Surficial Geology of the Doniphan 7.5 Minute Quadrangle, Nebraska

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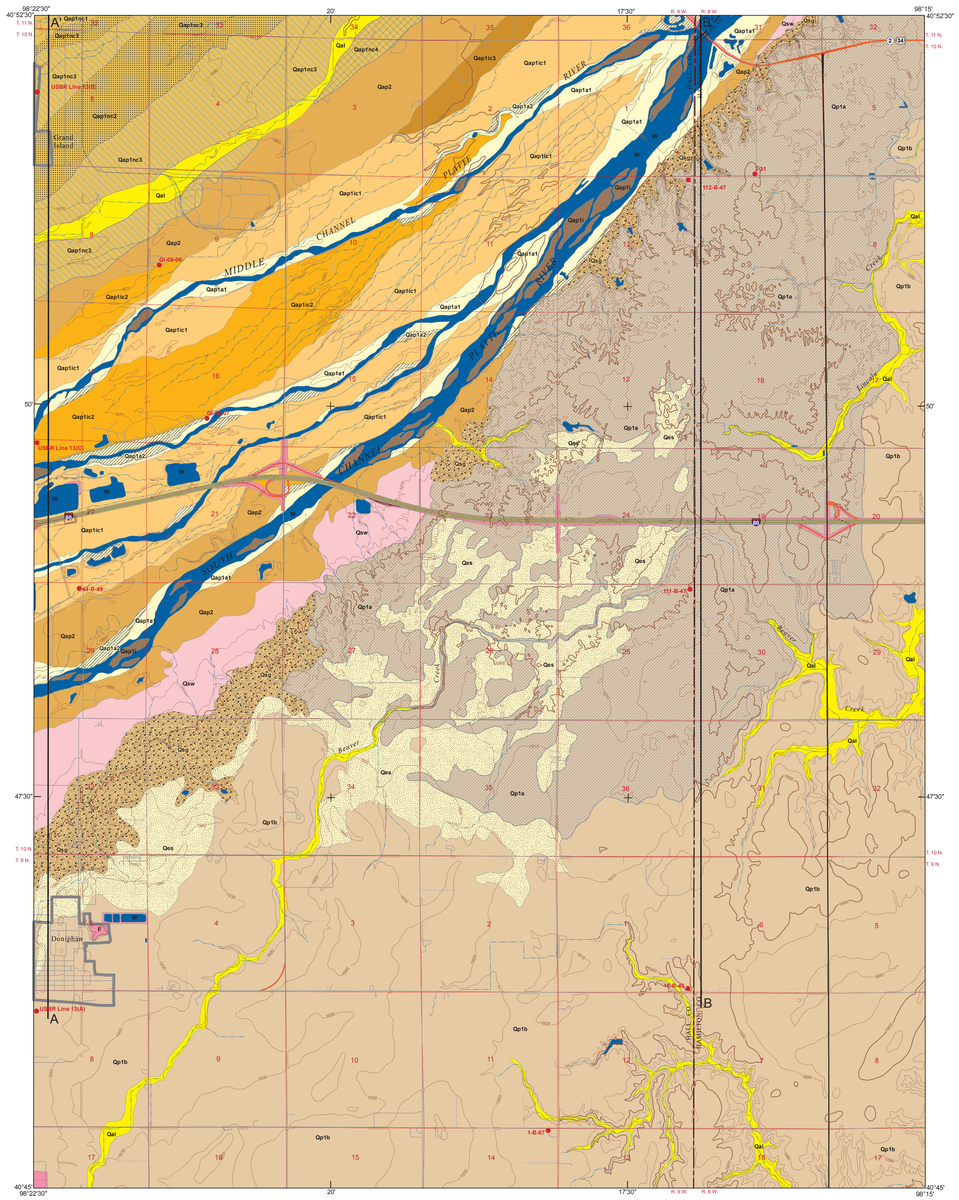

Projection: UTM zone 14 North, NAD83

Contours from the Nebraska Department of Natural Resources, compiled from USGS 7.5 minute topographic quadrangles

Additional base data derived from 2005 second edition TIGER/line files

Magnetic North Declination Approximately 5°12', 2008

SCALE 1:24,000

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

QUADRANGLE LOCATION

Cartography and GIS by:
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Description of Mapping Units:

Qap1a1 **Quaternary alluvium --younger channel and bar sediments of the active channel of the Platte River accreted during historic times (Recent)**

Medium to very coarse sand with fine to medium gravel.

