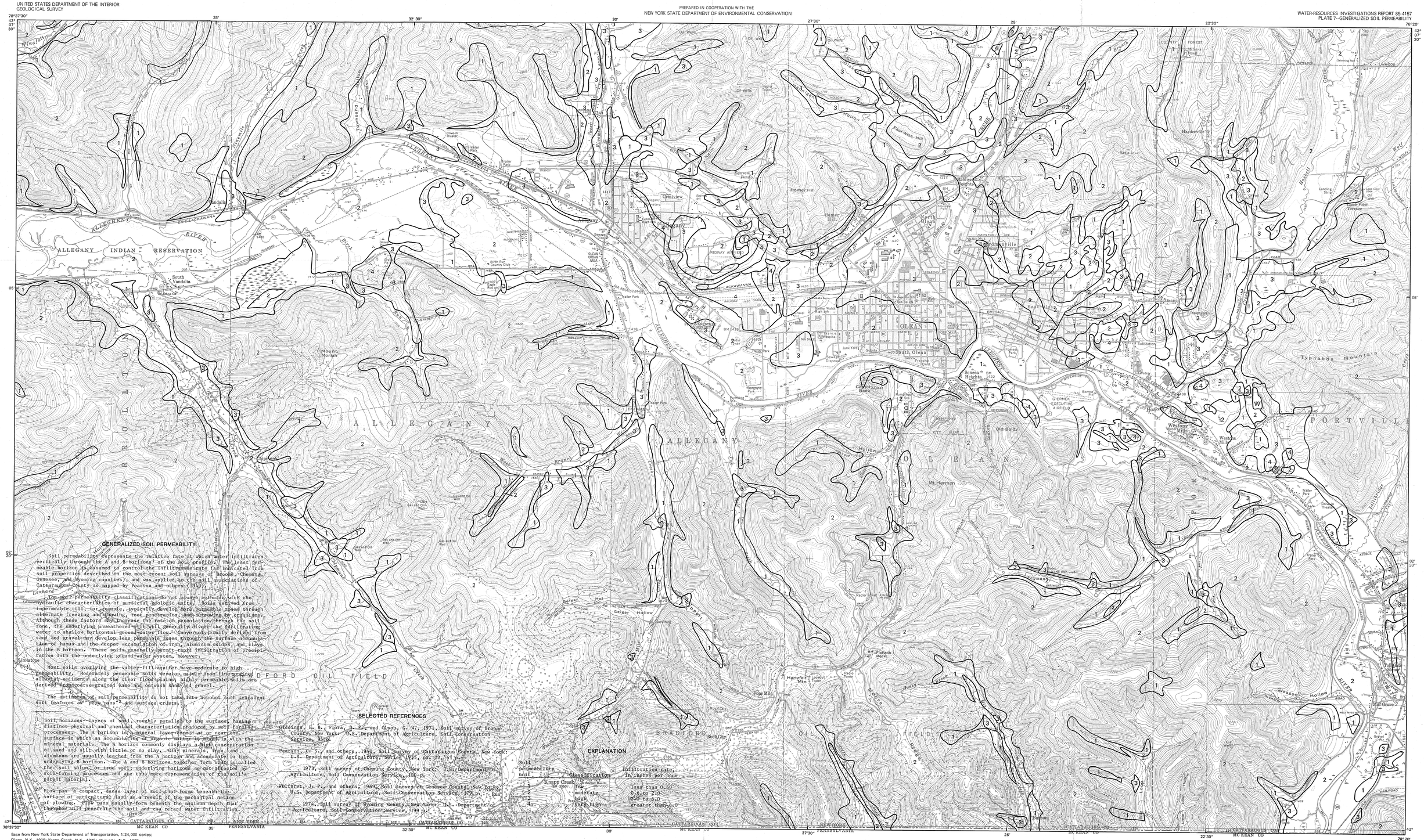
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

WATER-RESOURCES INVESTIGATIONS REPORT 85-4157
PLATE 7--GENERALIZED SOIL PERMEABILITY



GENERALIZED SOIL PERMEABILITY

Soil permeability represents the relative rate at which water infiltrates vertically through the A and B horizons of the soil profile. The least permeable horizon is assumed to control the infiltration rate (as indicated from soil properties described in the most recent soil surveys of Broome, Chemung, Genesee, and Wyoming counties), and was applied to the soil associations of Cattaraugus County as mapped by Pearson and others (1940).

