

# GEOLOGY OF THE MINOT AREA

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Clay-matrix supported diamicton sediments **Qccu** (Glacial Till).



Lignite seam within bedrock sediments of the Fort Union Group **Tfu** just west of Trestle Valley.



Glaciofluvial sands and gravels **Qcfc** overlain by subglacial clay-matrix supported diamicton.



Loess **Qow** overlying recent channel alluvium along Livingstone Creek. Contact at top of rock hammer.



Block of locally derived sandstone bedrock from the Bullion Creek Formation of the Fort Union **Tfu** Group.



Alluvial terrace gravels, cobbles, and boulders **Qat** along the floodplain of the Souris River Valley.

## References

Anderson, F.J., 2006, Surface Geology of the Minot Quadrangle: North Dakota Geological Survey, 1:24,000, 24K: Mnot -sg.  
 Anderson, F.J., 2006, Surface Geology of the Surrey Quadrangle: North Dakota Geological Survey, 1:24,000, 24K: Stry -sg.  
 Anderson, G.S., 1980, Surface Geology for Land Use Planning, Minot, North Dakota: University of North Dakota unpublished M.S. thesis, Grand Forks, 83 p.  
 Andrews, D. A., 1939, Geology and coal resources of the Minot region, North Dakota: U. S. Geol. Survey Bull. 906-B, p. 43-84, illus. incl. geol. map (scale 1:125,000).

- Borrow Area (abandoned and/or reclaimed)
- Includes gravel pits and disused mine workings.

## QUATERNARY SYSTEM

### HOLOCENE

#### ANTHROPOGENIC (RECENT) DEPOSITS

##### **Hlf** Landfill Deposits

Anthropogenic deposits, landfill sediments and solid waste placed as fill in the Old Minot Landfill (**Hlf**) and the new Minot landfill (**Hlf**). The Old Minot landfill, a former U.S. EPA Superfund site, was operated for several years by the City of Minot in the latter part of the 1980's. Currently, a passive bioventing system is in place which vents any generated landfill gas to the atmosphere. Recent land development has been slowly encroaching upon the footprint of the old landfill.

##### **Hef** Engineered Fill Deposits

Anthropogenic deposits of engineered sediments consisting of well sorted clays, sands, and gravels placed in cut and fill areas commonly located along roadways.

#### OAHE FORMATION

##### **Qop** Pond and Slough Sediment

Clay, silt, and organic debris; obscurely bedded; dark colored; deposited in modern ponds and sloughs.

##### **Qow** Loess

Yellow to tan silt deposited as windblown sediment over glacial sediments commonly 3 feet or more in thickness at outcrop. Nesting birds favor these sediments due to their consistency and ease of excavation.

#### OAHE FORMATION (PLEISTOCENE/HOLOCENE) **Qo**

##### **Qls** Landslide Deposits

Bedded and non-bedded sands, silts, and clays of the Fort Union, Coleharbor, and Oahe Formations where slumps and linear ridgeline landslide topography is displayed. Shallow ground-water seeps are common at the contacts between permeable (sands) and less permeable (clays and mudstones) sediments within these sequences, which exacerbate slope failures, particularly within transportation corridors.

##### **Qocf** Colluvial Fan Deposits - Oahe

Obscurely bedded sandy and silty clay originating as channel and slope wash sediments found at the mouths of coulees and ravines in alluvial fan-type deposits along the margins of the Souris River floodplain.

##### **Qot** River Terrace Deposits

Planar bedded sands and gravels with abundant cobbles and boulders deposited in terrace-form bars along the northern and southern valley walls of the Souris River.