Areas mapped as Qap1a1 were, in general, parts of the active channel of the Platte River ca. 1860 and were subsequently accreted to the banks through a process of channel abandonment from that time through the 20th century. Qap1a1 is considered to be slightly younger than Qap1a2 and can be differentiated from Qap1a2 on the basis of the more distal position of the latter relative to the active channel of the Platte River, and the generally more abundant woody vegetation on Qap1a2.

Qap1a2 **Quaternary alluvium--older channel and bar sediment of the active channel of the Platte River accreted during historic times (Recent)**

Medium to very coarse sand with fine to medium gravel.

Areas mapped as Qap1a2 were, in general, parts of the active channel of the Platte River ca. 1860 and were subsequently accreted to the banks through a process of channel abandonment from that time through the 20th century, although most of Qap1a2 was probably accreted before the 1960s. Qap1a2 is considered to be slightly older than Qap1a1 and occupies more distal positions relative to the active channel of the Platte River. Qap1a2 is also overgrown more frequently by woody vegetation than is Qap1a1.

Qap1i **Quaternary alluvium --stabilized bars (islands) within the active channel of the Platte River (Recent)**

Medium to very coarse sand with fine to medium gravel.

Areas mapped as Qap1a1 were, in general, mobile bars within the active channel of the Platte River during historic times. These bars were subsequently stabilized and amalgamated by the growth of woody vegetation after ca. 1860 and by the growth of new bars around previously-stabilized bars. The process of bar stabilization and island formation continues to the present day.

Qap1ic1 **Quaternary alluvium--sediments of younger inactive channels and bars of the South Channel of the Platte River, recently abandoned (Recent)**

Very thin silty sands and sandy silts overlying medium to very coarse sand with fine to medium gravel.

Areas mapped as Qap1ic1 are a complex of abandoned anastomosed Platte River channels and bars that appear very distinctly in the earliest aerial photograph series (1938 and 1951). Therefore, those channels are considered to have been active in relatively recent times, although survey records from ca. 1860 are insufficiently detailed to assess the condition of these channels at the beginning of Euramerican settlement. Qap1ic1 can be differentiated from Qap1ic2 because: (1) channel forms are more distinct in areas mapped as Qap1ic1, and (2) areas mapped as Qap1ic1 cut across areas mapped as Qap1ic2. Generally, less than 1 m of silty sediments overlies the sorted medium to very coarse sands in areas mapped as Qap1ic1.

Qap1ic2 **Quaternary alluvium--sediments of older inactive channels and bars of the South Channel of the Platte River, recently abandoned (Recent)**

Very thin silty sands and sandy silts overlying medium to very coarse sand with fine to medium gravel.

Areas mapped as Qap1ic2 are a complex of abandoned anastomosed Platte River channels and bars that appear less distinctly than those in Qap1ic1 in the earliest aerial photograph series (1938 and 1951). Areas mapped as Qap1ic2 are also cross-cut by those mapped as Qap1ic1. Therefore, Qap1ic2 is considered to be older than Qap1ic1. Generally, less than 1 m of silty sediments overlies the sorted medium to very coarse sands in areas mapped as Qap1ic2.

Qap1ic3 **Quaternary alluvium--sediments of old inactive channels and bars of the Platte River (Holocene to Recent)**

Clayey silt, silt, sandy silt, and silty sand overlying medium to very coarse sand with fine to medium gravel.

