UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH
IRONDEQUOIT BAY PURE WATERS DISTRICT
MONROE COUNTY DEPARTMENT OF ENGINEERING

WATER-RESOURCES INVESTIGATIONS REPORT 84-4259
PLATE 1--GEOMORPHIC FEATURES

ABSTRACT

Geohydrologic information on the area within and surrounding the Irondequoit Creek basin near Rochester, in north-central New York, are presented on five maps at 1:48,000 scale that indicate (1) locations of geomorphic features, (2) surficial geology, (3) soil permeability, (4) potentiometric-surface altitude and directions of ground-water movement, and (5) ground-water recharge. Also included are 20 geologic sections showing stratigraphic relationships, aquifer composition, and depth to bedrock. Each map includes a short text and a list of references.

Results of this study indicate that ground water within the basin flows northward to Irondequoit Bay and Lake Ontario and that the ground-water drainage system is considerably smaller than the overlying surface-drainage area.

These maps, based on available records and published data, depict the location of major recharge areas, relative rates of recharge, and the direction and rates of ground-water flow within the basin for use in aquifer management.

Sources of data include (1) State and County Department of Transportation borings along roads, and Monroe County Division of Pure Waters borings at sewer-construction sites; (2) reports by local engineering firms; and (3) published reports by Federal and State agencies and by universities.

INTRODUCTION

The Irondequoit Creek basin, a 169-mi^2 area draining to the south shore of Lake Ontario, contains the buried preglacial Irondogenesee River valley, which is filled mainly with glacially derived sediment. The northern end of the valley contains a sand and gravel aquifer system that provides municipal water supplies to the villages of Webster, East Rochester, and Pittsford. Whether the aquifer consists of isolated sand and gravel units or is a continuous, hydraulically connected deposit is uncertain. The extent of the aquifer south of East Rochester is unknown.

The effects of urbanization are of growing concern to local and county water managers and land-use planners because the paving of open areas may cause a substantial loss of recharge to the aquifer system. The resulting decline in ground-water levels would not only decrease the supply of potable ground water but would cause the base flow of the basin's many small streams to decrease or disappear. Thus, to maintain an adequate supply of potable ground water and prevent the decrease in baseflow, protection of the recharge areas of this watershed should be considered.

Purpose and Scope

This study was done during 1982-83 in cooperation with the Irondequoit Bay Pure Waters District and the Monroe County Department of Engineering. Its purpose was to compile pertinent information on the location and rate of aquifer recharge and the direction of ground-water movement in the Irondequoit basin. The study was an extension of work by Waller and others (1982), who identified and described the lower (northern) part of the Irondogenesee aquifer as part of a study of 11 selected aquifers in upstate New York.

This set of five maps and 20 geologic sections provides much of the geohydrologic information needed to identify the major recharge areas and also provides much of the information needed for aquifer management. Each map contains a short descriptive text. A glossary is included on plate 6B.

Sources of Data

Information sources included (1) geologic mapping by Leggette and others (1935), Young (1980), and Muller (in press); (2) soil-survey maps of Monroe County (Sweet and Latimer, 1938; Heffner and Goodman, 1973), Ontario County (Pearson and Cline, 1958), and Wayne County (Higgins and Neeley, 1978); (3) test borings completed as part of the Monroe County Pure Waters Sewer Interceptor project, and (4) other engineering boreholes throughout the basin. Previous works on glacial features are cited on each map.

Acknowledgments

The authors express gratitude to the Monroe County Department of Engineering for providing data on sewer-interceptor projects throughout the basin and to the several consulting firms that allowed access to their files. The authors also thank Dr. Ernest Muller of Syracuse University and Dr. Richard Young of the State University of New York at Geneseo for sharing results of their work and providing guidance in preparing the maps of geomorphic features (pl. 1) and surfical geology (pl. 2).