##### **Qalt** Tributary Alluvium

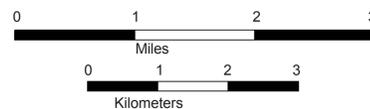
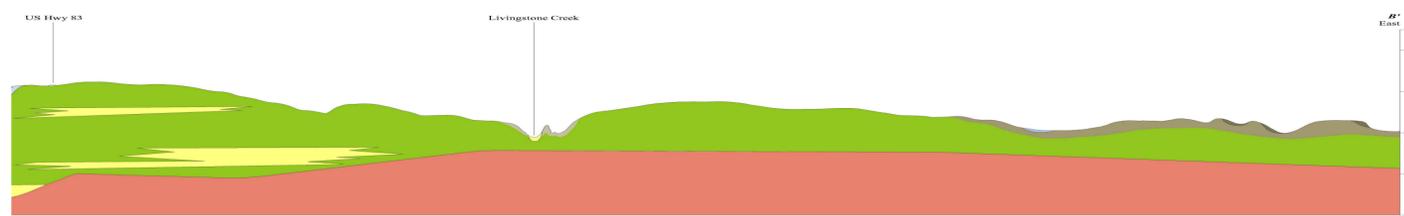
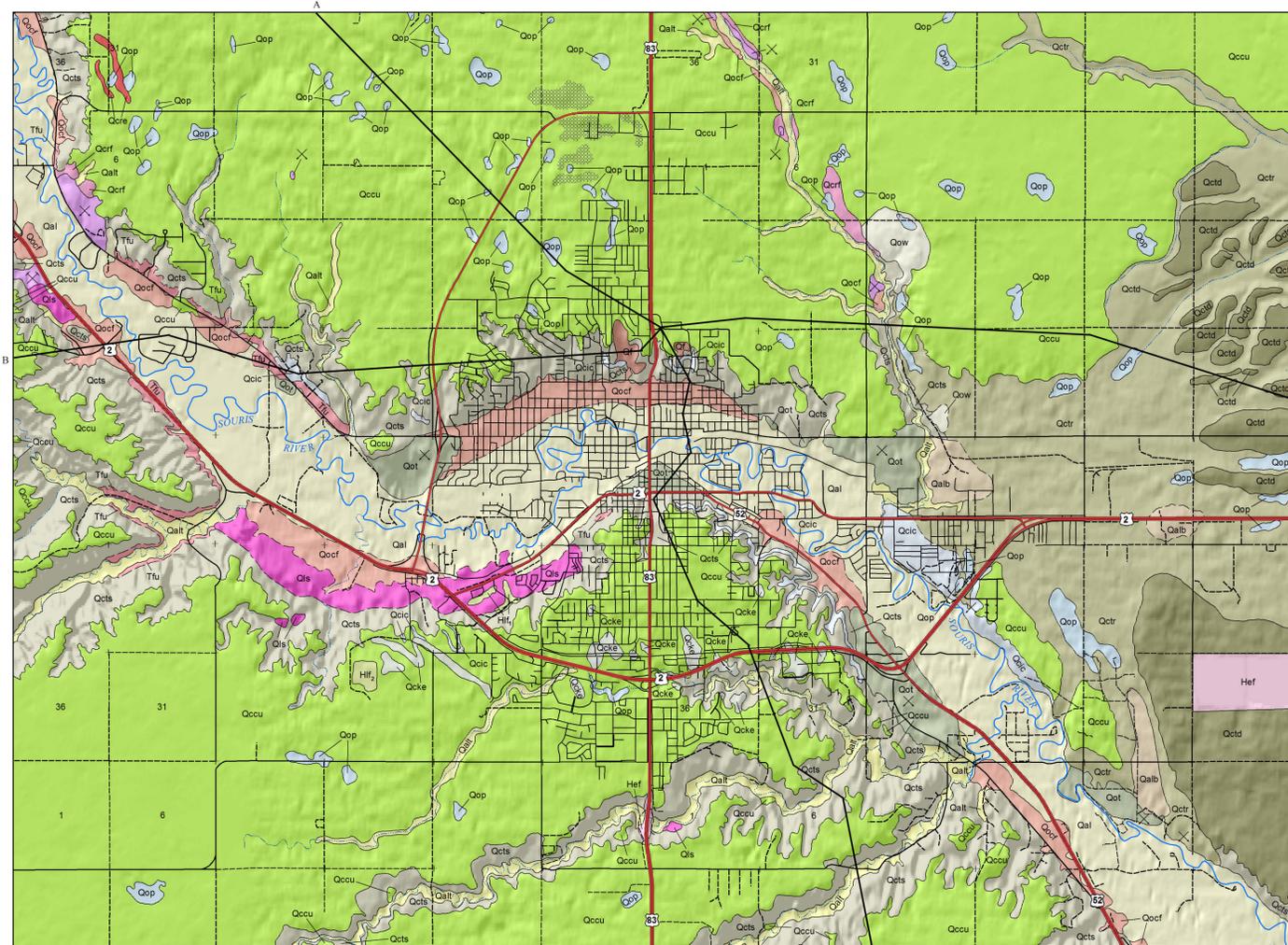
Gray to brown fluvial channel and overbank sands, gravels, silts, and clays within tributary coulee drainageways of the Souris River floodplain deposited as reworked slope-washed till ranging from three to 30 feet in thickness.

##### **Qcrf** Channel Sediment

Moderately well-sorted, cross-bedded and plane-bedded sand and gravel deposited as point bars and outwash. Includes cobble and boulder-laden sediments of the Des Lacs and Souris spillways.

