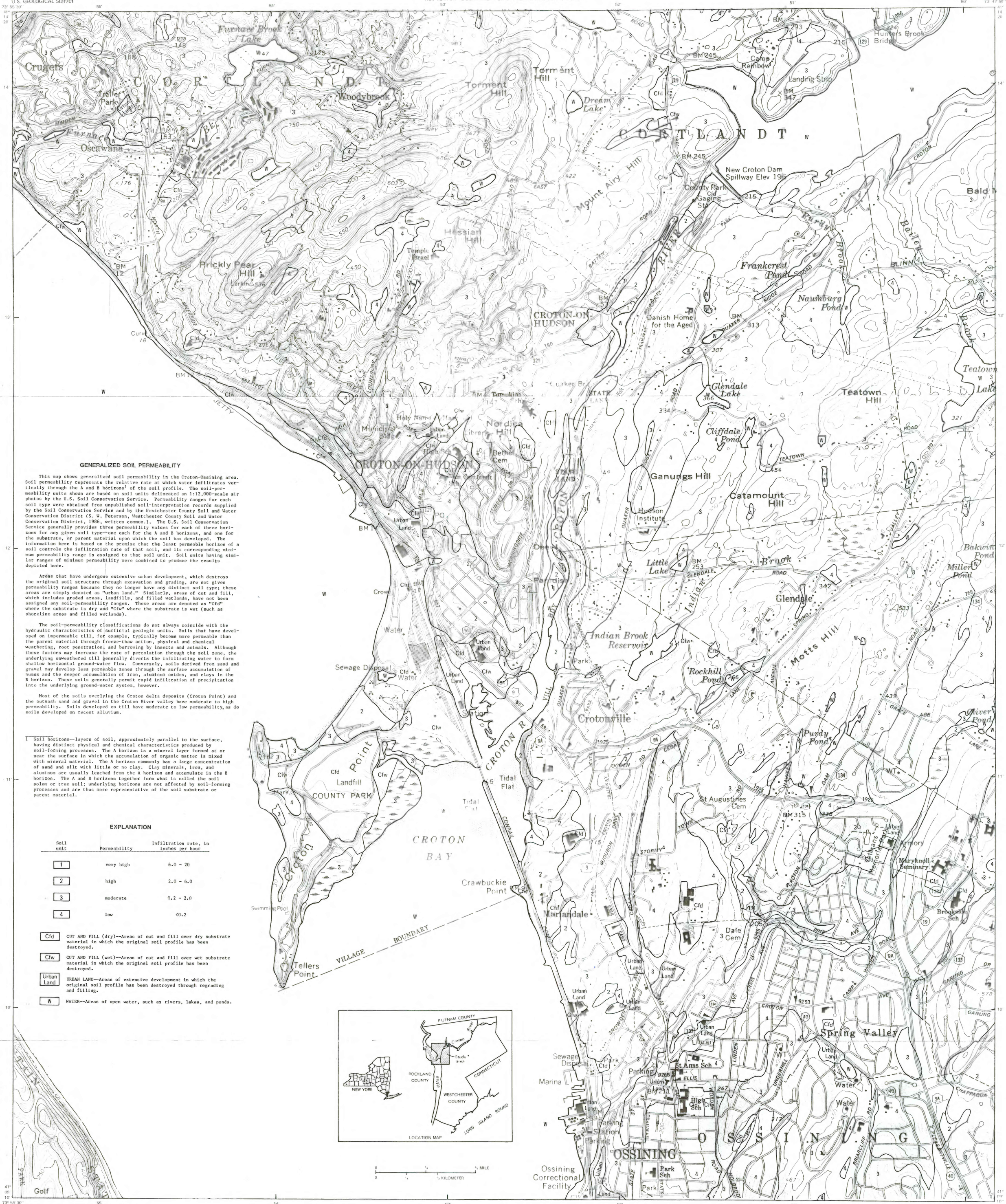
Prepared in cooperation with the
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION



GENERALIZED SOIL PERMEABILITY

This map shows generalized soil permeability in the Croton-Ossining area. Soil permeability represents the relative rate at which water infiltrates vertically through the A and B horizons[1] of the soil profile. The soil-permeability units shown are based on soil units delineated on 1:12,000-scale air photos by the U.S. Soil Conservation Service. Permeability ranges for each soil type were obtained from unpublished soil-interpretation records supplied by the Soil Conservation Service and by the Westchester County Soil and Water Conservation District (S. W. Peterson, Westchester County Soil and Water Conservation District, 1986, written commun.). The U.S. Soil Conservation Service generally provides three permeability values for each of three horizons for any given soil type--one each for the A and B horizons, and one for the substrate, or parent material upon which the soil has developed. The information here is based on the premise that the least permeable horizon of a soil controls the infiltration rate of that soil, and its corresponding minimum permeability range is assigned to that soil unit. Soil units having similar ranges of minimum permeability were combined to produce the results depicted here.

Areas that have undergone extensive urban development, which destroys the original soil structure through excavation and grading, are not given permeability ranges because they no longer have any distinct soil type; these areas are simply denoted as "urban land." Similarly, areas of cut and fill, which includes graded areas, landfills, and filled wetlands, have not been assigned any soil-permeability ranges. These areas are denoted as "Cfd" where the substrate is dry and "Cfw" where the substrate is wet (such as shoreline areas and filled wetlands).

The soil-permeability classifications do not always coincide with the hydraulic characteristics of surficial geologic units. Soils that have developed on impermeable till, for example, typically become more permeable than the parent material through freeze-thaw action, physical and chemical weathering, root penetration, and burrowing by insects and animals. Although these factors may increase the rate of percolation through the soil zone, the underlying unweathered till generally diverts the infiltrating water to form 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 of the soils overlying the Croton delta deposits (Croton Point) and the outwash sand and gravel in the Croton River valley have moderate to high permeability. Soils developed on till have moderate to low permeability, as do soils developed on recent alluvium.

1 Soil horizons--layers of soil, approximately parallel to the surface, having distinct physical and chemical characteristics produced by soil-forming processes. The A horizon is a mineral layer formed at or near the surface in which the accumulation of organic matter is mixed with mineral material. The A horizon commonly has a large concentration of sand and silt with little or no clay. Clay minerals, iron, and aluminum are usually leached from the A horizon and accumulate in the 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 substrate or parent material.

EXPLANATION

Soil unit	Permeability	Infiltration rate, in inches per hour
1	very high	6.0 - 20
2	high	2.0 - 6.0
3	moderate	0.2 - 2.0
4	low	<0.2

Cfd — CUT AND FILL (dry)--Areas of cut and fill over dry substrate material in which the original soil profile has been destroyed.

Cfw — CUT AND FILL (wet)--Areas of cut and fill over wet substrate material in which the original soil profile has been destroyed.

Urban Land — URBAN LAND--Areas of extensive development in which the original soil profile has been destroyed through regrading and filling.

W — WATER--Areas of open water, such as rivers, lakes, and ponds.

Base from New York State Department of Transportation, 1:24,000, Ossining, 1982, Haverstraw, 1982

Hydrogeology by R.J. Reynolds, 1985

HYDROGEOLOGY OF THE CROTON-OSSINING AREA, WESTCHESTER COUNTY, NEW YORK

By
Richard J. Reynolds

1988

Plate 5. Generalized Soil Permeability