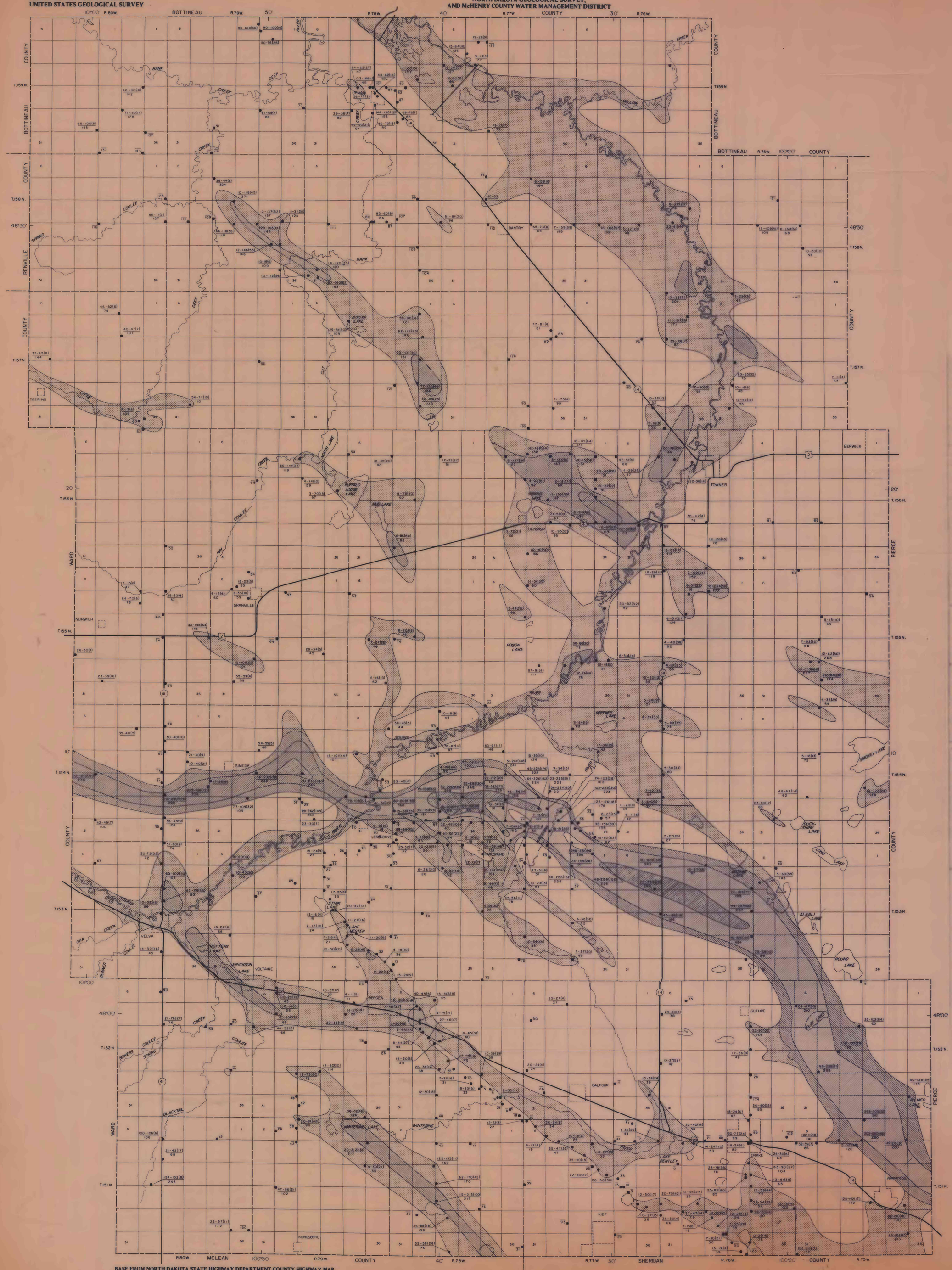
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED IN COOPERATION WITH THE
NORTH DAKOTA STATE WATER COMMISSION,
NORTH DAKOTA GEOLOGICAL SURVEY,
AND McHENRY COUNTY WATER MANAGEMENT DISTRICT

OPEN-FILE REPORT 80-562



BASE FROM NORTH DAKOTA STATE HIGHWAY DEPARTMENT COUNTY HIGHWAY MAP

EXPLANATION

ESTIMATED POTENTIAL WELL YIELDS, IN GALLONS PER MINUTE (LITERS PER SECOND)

- 1001 to 2000 (63 to 126)
- 501 to 1000 (32 to 63)
- 201 to 500 (13 to 32)
- 51 to 200 (3 to 13)
- 0 to 50 (0 to 3)

