

# Surface Geology

## Valley City East Quadrangle, North Dakota

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### EXPLANATION

All color descriptions refer to moist material.

**Qb** Borrow Area

#### QUATERNARY SYSTEM

##### HOLOCENE

**Qls** Landslide

A mass of glacial and/or preglacial material that has slumped downslope. Includes earthflows and areas of soil creep.

##### HOLOCENE/PLEISTOCENE

##### OAHE FORMATION

**Qoc** Colluvium

Light olive brown calcareous silt and clay; plastic; masses of gypsum common below about 3 feet (0.9 m). Found at the base of steep slopes in the Sheyenne River Valley and its tributaries. Local relief 10 to 50 feet (3-15 m).

**Qop** Pond and Slough Sediment

Clay, silt, and organic debris; obscurely bedded; dark colored; deposited in sloughs. All map areas not coded are (Qop) pond and slough sediment.

**Qor** River Sediment

Dark, occasionally cross-bedded overbank sediment deposited on the floodplains of modern streams. Contains some sand and gravel (channel sediment).

##### COLEHARBOR GROUP

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

##### Ice-Contact Deposits

**Qecs** Till

Poorly sorted, unbedded mixture of rock, cobbles, pebbles, gravel, sand, silt and clay deposited by active and stagnating ice. Matrix is olive brown clayey to sandy silt; calcareous; rock fragments mainly shale with minor crystalline and limestone pebbles, cobbles, and boulders that increase in abundance with size. Hilly, steeply sloping, bouldery surface eroded by slopewash; found mainly along the slopes of the Sheyenne River Valley and its tributaries. Local relief up to 200 feet (60m).

**Qecu** Till

Poorly sorted, unbedded mixture of rock, cobbles, pebbles, gravel, sand, silt, and clay deposited by active and stagnating ice. Matrix is olive brown clayey to sandy silt; calcareous; rock fragments mainly shale with minor crystalline and limestone pebbles, cobbles, and boulders that increase in abundance with size. Undulating to rolling surface, pitted with numerous, water-filled, closed depressions ("potholes"); bouldery in places. Local relief 20 to 100 feet (6-30m).

**Qecg** Till

Poorly sorted, unbedded mixture of rock, cobbles, pebbles, gravel, sand, silt, and clay deposited by active and stagnating ice. Matrix is olive brown clayey to sandy silt; calcareous; rock fragments mainly shale with minor crystalline and limestone pebbles and cobbles. Includes small, isolated areas of stratified sand and gravel. Overlain in places by a thin (~2 to 4 feet [0.6-1.2 m]) veneer of lacustrine silt and clay. Small areas of subdued, ring-shaped hummocks and other collapse features visible on aerial photographs. Local relief 0 to 20 feet (0-6 m).

##### Glaciofluvial Sediment

**Qcre** Ice-Contact Fluvial Deposits

Poorly to well-sorted grayish-brown and very dark gray silt, sand and gravel intermixed with pebbles, cobbles, boulders and till. Cross-bedding, laminae, faults, and soft-sediment deformation structures common. Includes eskers, kames, and crevasse fill.

**Qcrt** Outwash Terraces

Moderately well sorted, cross-bedded and plane-bedded grayish to reddish brown and very dark gray sand, gravel, pebbles and cobbles interbedded with well-sorted silt and sand. Locally very stony. Deposited by glacial meltwater as outwash and channel sediment. Flat to gently sloping topography.

**Qerl** Fluvio-lacustrine Sediment

Moderately well sorted, olive brown, stratified fine silty sand, and medium to coarse shaly sand and gravel. May be overlain by up to 4 feet (1.2 m) of well-sorted, light olive brown and olive brown lacustrine silt and fine sand that transitions gradually to coarser sand and gravel. Lake sediment and fluvial sediment deposited by meltwater streams flowing into a proglacial lake. Smooth to gently undulating lakeward-sloping surfaces with local relief generally less than 10 feet (3 m).

##### Glacio-lacustrine Deposits

**Qel** Lake Sediment

Light gray, light yellowish brown and light olive brown well-sorted, thinly laminated, calcareous silt and clay. Contains localized zones of small (0.5-1 in [1.2-2.5 cm]) light-gray, calcareous, irregularly-shaped marl- or-type concretions. Maximum thickness 30 feet (9 m). Flat to gently undulating surface.

**Qes** Shoreline and Nearshore Sediment

Well sorted, olive brown, grayish brown, and dark gray stratified sand and silty sand. Shaly. Nearly level to rolling topography; relief generally less than 5 feet (1.5 m) but may be up to 20 feet (6 m) in upland areas.

##### CRETACEOUS SYSTEM

**Kp** PIERRE FORMATION

Dark gray, flaky, fissile, non-calcareous shale with abundant small (0.5-1.5 in [1.2-4 cm]), knobby, rod-like ironstone concretions; fossiliferous. Offshore marine sediment. Exposed only along the slopes of the Sheyenne River Valley and its tributaries, where local relief may exceed 100 feet (30m). Prone to slope failure.

##### Geologic Symbols

- Known contact between two geologic units.
- - - - Approximate contact between two geologic units.
- Crest of longitudinal glacial ridge.
- Control Points
- Test holes, observation wells, and field observations.

##### Other Features

- Water
- Interstate Highway
- Paved Road
- Unpaved Road