The soil permeability classifications do not always coincide with the hydraulic characteristics of surficial geologic units. Soils derived from impermeable till, for example, typically develop more permeable zones through alternate freezing and thawing, root penetration, and burrowing by organisms. Although these factors may increase the rate of percolation through the soil zone, the underlying unweathered till will generally divert the infiltrating water to shallow horizontal ground-water flow. Conversely, soils derived from sand and gravel may develop less permeable zones through the surface accumulation of humus and the deeper accumulation of iron, aluminum oxides, and clays in the B horizon. These soils generally permit rapid infiltration of precipitation into the underlying ground-water system, however.

Most soils overlying the valley-fill aquifer have moderate to high permeability. Moderately permeable soils develop mainly from fine-grained alluvial sediments along the river flood plains; highly permeable soils are derived from coarse-grained kame and outwash sand and gravel.

The estimates of soil permeability do not take into account such transient soil features as "plow pans" and surface crusts.

Soil horizons--layers of soil, roughly parallel to the surface, having distinct physical and chemical characteristics produced by soil-forming processes. The A horizon is a general layer formed at or near the surface in which an accumulation of organic matter is mixed in with the mineral material. The A horizon commonly displays a high concentration of sand and silt with little or no clay. Clay minerals, iron, and aluminum are usually leached from the A horizon and accumulated in the underlying B horizon. The A and B horizons together form what is called the "soil solum" or true soil; underlying horizons are not affected by soil-forming processes and are thus more representative of the soil's parent material.

Plow pan--a compact, dense layer of soil that forms beneath the surface of agricultural land as a result of the mechanical action of plowing. Plow pans usually form beneath the maximum depth that the plow will penetrate the soil and can retard water infiltration.

SELECTED REFERENCES

Giddings, E. B., Flora, D. F., and Olson, G. W., 1971, Soil survey of Broome County, New York: U.S. Department of Agriculture, Soil Conservation Service, 95 p.

Pearson, R. S., and others, 1940, Soil survey of Cattaraugus County, New York: U.S. Department of Agriculture, Series 1935, no. 22, 163 p.

_____ 1973, Soil survey of Chemung County, New York: U.S. Department of Agriculture, Soil Conservation Service, 100 p.

Wultenat, J. P., and others, 1969, Soil survey of Genesee County, New York: U.S. Department of Agriculture, Soil Conservation Service, 175 p.

_____ 1974, Soil survey of Wyoming County, New York: U.S. Department of Agriculture, Soil Conservation Service, 199 p.

EXPLANATION

Soil permeability unit	Classification	Infiltration rate, in inches per hour
1	Knapp Creek (Not scored, Shown for comparison)	less than 0.60
2	low	0.6 to 2.0
3	moderate	2.0 to 6.0
4	high	greater than 6.0
5	very high	

Base from New York State Department of Transportation, 1:24,000 series: Olean, N.Y., 1975; Knapp Creek, N.Y., 1975; Portville, N.Y., 1976

NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD of 1929)--a geodetic datum derived from a general adjustment of the first-order level nets of both the United States and Canada, formerly called "Mean Sea Level".

0 ½ 1 2 MILES
0 ½ 1 2 KILOMETERS

Modified from Pearson and others, 1940, by N.C. Bartow and P.J. Zarriello, 1983

HYDROGEOLOGY OF THE OLEAN AREA, CATTARAUGUS COUNTY, NEW YORK

by

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