets 4, 5, 6) in the absence of supporting well-yield data.

1 ESTIMATED POTENTIAL YIELD GREATER THAT 100 GALLONS PER MINUTE--Areas known to be underlain by aquifers consisting of well-sorted outwash sand and gravel, and recent alluvium primarily occupying valley bottoms and having a saturated thickness greater than 10 feet. Potential yields may exceed 500 gal/min in areas where surficial sand and gravel units are hydraulically connected to overlying streams and rivers that could provide induced infiltration. These deposits may comprise a surficial (water-table) sand and gravel aquifer, a deeper (confined) sand and gravel aquifer, or both.

1a INFERRED POTENTIAL YIELD GREATER THAN 100 GALLONS PER MINUTE--Areas believed to be underlain by deposits consisting of outwash sand and gravel, and recent alluvium primarily in valley bottoms. Saturated thickness unknown but probably greater than 10 feet. Areas so delineated have little or no supporting well-yield data to confirm the presence of productive sand and gravel aquifers; their location and extent indicated on this map are inferred primarily from surficial geologic evidence (sheets 4, 5, 6).

2 ESTIMATED POTENTIAL YIELD 10 TO 100 GALLONS PER MINUTE--Areas known to be underlain by aquifers composed of kame sand and gravel, glaciofluvial terrace gravel, deltas, high-elevation kames, lacustrine sand and beach deposits, and alluvium deposited as terraces and fans. In many areas, modern streams have incised channels through these deposits so that they remain elevated above the modern streambed and are, therefore, largely unsaturated. Saturated thickness of these deposits is estimated to be less than 10 feet. Individual well yields may be greater in areas where nearby surface-water sources permit induced infiltration or where saturated thickness is substantially greater than 10 feet.

2a INFERRED POTENTIAL YIELD 10 TO 100 GALLONS PER MINUTE--Areas believed to be underlain by deposits composed of kame sand and gravel, glaciofluvial terrace gravel, deltas, high-elevation kames, lacustrine sand and beach deposits, and alluvium deposited as terraces and fans. Saturated thickness unknown but probably less than 10 feet. Areas thus delineated have little or no supporting well-yield data to confirm the presence of productive sand and gravel aquifers. Their location and extent is inferred primarily from geologic evidence (pls. 4, 5, 6). Individual well yields may be greater in areas where induced infiltration from nearby surface-water sources permits induced recharge or where saturated thickness is substantially greater than 10 feet.

3 ESTIMATED POTENTIAL YIELD 10 TO 50 GALLONS PER MINUTE--Areas underlain by aquifers consisting of unstratified ablation till or kame-moraine and lacustrine sand deposits. Ablation till and kame moraine in this region generally is an unsorted to poorly sorted, sandy mixture of cobbles and gravel that is relatively free of silt and clay. Thus, it is generally more permeable than lodgment till or ground moraine but less permeable than fluvially sorted sand and gravel deposits such as outwash. Yields of 6-inch-diameter wells finished in ablation till or kame moraine differ widely as a result of the diverse composition of the till but may be as high as 50 gal/min. Lacustrine deposits composed primarily of stratified fine-to-medium gravel can yield similar amounts to 6-inch-diameter wells. Saturated thicknesses of these deposits is highly variable but generally is less than 20 feet. Locally, lacustrine sand deposits are believed to grade into lacustrine silt and clay with depth, which may limit the saturated thickness of usable aquifer material.

[ ] ESTIMATED POTENTIAL YIELD LESS THAN 10 GALLONS PER MINUTE--Areas underlain by deposits consisting of unstratified till that mantles bedrock uplands (ground moraine) and thicker deposits of till moraine (lodgment till). Also included in this category are valley segments underlain by lacustrine silt and clay and areas of exposed bedrock uplands. Till in this region is an unsorted, compacted mix of cobbles, gravel, sand, silt, and clay with very low permeability. Where sufficiently saturated, till can yield adequate amounts of water for domestic use to properly constructed, large-diameter wells. Thickness is variable and generally less than 10 feet for ground moraine and less than 50 feet for till moraine. Some dug wells excavated in till are prone to failure during prolonged droughts or seasonal declines in the water table.

W OPEN WATER--Areas of open water such as lakes, large ponds, and reservoirs.

——— ESTIMATED WELL YIELD UNIT BOUNDARY--Denotes contact between zones of estimated potential well yield. The location of these contacts is based largely on surficial geology (sheets 4,5,6) and are approximately located.

—·—·— BASIN BOUNDARY--Indicates approximate location of the surface-water divide that separates the Mohawk River basin from adjacent river basins.

AVAILABILITY OF GROUND WATER FROM UNCONSOLIDATED DEPOSITS IN THE MOHAWK RIVER BASIN, NEW YORK

By
Richard J. Reynolds

Sheet 7.--Estimated potential well yields, West