DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

PREPARED BY THE UNITED STATES GEOLOGICAL SURVEY IN COOPERATION WITH THE NORTH DAKOTA STATE WATER COMMISSION, NORTH DAKOTA GEOLOGICAL SURVEY, AND SHERIDAN COUNTY WATER MANAGEMENT DISTRICT

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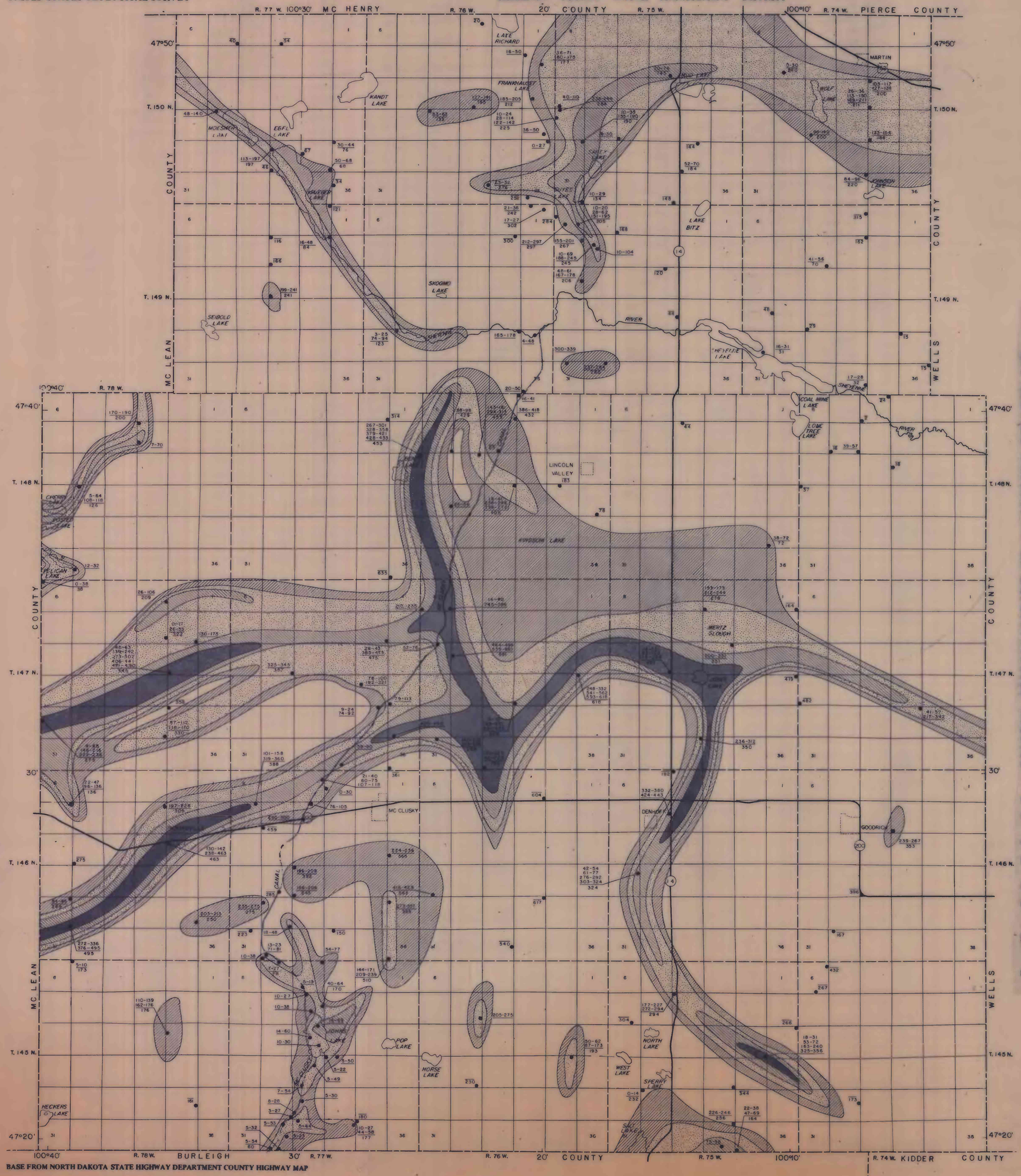



BASE FROM NORTH DAKOTA STATE HIGHWAY DEPARTMENT COUNTY HIGHWAY MAP

2 0 2 4 6 8 10 MILES
2 0 2 4 6 8 10 KILOMETERS

## EXPLANATION

**ESTIMATED POTENTIAL YIELDS OF WELLS, IN GALLONS PER MINUTE (LITERS PER SECOND)**

- MORE THAN 500 (32)
- 251 to 500 (16 to 32)
- 101 to 250 (6.4 to 16)
- 50 to 100 (3.2 to 6.4)
- LESS THAN 50 (3.2)

**SELECTED TEST-HOLE OR WELL DATA**

236-312 / 350 TEST HOLE OR WELL—Upper numbers indicate aquifer intervals in glacial drift in feet below land surface. Intervals of less than 10 feet (3 meters) not shown. Lower number is depth to bedrock in feet below land surface

YIELD BOUNDARY

## INTRODUCTION

This preliminary availability map is the first product of a study of the ground-water resources of Sheridan County. The study is part of a statewide program to determine the location, extent, and hydrologic characteristics of the ground-water reservoirs (aquifers) in North Dakota.