SELECTED TEST-HOLE AND WELL DATA

26-216(8) / 220 — TEST-HOLE OR WELL DATA—Upper numbers are depth to top and base of glacial-drift aquifer, in feet below land surface. Number in parentheses is aggregate thickness of sand and gravel. Sand and gravel thicknesses of less than 4 feet (1.2 meters) are not shown. Lower number is depth to bedrock, in feet below land surface. Absence of lower number indicates that the test hole or well did not completely penetrate the glacial drift

YIELD BOUNDARY

SELECTED FACTORS FOR CONVERTING INCH-POUND UNITS TO THE INTERNATIONAL SYSTEM (SI) OF METRIC UNITS

A dual system of measurements—inch-pound units and the International System (SI) of metric units—is given in this report. SI is an organized system of units adopted by the 11th General Conference of Weights and Measures in 1960. Selected factors for converting inch-pound units to SI units are given below.

Multiply inch-pound unit	By	To obtain SI unit
Foot (ft)	0.3048	meter (m)
Gallon per minute (gal/min)	0.06309	liter per second (L/s)
Mile (mi)	1.609	kilometer (km)
Square mile (mi^2)	2.590	square kilometer (km^2)

INTRODUCTION

This preliminary map is the first product of the ground-water resources study of McHenry County. This study is part of a statewide program to determine the location, extent, chemical quality, and hydrologic characteristics of the ground-water resources (aquifers) in North Dakota. The study was made by the U.S. Geological Survey in cooperation with the North Dakota State Water Commission, North Dakota Geological Survey, and McHenry County Water Management District.

Many sources of data have been used in the preparation of the ground-water availability map. A well inventory provided data on depth, construction, and yields of private and public wells. Test drilling and construction of observation wells by the North Dakota State Water Commission as well as production wells constructed by commercial well drillers provided data regarding the thickness, areal extent, and hydrologic characteristics of the aquifers.

Potential well yields shown on the availability map were estimated using the thickness and hydraulic conductivity (permeability) of the aquifers determined at each test hole or well site, and data from aquifer tests. Generally the yield of a well is proportional to the hydraulic conductivity, thickness, and areal extent of the aquifer. If the width of an aquifer is limited, as in the instance of channel deposits in surficial or buried valleys, well yields per unit of drawdown may decrease significantly as pumping continues unless a stream, lake, or other source of recharge is intercepted by the cone of depression created by a pumping well.

OCCURRENCE AND POTENTIAL YIELD OF AQUIFERS

Aquifers occur in both glacial drift and underlying or adjacent bedrock formations. However, this availability map shows only the approximate extent and potential yields of the glacial-drift aquifers.

McHenry County, which has an area of 1,904 mi^2 (4,931 km^2) in north-central North Dakota (see location map), is almost entirely covered by glacial drift. The glacial drift consists of till and glaciofluvial deposits.

Till is an unsorted, unstratified mixture of clay, silt, sand, gravel, cobbles, and boulders deposited directly by glaciers. Till has a relatively small hydraulic conductivity and is not considered to be a significant aquifer.

Glaciofluvial deposits are stratified deposits of silt, sand, and gravel that were deposited by the combined action of ice and water. The sand and gravel deposits commonly have relatively large hydraulic conductivities and form the principal aquifers in the county. These aquifers may be either confined or unconfined. Wells developed in these aquifers will generally yield more than 50 gal/min (3 L/s), and in places yields may be as much as 2,000 gal/min (126 L/s). Where the glacial drift is greater than 150 feet (46 m) thick, it is not uncommon for two or more aquifers to be interlayered with confining beds of till, clay, or silt.

The estimated yields shown on the availability map are for properly spaced, screened, and developed wells that fully penetrate the aquifer. The map is designed as a guide to the availability of ground water from major glacial-drift aquifers and not to locate specific wells. Few glacial-drift aquifers are so uniform in their water-bearing properties that production wells may be drilled in them without additional test drilling. If the map is used with an understanding of its limitations, it will be useful in the future development of ground-water resources in McHenry County.

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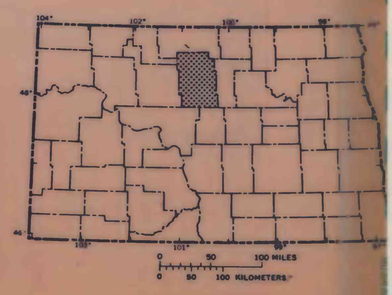

LOCATION OF STUDY AREA

PRELIMINARY MAP SHOWING AVAILABILITY OF WATER FROM GLACIAL-DRIFT AQUIFERS IN McHENRY COUNTY, NORTH-CENTRAL NORTH DAKOTA

By

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1980