North Dakota Geological Survey
24K: Mfft - sg

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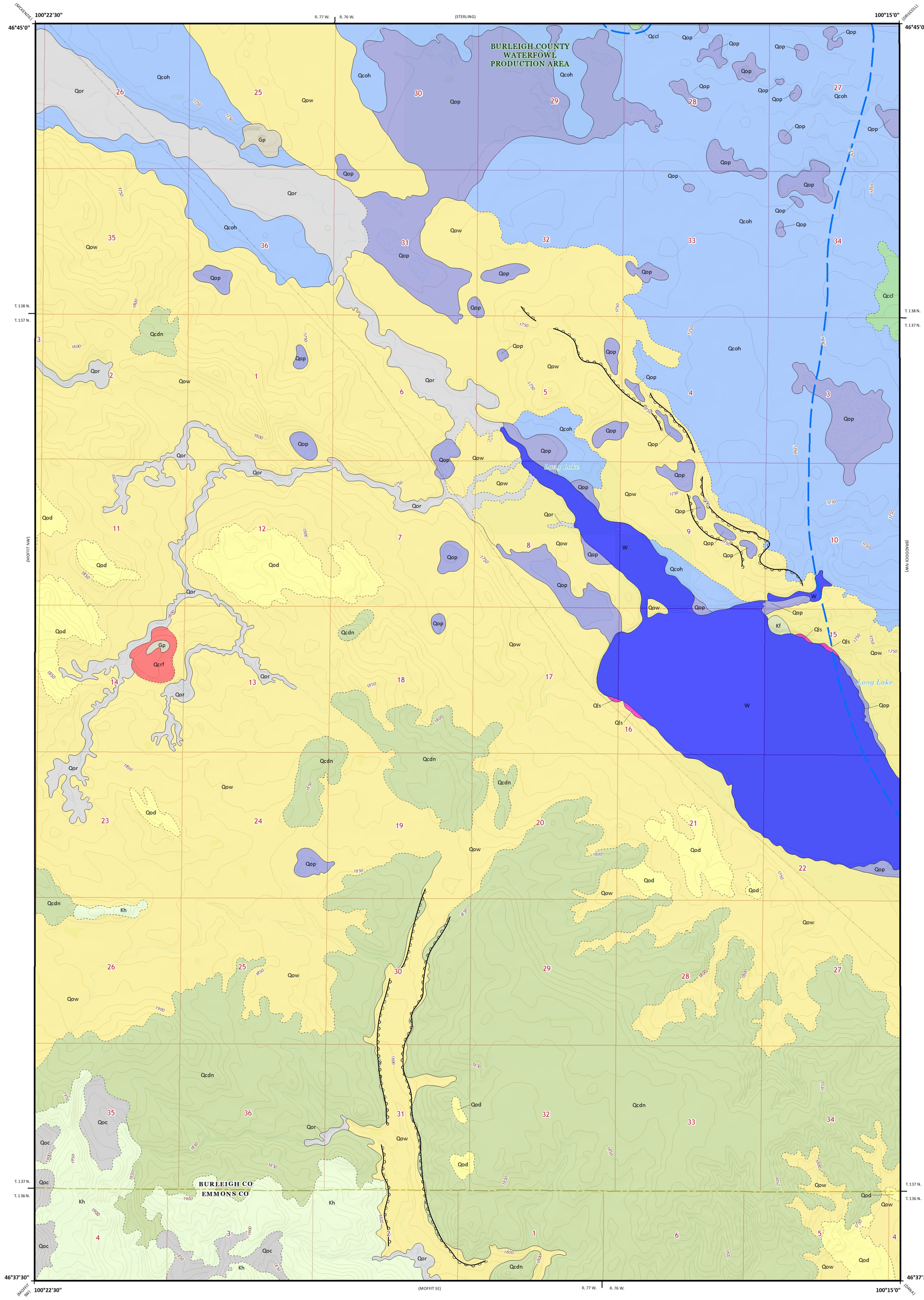
Surface Geology
Moffit Quadrangle, North Dakota

Lorraine A. Manz

2020



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.

Qls **Landslide deposits**
Moderately to poorly sorted combination of soil, unconsolidated sediments, and sedimentary rocks that has slid down the local slope under its own weight. Common where unconsolidated sediments form low bluffs along the shoreline of Long Lake.

Qod **Windblown sand**
Well-sorted, fine to medium sand; obscurely bedded; poorly developed paleosols common; subdued topography, consisting of vague knobs and elongated ridges with long axes aligned parallel to prevailing northwesterly winds; blowouts common; windblown lake and fluvial sand reworked into dunes; currently inactive.

Qow **Windblown silt and sand**
Moderately to well sorted grayish brown to tan, silt and sand; deposited as a thin mantle draped over, and only slightly modifying, the pre-existing glacial and non-glacial topography; generally less than 10 feet (3 meters) thick.

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.

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.

Qcoh **Collapsed lake sediment**
Flat-bedded to gently folded, light olive-brown to olive-brown laminated clay, clayey silt, silty clay, silt and sand; non to moderately calcareous; iron-stained in places; small (generally less than pebble-sized) carbonate nodules and masses of gypsum, and sand-sized organic fragments common; subtle, flat to gently undulating hummocky surface, pitted by steep-sided, bowl-shaped depressions (kettle holes) formed by the melting of detached blocks of buried ice; sediment deposited in a proglacial lake floored by stagnant ice from an earlier glacial advance. May be covered by a patchy, thin (< 5 feet [1.5 meters]) veneer of windblown sediment.

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.

CRETACEOUS SYSTEM

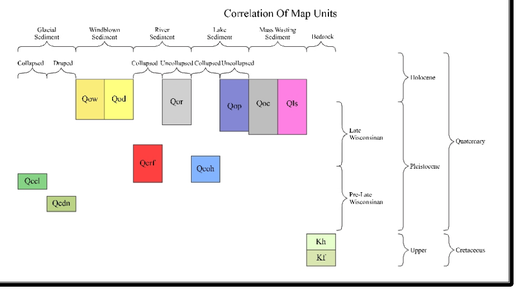
Kh **HELL CREEK FORMATION**
Nonmarine, drab colored, gray to grayish brown interbedded sandstone, siltstone, mudstone, and swelling claystone; poorly to moderately well-cemented crossbedded sandstone; bentonitic claystone; abundant limestone, manganese oxide and iron oxide nodules and concretions; forms sparsely vegetated, rilled slopes that are highly prone to failure. Maximum thickness in the map area is about 250 feet (76 meters).

Kf **FOX HILLS FORMATION**
Yellowish brown to gray mudstone, siltstone, and sandstone; poorly to well-cemented, very thinly bedded to massive locally cross-bedded sandstone; organic laminae; tuffaceous bed(s); abundant iron oxide nodules. Offshore marine and nearshore deposits. Maximum thickness of the Fox Hills Formation is about 250 feet (76 meters) in this map area.

Geologic Symbols

- Geologic contact
- Geologic contact (inferred)
- **Partly buried channel –** Established from aerial photographs and LiDAR; lines indicate the crests of the scarps; half-circles indicate the downslope direction; interpreted as a partly buried stream or meltwater channel; generally apparent on topographic maps, may not be apparent 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. Dashed where uncertain.

Correlation Of Map Units



Moffit 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°37'30"N, 46°45'0"N
NGVD 1988

5°30' MN

2019 Magnetic North
Declination at Center of Sheet

W Water

Gp Gravel Pit

Cartographic Compilation: Navin Thapa