The area mapped as Qap1ic3 shows a few, faint channel forms in the earliest aerial photograph series (1938 and 1951), but is distinct from the smoother, slightly higher terrain alongside. Qap1ic3 is considered to be the product of sedimentation in and atop an old inactive channel of the Platte River that flowed obliquely to the modern South Channel of the river. Qap1ic3 is considered to be older than Qap1ic2 by virtue of surface expression and geometric relationships. In general, Qap1ic3 includes a greater thickness of finer-grained overbank deposits (perhaps approaching 2 m in places) than either Qap1ic1 or Qap1ic2, and these sediments probably mask channel and bar topography.

Qal **Quaternary alluvium of small streams (Holocene to Recent)**

Silt, sandy to pebbly silt, silty sand, and fine to medium sand.

Late Holocene to Recent alluvium deposited in and along small tributary streams. This unit also includes sediment in channelized streams.

Qsw **Slopewash (Holocene to Recent)**

Thin, silty to sandy sediments produced from the erosion of unconsolidated materials upslope.

Slopewash forms extensive deposits along the margins of alluvial terraces and loess - mantled upland terrains. These deposits probably merge downslope with older alluvium.

Qap1nc1 **Quaternary alluvium—surficial sediments of the North Channel of the Platte River, abandoned during late prehistoric and historic times (Late Holocene? to Recent)**

Very thin sandy silt to silty sand overlying medium to very coarse sand with fine to medium gravel.

The area mapped as Qap1nc1 is very distinct in tone and surface features (prominent channel and bar topography) from surrounding areas in 1938 aerial photographs and subsequent imagery. Qap1nc1 was a narrow active braided channel of the Platte River prior to ca. 1860. The width of the flowing part of the North Channel of the Platte River identified in GLO survey maps from the 1860s is unclear, but its course seems to have been approximately the same as that of the modern Wood River in the same area. Qap1nc1 is considered to be slightly younger than Qap1nc2 and significantly younger than Qap1nc3 because of geometric relationships between these map units (Qap1nc1 features appear to cut across Qap1nc2 and Qap1nc3) and the comparative prominence of channel and bar topography on surfaces mapped as Qap1nc1. Furthermore, sloughs are less prominent on areas mapped as Qap1nc1.

Qap1nc2 **Quaternary alluvium--older surficial sediments of the North Channel of the Platte River (Holocene to Recent?)**

Very thin sandy silt to silty sand overlying medium to very coarse sand with fine to medium gravel.

Areas mapped as Qap1nc2 show less-prominent abandoned channels and bars, but also exhibit more well-developed sloughs, than do areas mapped as Qap0nc1. Areas mapped as Qap1nc2 are also cross-cut by those mapped as Qap1nc1. Therefore, Qap1nc2 is considered to be older than Qap1nc1. Generally, less than 1 m of silty sediments overlies medium to very coarse sands under areas mapped as Qap1nc2.

Qap1nc3 **Quaternary alluvium--older surficial sediments of the North Channel of the Platte River (Late Pleistocene?-Holocene?)**

Silty sand to sandy silt overlying medium to very coarse sand with fine to medium gravel.

Areas mapped as Qap1nc3 are abandoned braid channels and bars of the North Channel of the Platte River. These areas show pronounced development of modern sloughs in the earliest aerial photograph series (1938 and 1951). Qap1nc3 is considered to be older than Qap1nc2 by virtue of surface expression and geometric relationships. The surfaces mapped as Qap1nc3 are younger than those mapped Qap1nc4, and can be differentiated from the latter because they have more well-developed sloughs on them. Also, areas mapped as Qap1nc4 are cross-cut by areas mapped as Qap1nc3.

Qap1nc4 **Quaternary alluvium--oldest surficial sediments of the North Channel of the Platte River (Late Pleistocene?-Holocene?)**

Sandy silt overlying medium to very coarse sand with fine to medium gravel.

