North Dakota Geological Survey
24K: SbIB - sg

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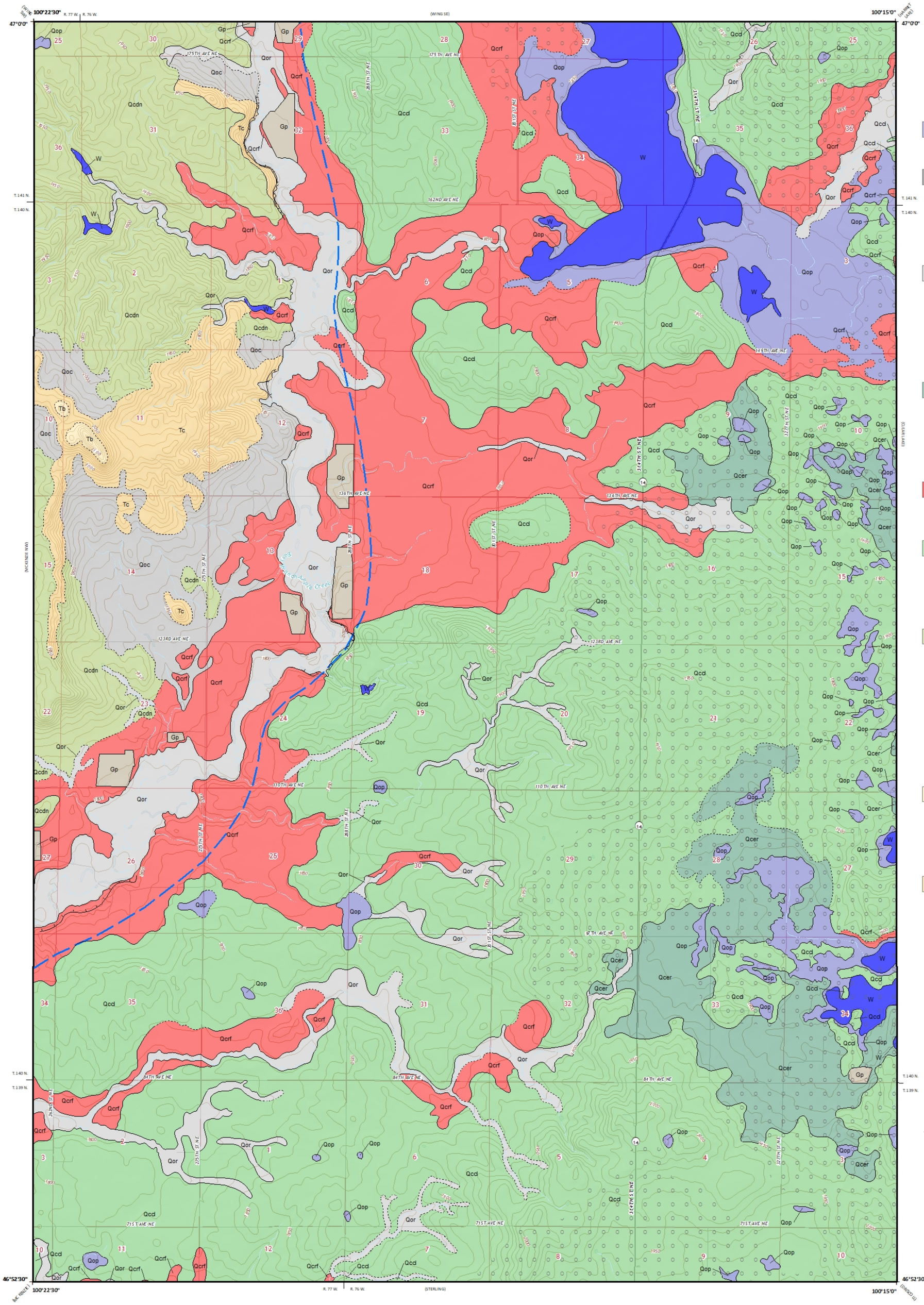
# Surface Geology
# Sibley Butte Quadrangle, North Dakota

**Lorraine A. Manz**

**2021**




## QUATERNARY SYSTEM

### HOLOCENE

#### OAHE FORMATION

Sand, silt, clay, gravel, and organic debris; all postglacial sediment deposited on the landscape; includes river sediment, windblown sediment, and lake sediment.

**Qop** — **Pond and slough sediment**
Organic debris, clay, and silt; obscurely bedded; dark colored; generally more than 3 feet (1 meter) thick; deposited in poorly drained depressions in the landscape.

**Qor** — **Alluvium and overbank sediment**
Sand, silt, clay, and disseminated organic debris; obscurely bedded, dark colored; locally abundant gastropod and pelecypod shells including *Valvata tricarinata*, *Sphaerium* sp., and *Pisidium* sp.; commonly up to 50 feet (15 meters) thick in the Missouri River floodplain and up to 15 feet (4.6 meters) thick along creeks in the area.

### HOLOCENE/PLEISTOCENE

**Qoc** — **Colluvium**
Unconsolidated sediment, mostly fine sand, silt and clay; obscurely bedded, dark colored; deposited primarily by slope wash and mass movement as an apron at the base of bedrock uplands. Commonly up to 15 feet (4.6 meters) thick.