GEOMORPHIC FEATURES

Glacial Advance

The southward advance of the last continental ice sheet in western New York transported rock fragments and finer sediments derived from the underlying sedimentary bedrock. The transported material was moved both within and beneath the ice. Some of this material was subsequently deposited on the land surface as till in varying thicknesses in the form of ground moraines (till plains) and drumlins. Massive accumulations of till, some representing multiple periods of glaciation, have been detected in parts of the buried Irondogenesee valley. Ground moraines are readily identifiable in the northeast and southwest parts of the Irondequoit basin wherever drumlins are present.

Glacial Recession

Temporary periods of ice stagnation or readvances during the retreat of the ice sheet, combined with the uncovering of the land surface at lower altitudes, resulted in a series of proglacial lakes that formed between the melting ice front and the higher ground to the south. At times the lakes coalesced to form a single large lake extending across New York State into Ohio, Indiana, and Michigan. As the ice sheet continued to retreat northward, successively lower lake outlets were exposed, and the altitude of lakewaters fell. The result was a steplike series of distinct lake stages through time. Some of these stages were transitory; others were longer lived.

Evidence of the proglacial lakes and other meltwater features remains in the form of (1) lake features such as beaches, deltas, silt and sand plains, incised lake-outlet channels, and terraces; and (2) ice-contact features such as kamic hills and esker ridges.

Evidence of at least three major lake stages in the Irondequoit watershed is described by Fairchild (1909, 1928), Chadwick (1917), and Young (1980). These lake stages have been named Lake Warren, Lake Dawson, and Lake Iroquois. A fourth lake stage, Lake Dana, is also reported in the literature but has not been entirely accepted owing to the scant evidence on the present landscape (E. H. Muller, Syracuse University, oral commun., 1983). Lake sediments associated with Lake Dana were probably deposited in the transitional period between Lakes Warren and Dawson.

Estimation of the former lakes' surface altitudes has been difficult because of the continuing uplift of the land surface since the glacial recession. This rebound, a result of the reduction in weight of the melting ice, must be considered when one extrapolates the altitude of a past shoreline over distances of several miles, especially in a north-south direction.

The approximate positions of the lake shores are based on published work. The Lake Warren and Lake Dawson shore contours are based on the altitudes given in the explanation. The Lake Iroquois shore contour is based on field investigations of lake deposits by Chadwick (1917). Positions of glacial-lake boundaries and other significant glacial features of the Irondequoit watershed are indicated on this map to suggest their relationship to the events by which they were formed.

