PRELIMINARY SURFICIAL GEOLOGY OF THE PILSEN QUADRANGLE, MARION COUNTY, KANSAS

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2026

KANSAS GEOLOGICAL SURVEY
The University of Kansas

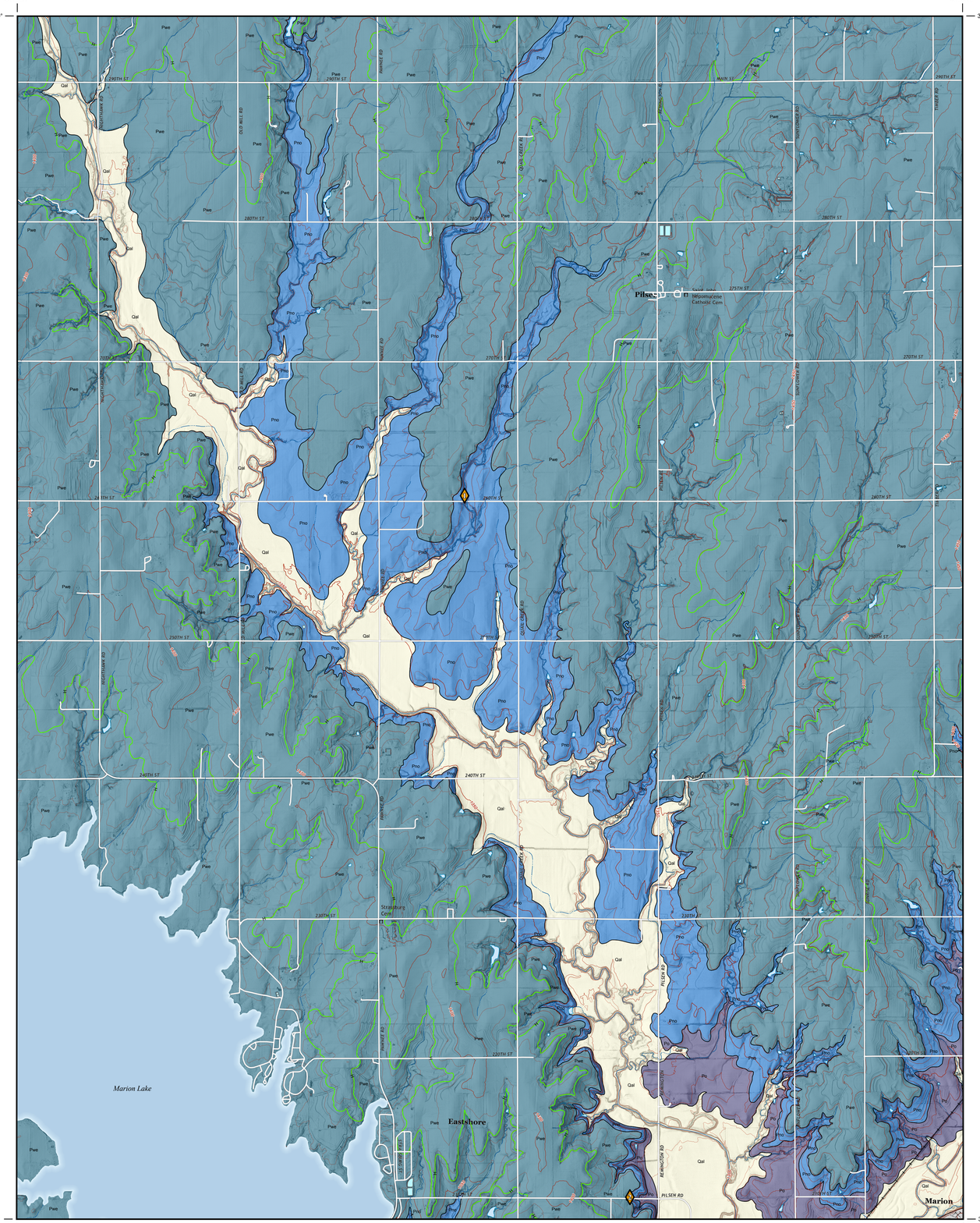
Open-File Report 2026-23

Funded in part by the USGS National Cooperative Geologic Mapping Program

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

The National Map US Topo

PILSEN QUADRANGLE
KANSAS - MARION COUNTY
7.5-MINUTE SERIES



Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and 1 000-meter grid:Universal Transverse Mercator, Zone 14S
This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery.....NAIP, July 2017 - September 2017
Roads.....U.S. Census Bureau, 2018
Names.....GNIS, 1984 - 2021
Hydrography.....National Hydrography Dataset, 2001 - 2018
Contours.....National Elevation Dataset, 2014
Boundaries.....Multiple sources; see metadata file 2019 - 2021
Public Land Survey System.....BLM, 2018
Wetlands.....FWS National Wetlands Inventory 1985 - 1986

MN
GN
3°19'
59 MILS
1°12'
21 MILS
UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
PH
Grid Zone Designation
14S

SCALE 1:24 000
KILOMETERS
METERS
MILES
FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the National Geospatial Program US Topo Product Standard.

EXPLANATION

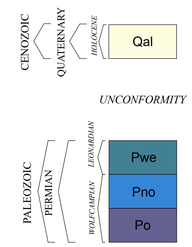
Transportation
Paved road
Railroad

Hydrology
Perennial stream
Intermittent stream
Waterbody

Topography
Index elevation contour (50 feet)
Elevation contour (10 feet)

Geology
Observed contact
Hollenberg Limestone Member
Photo location
Quarry

CORRELATION OF UNITS



These descriptions are a compilation of several sources, including field notes and measured sections, Kansas Department of Transportation geological reports and profiles, and lithologic descriptions in Bettis et al. (2003), Bayne et al. (1971), and Plummer and Romary (1941).