### PLEISTOCENE

#### COLEHARBOR GROUP

The Coleharbor Group includes all sediments in North Dakota associated with deposition by Pleistocene glaciers.

**Qcer** — **River-eroded glacial sediment**
Light olive-brown to olive-brown; unsorted; unbedded; contains cobbles and boulders; shale pebbles abundant; overlain by a thin, discontinuous layer of fluvial silt and sand or sand and gravel. Flat to gently undulating surfaces with residual ring-shaped hummocks and other collapse features visible in places on aerial photographs and LiDAR. Glacial sediment eroded by running water. Found in the bottoms of former till-floored meltwater channels and broad areas of stream-washed till.

**Qcrf** — **Collapsed outwash**
Moderately well-sorted, light to dark olive brown, low-angle flat-bedded to high-angle cross-bedded silt, sand, and gravel; calcareous; shaly; bouldery in places; deposited as outwash or by meltwater in contact with the ice margin.

**Qccl** — **Collapsed glacial sediment**
Light olive-brown to olive-brown; unsorted; unbedded; calcareous; very shaly; lignite fragments common; contains abundant cobbles and surface boulders of mostly crystalline lithologies, with minor amounts of limestone, dolostone, and, more rarely, local bedrock types; undulating to rolling, hummocky surface; deposited as end moraine on a predominantly non-glacial surface by an early Late Wisconsinan glacier (Long Lake Advance).

**Qcdn** — **Draped glacial sediment**
Light olive-brown to olive-brown; unsorted; unbedded; calcareous; shaly; lignite fragments common; contains abundant cobbles and surface boulders of mostly crystalline lithologies, with minor amounts of limestone, dolostone, and, more rarely, local bedrock types; undulating to hilly surface; discontinuous; thin; lacks hummocky topography owing to postglacial erosion; deposited on a non-glacial surface as a thin mantle draped over, and only slightly modifying, the pre-existing topography by a pre-Late Wisconsinan glacier (Napoleon Advance). May be covered by a patchy, thin (< 5 feet [1.5 meters]) veneer of windblown sediment.

## PALEOGENE SYSTEM

### PALEOCENE

**Tb** — **BULLION CREEK FORMATION**
Nonmarine sandstone, siltstone, claystone, and lignite; generally brightly colored yellow, brown and gray; poorly to well-cemented sandstone; unbedded to sharply bedded siltstone and claystone; non-fissile; commonly thinly laminated. Maximum thickness in the map area is about 60 feet (18 meters). The contacts between the Bullion Creek, Slope, and Cannonball Formations were inferred from elevations of contacts in adjacent quadrangles.

**Tc** — **CANNONBALL FORMATION**
Marine sandstone and mudstone. Grayish green to yellowish brown, medium to fine grained, generally poorly cemented sandstone; contains scattered ironstone concretions and dark mineral grains that impart a "salt and pepper" appearance; commonly capped by a two- to three-foot-thick, well-cemented, lenticular sandstone. Light to dark gray to black mudstone; fissile; commonly banded with lenses of white to yellowish brown silt and very fine sand; forms smooth, rounded slopes. Maximum thickness of the Cannonball Formation is about 300 feet (91 meters) in this map area. May be covered by a thin (< 5 feet [1.5 meters]) veneer of glacial sediment.

## Geologic Symbols

Geologic contact

Geologic contact (inferred)

**Hummocky topography –** Established from aerial photographs and LiDAR; the circular pattern indicates areas of subdued ring-shaped hummocks in collapsed supraglacial glacial sediment; interpreted as circular disintegration ridges formed by the subsidence of supraglacial sediment (commonly till) during wastage of the underlying ice; generally difficult to discern on topographic maps and on the ground.

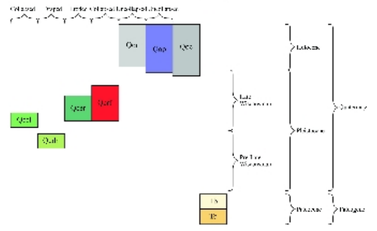
**Sharp-walled channel** – Established from aerial photographs and LiDAR; lines indicate the crests of the scarps and hachures point downslope; interpreted as a meltwater channel; apparent on topographic maps and on the ground.

**Ice margin** – Established from aerial photographs, LiDAR, and soil survey maps; marks the approximate limit of the early Late Wisconsinan Long Lake glaciation.

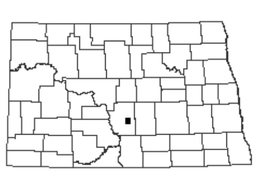
**ROAD CLASSIFICATION**

Expressway — Local Connector
Secondary Hwy — Local Road
Ramp — 4WD
Interstate Route — US Route — State Route

Correlation Of Map Units



Cartographic Compilation: Navin Thapa



Sibley Butte Quadrangle, North Dakota

Scale 1:24,000
0 0.5 1
Miles

Lambert Conformal Conic Projection
North American 1983 Datum
USGS 7.5 Minute Topo Map

Standard Parallels 46°52'30"N, 47°0'0"N
NGVD 1988

5°30' MN

2019 Magnetic North
Declination at Center of Sheet

W Water

Gp Gravel Pit