Areas mapped as Qap1nc4 are abandoned braid channels and bars of the North Channel of the Platte River. These areas show faintly-developed sloughs in the earliest aerial photograph series (1938 and 1951).

Qap2 **Quaternary alluvium--older, distal alluvium of the Platte River (Late Pleistocene?-Holocene)**

Sandy silts overlying medium to very coarse sand with fine to medium gravel.

Qap2 can be distinguished from the younger Qap1 surficial sediments (Qap1ic1 through Qap1ic3 and Qap1nc1 through Qap1nc4) because surfaces mapped as Qap2 are nearly devoid of channel features. Cross-cutting and burial by these Qap1 sediments has resulted in Qap2 surfaces being isolated between areas mapped as Qap1ic1 through Qap1ic3 or Qap1nc1 through Qap1nc4.

Qes **Eolian sand (Late Pleistocene-Holocene?)**

Fine to medium eolian sand.

Areas mapped as Qes lie in uplands south of the Platte River and are near or within other areas covered by Peoria Loess. Many areas mapped as Qes show very low -relief (<2 m) hummocks that may represent incipient dunes.

Qp1a **Peoria Loess and associated units (Late Pleistocene)**

Thick eolian silt showing mottled tonal patterns in early aerial photographs.

The thick Peoria Loess on the uplands south of the Platte River shows either flat, smooth, and relatively uniformly-toned terrain or slightly greater-relief terrain with a mottled appearance in 1951 aerial photographs, the latter being mapped as Qp1a. The mottled appearance in Qp1a appears to result from the existence of a subdued drainage pattern. Qp1a is probably underlain by the Illinoian Loveland Loess throughout the mapped area. As far as can be determined, natural outcrops of the Loveland Loess do not exist on lower slope positions in the mapped area, presumably because the Peoria Loess mantled pre-existing slopes. Nonetheless, an excavation in 2008 in the NW ¼ NE ¼ of section 6, T. 10 N., R. 8 W., adjacent to the Riverside Lakes development, showed the upper contact of the Loveland Loess in a footslope position, as well as the Sangamon Geosol developed at the upper contact of the Loveland Loess. It can be assumed that there is at least some Gilman Canyon Formation (also eolian silt) present between the base of the Peoria Loess and the top of the Loveland Loess. It is not possible, however, to map either the Gilman Canyon Formation or the Loveland Loess at the surface in the area.

Qp1b **Peoria Loess and associated units (Late Pleistocene)**

Thick eolian silt showing flat, smooth, and relatively uniformly-toned terrain in early aerial photographs.

Areas mapped as Qp1b on the uplands south of the Platte River are underlain by thick Peoria Loess and exhibit flat, smooth, and relatively uniformly-toned terrain in 1951 aerial photographs. As far as can be determined, natural outcrops of the Loveland Loess do not exist on lower slope positions in the mapped area, presumably because the Peoria Loess mantled pre-existing slopes. Nonetheless, an excavation in 2008 in the NW ¼ NE ¼ of section 6, T. 10 N., R. 8 W., adjacent to the Riverside Lakes development, showed the upper contact of the Loveland Loess in a footslope position, as well as the Sangamon Geosol developed at the upper contact of the Loveland Loess. It can be assumed that there is at least some Gilman Canyon Formation (also eolian silt) present between the base of the Peoria Loess and the top of the Loveland Loess. It is not possible, however, to map either the Gilman Canyon Formation or the Loveland Loess at the surface in the area.