REFERENCES CITED

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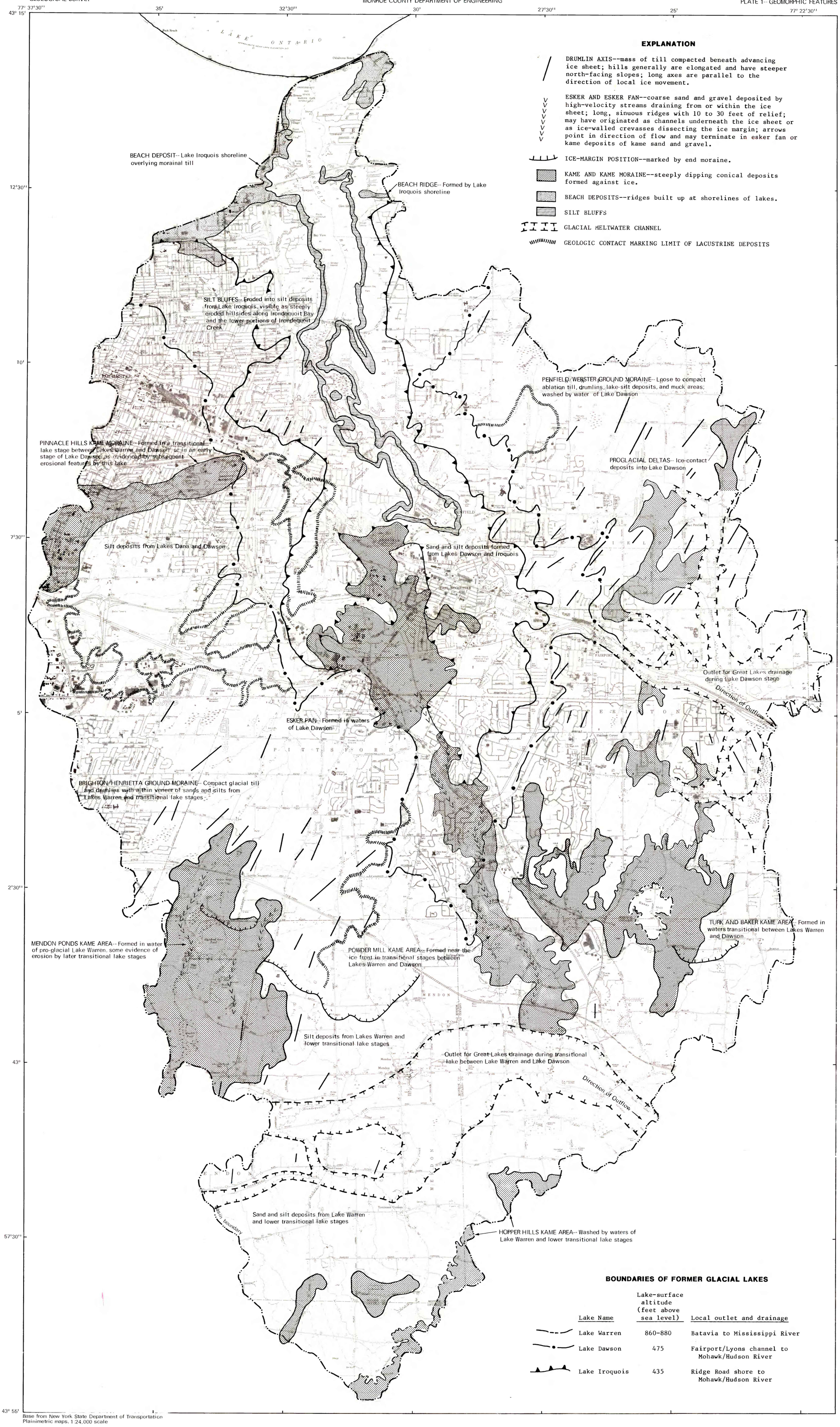

EXPLANATION

DRUMLIN AXIS--mass of till compacted beneath advancing ice sheet; hills generally are elongated and have steeper north-facing slopes; long axes are parallel to the direction of local ice movement.

ESKER AND ESKER FAN--coarse sand and gravel deposited by high-velocity streams draining from or within the ice sheet; long, sinuous ridges with 10 to 30 feet of relief; may have originated as channels underneath the ice sheet or as ice-walled crevasses dissecting the ice margin; arrows point in direction of flow and may terminate in esker fan or kame deposits of kame sand and gravel.

ICE-MARGIN POSITION--marked by end moraine.

KAME AND KAME MORAINE--steeply dipping conical deposits formed against ice.

BEACH DEPOSITS--ridges built up at shorelines of lakes.

SILT BLUFFS

GLACIAL MELTWATER CHANNEL

GEOLOGIC CONTACT MARKING LIMIT OF LACUSTRINE DEPOSITS

BOUNDARIES OF FORMER GLACIAL LAKES

Lake Name	Lake-surface altitude (feet above sea level)	Local outlet and drainage
Lake Warren	860-880	Batavia to Mississippi River
Lake Dawson	475	Fairport/Lyons channel to Mohawk/Hudson River
Lake Iroquois	435	Ridge Road shore to Mohawk/Hudson River

GEOHYDROLOGY OF THE IRONDEQUOIT CREEK BASIN NEAR ROCHESTER, NEW YORK

GEOMORPHIC FEATURES

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