##### **Qal** Floodplain Alluvium

Gray to brown fluvial channel and overbank sands, gravels, silts, and clays deposited within the Souris River floodplain. Prone to slumping and instability along meander loop cutbanks along the Souris River. Commonly 100 feet or more in thickness within the floodplain.



This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program.

Map Scale 1:48,000  
 This map has been placed on a shaded relief background.



Tributary valley **Qalt** formed within subglacial sediments (till) adjacent to the Souris River Valley.



Kame and esker deposits mantling **Qcke** glacial till plain in the southeastern Minot area.



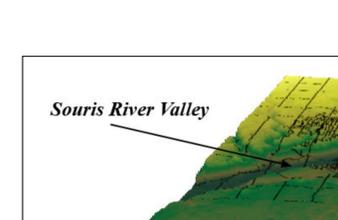
Abandoned coal mining works along the Souris River Valley northwest of Burlington.



Recent landslides **Qls** within roadcuts along ND HWY 2 just northwest of Burlington.



The Old Minot Landfill **Hlf** in southwest Minot.



View to the west/southwest across a digital elevation terrain model of the Minot area.



## COLEHARBOR GROUP (PLEISTOCENE/HOLOCENE) **Qc**

### **Qcke** Kames and Esker Deposits

Generally poorly sorted bedded to non-bedded sands and gravels deposited as linear or circular collapse deposits mantling Coleharbor Group subglacial sediments. Typically located on the southern side of the Souris River drainage way.

### **Qctr** Glacial Till (Channel Washed)

Dark-gray brown clay with silt, low to moderate plasticity and cohesiveness, massive, clay matrix-supported diamicton, occasional fine to coarse gravel clasts. Typically oxidized and unleached (calcium carbonate), with occasional clay and lignite clasts. Eroded by overbank flooding of the Souris River towards Glacial Lake Souris. Expressed as channels of relatively low local topographic relief.

### **Qctd** Glacial Till (River Washed)

Dark-gray brown clay with silt, low to moderate plasticity and cohesiveness, massive, clay matrix-supported diamicton, occasional fine to coarse gravel clasts. Typically oxidized and unleached (calcium carbonate), with occasional clay and lignite clasts. Eroded by overbank discharge of the Souris River towards Glacial Lake Souris.

### **Qcts** Glacial Till (Slope Washed)

Dark-gray brown subglacial till consisting of clay with silt of low to moderate plasticity and cohesiveness, massive at outcrop consisting of clay matrix supported diamicton with occasional fine to coarse gravel clasts. Typically oxidized and unleached (calcium carbonate) with occasional clay and lignite clasts. Eroded by slope wash along the sides of coulees and ravines.

### **Qcic** Glacial Ice Contact Deposits

Brown to tan sand and gravel with silt, poorly sorted and generally displaying laminated or contorted bedding at outcrop. Typically overridden by subglacial diamicton (subglacial till) sediments. Exposed along lower portions of valley walls along the Souris River. Bed thicknesses range from one to ten feet at outcrop.

### **Qccu** Till

Poorly sorted, unbedded mixture of rock, cobbles, pebbles, gravel, sand, silt, and clay deposited by active and stagnating ice. Flat to undulating topography with poorly to moderately well-integrated drainage. Subdued disintegration features visible on air photos. This type of material is the most ubiquitous near-surface geologic unit throughout the Minot area. This glacially derived sediment was deposited in the subglacial environment. Scattered gravel to pebble size clasts can be seen distributed throughout a fine muddy matrix diamicton. Rock hammer at left for scale.

## TERTIARY (PALEOGENE) SYSTEM

### EROSIONAL UNCONFORMITY

#### **Tfu** FORT UNION GROUP

Poorly exposed, weakly lithified, loosely consolidated, sandstone, siltstone, and claystone bedrock present beneath unconsolidated glacial sediments at depths between 100 and 200 feet. Thin seams of lignite present throughout.

#### Geologic Symbols

- Known contact between two geologic units.
- Approximate contact between two geologic units.
- Areas of conspicuous, low-relief, ring shaped hummocks.

View to the west/southwest across a digital elevation terrain model of the Minot area. The Souris River Valley, along with several of its tributary drainages, are readily identifiable on this model. The well-developed anastomosing drainage pattern developed as a result of outburst flooding, from Glacial Lake Regina during the Pleistocene, is well expressed in the lower right foreground. Several well-developed drainage channels, trending from the west/southwest to the east/northeast, have eroded into older glacial tills and can be seen in the right foreground. Lower elevations are depicted as darker browns and greens. Higher elevations are depicted as lighter greens and yellows. The road coverage on the main map is shown in black.