Qsg **(Early to Middle Pliestocene?)**

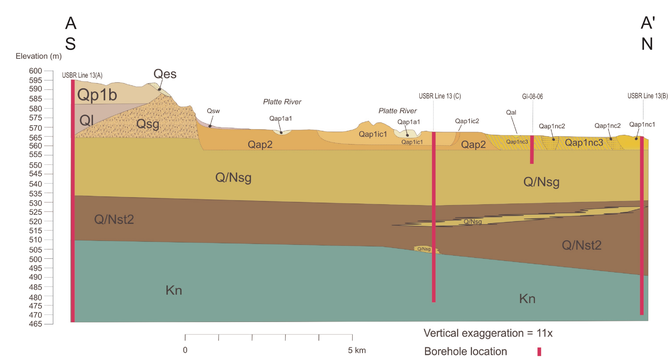
Medium to coarse sand and fine to medium gravel.

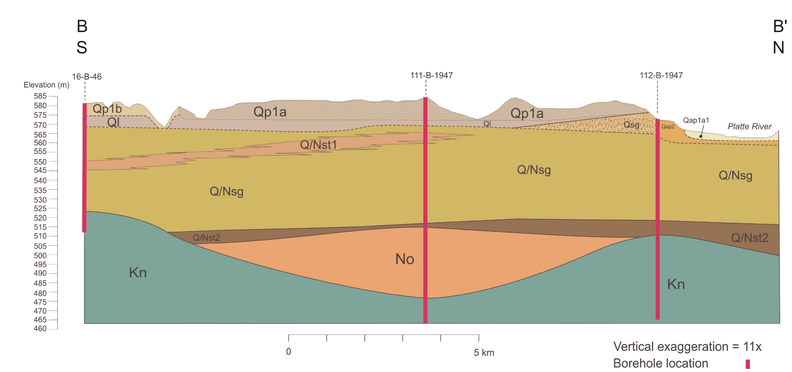
Areas mapped as Qsg on the upland scarp south of the Platte River are underlain by coarse alluvium deposited by the ancestral Platte River system. The surface of this mapping unit shows flat to hummocky terrain, depending on its slope position.

F **Artificial fill**

W **Water**

Test hole location





Ql **Loveland Loess (Middle Pleistocene)**

Thick eolian silts and silty clays

Eolian silts and silty clays of the Illinoian Loveland Loess underlie areas mapped at the surface as Peoria Loess in the uplands south of the Platte River. The Loveland Loess can be differentiated from the Peoria Loess in the subsurface by virtue of differences in color, the uppermost Loveland Loess generally being slightly redder in color.

Q/Nst1 **Old alluvial silts (Late Neogene [Late Pliocene]? to Middle Pleistocene?)**

Silts and silty clays, probably of alluvial origin.

Silt and silty clay appear in association with medium to coarse sands and gravels in the subsurface under uplands on the south side of the Platte River.

Q/Nsg **Old alluvial sands and gravels (Late Neogene [Late Pliocene] to Early Pleistocene)**

Medium to coarse sand and fine to coarse gravel.

These thick, coarse-grained fluvial sediments are prominent in the subsurface under the present Platte River Valley and under the adjacent uplands.

Q/Nst2 **Old silts (Late Neogene [Late Pliocene] to Early Pleistocene)**

Thick silts and silty clays.

These fine-grained sediments are alluvial and/or eolian in origin (they may be ancient loess deposits, at least in part). They exist at depth under the present Platte River and under the adjacent uplands. This unit extends under most of the mapped area.

No **Ogallala Group (Late Neogene [Late Miocene])**

Dominantly poorly-consolidated fine to medium sandstones, fine to medium sands, thin silts and silty clays.

The Ogallala Group consists of alluvial sediments with rare, thin, and spatially-isolated lacustrine sediments. Ancient calcretes (petrocalcic horizons) also appear locally within the Ogallala Group. In some parts of the mapped area, the Ogallala Group is filling broad, shallow valleys incised into Cretaceous strata.

Ks **Niobrara Formation (Late Cretaceous)**

Limestone, shaly chalk, and chalky shale.

The marine sediments of the Niobrara Formation underlie the entire mapped area, at depth. Over parts of the mapped area, the Niobrara Formation is the local bedrock.

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

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