The study of the ground-water resources of Sheridan County was made cooperatively by the U.S. Geological Survey, North Dakota State Water Commission, North Dakota Geological Survey, and Sheridan County Water Management District. The final results of the study will be published by the cooperating State agencies.

A well inventory (Burkart, 1980) provided data on depth, construction, and productivity of private and public wells. Test drilling by the North Dakota State Water Commission and commercial well drillers provided data regarding the thickness, areal extent, and hydrologic characteristics of aquifers.

Potential well yields shown on the availability map were estimated from the thickness and hydraulic conductivity (permeability) of the water-bearing materials logged at each test hole, and from aquifer tests. Generally the yield of a well is proportional to the hydraulic conductivity, thickness, and areal extent of the aquifers, and available drawdown. If the width of an aquifer is limited, as in the case 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 water is intercepted by the cone of pumping influence.

## OCCURRENCE AND POTENTIAL YIELD OF AQUIFERS

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

Sheridan County, which has an area of 1,005 square miles (2,600 square kilometers) in 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. It has a low hydraulic conductivity and is not considered to be a significant aquifer. However, in many places, lenses of saturated sand and gravel that will yield adequate water for domestic and stock supplies occur within the till. Glaciofluvial deposits are stratified deposits of silt, sand, and gravel that were deposited by glacial melt-water streams. The sand and gravel deposits commonly have high hydraulic conductivities and form the principal aquifers in the county. They may be either confined or unconfined. Wells developed in these aquifers generally will yield more than 50 gallons per minute (3 liters per second), and in places may yield more than 500 gallons per minute (32 liters per second). Where the glacial drift is greater than 200 feet (61 meters) thick, it is not uncommon for two or more aquifers to be interlayered with confining deposits of till, clay, or silt.

The availability map should be used with the understanding that the estimated yields 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 preliminary 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 Sheridan County.

## SELECTED REFERENCES


Benson, W. E., 1952, Geology of the Knife River area, North Dakota: U.S. Geological Survey Open-File Report, 323 p.

Burkart, M. R., 1980, Ground-water data for Sheridan County, North Dakota: North Dakota State Water Commission County Ground-Water Studies 32, pt. II, and North Dakota Geological Survey Bulletin, pt. II, 302 p.

Colton, R. B., Lemke, R. W., and Lindvall, R. M., 1963, Preliminary glacial map of North Dakota: U.S. Geological Survey Miscellaneous Geologic Investigations Map I-331.

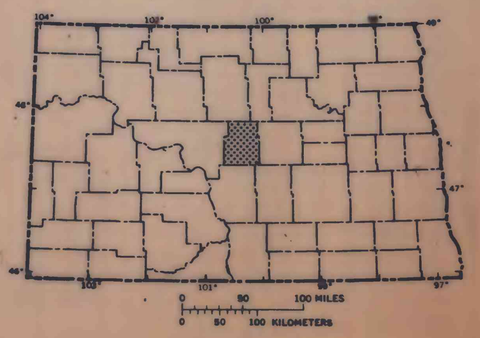
Klausing, R. L., 1974, Ground-water resources of McLean County, North Dakota: North Dakota State Water Commission County Ground-Water Studies 19, pt. III, and North Dakota Geological Survey Bulletin 60, pt. III, 73 p.

Lemke, R. W., 1960, Geology of the Souris River area, North Dakota: U.S. Geological Survey Professional Paper 325, 138 p.

Meyer, R. R., 1963, A chart relating well diameter, specific capacity, and the coefficients of transmissibility and storage, in Bentall, Ray, Methods of determining permeability, transmissibility, and drawdown: U.S. Geological Survey Water-Supply Paper 1536-I, p. 338-340.

Randich, P. G., and Hatchett, J. L., 1966, Geology and ground-water resources of Burleigh County, North Dakota: North Dakota State Water Commission County Ground-Water Studies 3, pt. III, and North Dakota Geological Survey Bulletin 42, pt. III, 91 p.

Simpson, H. E., 1929, Geology and ground-water resources of North Dakota: U.S. Geological Survey Water-Supply Paper 598, 312 p.


LOCATION OF STUDY AREA

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


By

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