GEOLOGIC UNITS

Qal — Undifferentiated floodplain alluvium

These deposits are found along major rivers and smaller streams in Marion County. The floodplain sediments of the largest river in the county, the Cottonwood River, consist of clay, silt, sand, and gravel that probably do not exceed 60 ft (18 m) in thickness. The smaller streams draining the uplands, such as Doyle Creek, Mud Creek, and Clear Creek, are dominated by clay and silt and range up to 20 ft (6 m) thick.

Pwe — Wellington Formation

Much of the outcrop area of the Wellington Formation is under cultivation and the formation is generally poorly exposed. The unit consists of predominantly tan-gray to green-gray, silty shale with thin beds of gypsum, anhydrite, and limestone. The Hollenberg Limestone Member (H) consists of a gray to tan, coarsely crystalline, dolomitic limestone that is less than approximately 7 ft (2 m) thick and an inconsistent ledge-former. The Wellington Formation below the Hollenberg may contain thin-bedded maroon to dark green calcareous beds of shale. The Carlton Limestone Member is a light gray to tan, thin-bedded, platy, lenticular limestone that crops out approximately 90 ft (27.5 m) from the base of the formation in the central portion of the county. Although the Wellington Formation can be up to 700 ft (213 m) thick in some parts of Kansas, only about 150 ft (46 m) is exposed in Marion County.

Pno — Nolans Limestone

At the base of the Nolans is the Kidder Limestone Member which consists of one or two beds of hard, gray to yellowish-brown, nodular, and dolomitic limestone with a "sugary" rough texture and containing bivalves and brachiopods. The Kidder has a total thickness of approximately 2 ft (0.6 m). Above the Kidder limestone is the Paddock Shale Member consisting of olive to gray-green argillaceous, blocky shale near its base transitioning to a tan-gray shale towards the top. The Paddock shale is approximately 15 ft (4.5 m) thick in Marion County. At the top of the Nolans is the Herington Limestone Member which consists of a light gray to grayish-brown, massive, dolomitic limestone with locally present calcite geodes, concretions, and bivalve fossils. The Herington is up to 8 ft (2.5 m) thick and has been extensively quarried for building construction in Marion County. The total thickness of the Nolans Limestone in Marion County is approximately 25 ft (7.5 m).

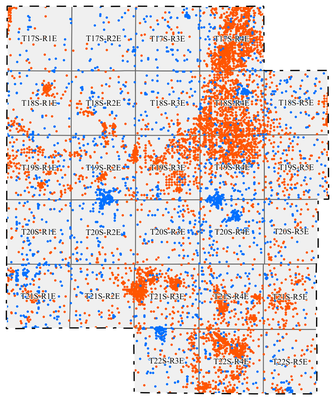
Po — Odell Shale

Alluvium beneath floodplain and low terrace surfaces is found along major river valleys and the upper reaches of smaller tributaries in the county. Low terrace surfaces stand 12–18 ft (3.7–5.5 m) above the elevation of the modern channel in the Saline River valley. Floodplain and low terrace deposits are inset against older terrace valley fills (Qt1) in major river valleys and unconformably overlie Cretaceous bedrock in smaller tributaries. Due to scale, inset Qal deposits are predominantly mapped in the Saline River valley. Deposits mostly comprise silt and clay with some sand. Based on regional studies, valley fills beneath low terrace surfaces are likely younger than 3,000 years old and floodplain deposits are less than 1,000 years old (e.g., Mandel, 1988, 1992; Arbogast and Johnson, 1996; Layzell and Mandel, 2020).

Figure 1. Cutbank showing the Paddock Shale Member of the Nolans Limestone consisting of yellow-green shale overlying gray-brown bed of dolomitic limestone. Photo credit: Jon J. Smith, University of Kansas

Figure 2. Roadcut exposure of the Nolans Limestone. Photos shows approximately 1.5 m of gray to tan dolomitic limestone of the Herington Limestone Member overlying the yellow-green Paddock Shale Member.

OIL/GAS AND WATER WELLS FOR MARION COUNTY



SOURCES

Aber, J. S., 1991, Surficial geology of Butler County, Kansas, final report: Kansas Geological Survey, Open-File Report 91-48, p. 1–31.

Aber, J. S., 1994, Geologic map, Butler County, Kansas: Kansas Geological Survey, Map M-30, scale 1:50,000.

Byrne, F. E., Walter, C. P., Hill, J. L., and Riseman, L., 1959, Geology and construction-material resources of Marion County, Kansas: U.S. Geological Survey, Bulletin 1060-B, p. 63–95.

Kansas Geological Survey, 2022, Water well completion records (WWC5), http://www.kgs.ku.edu/Magellan/WaterWell/index.html.

Moore, R. C., Jewett, J. M., O'Connor, H. G., 2004, Geologic map of Chase County, Kansas: Kansas Geological Survey, Map M-56, scale 1:50,000.

Zeller, D. E., ed., 1968, The stratigraphic succession in Kansas: Kansas Geological Survey, Bulletin 189, 81 p., https://doi.org/10.17161/kgsbulletin.no.i189.22214

Elevation contours are included for general reference. They are used in the U.S. Geological Survey's current US Topo 1:24,000-scale topographic map series. Elevation contours were generated from hydrographically-improved 1/3 arc-second National Elevation Dataset (NED) data and smoothed during processing for use at a 1:24,000 scale. In some places, the contours may be more generalized than the base data used for compilation of geologic outcrop patterns. Outcrop patterns on the map typically reflect topographic variation more accurately than the associated contour lines. Repeated fluctuation of an outcrop line across a contour line is an indication that the mapped rock unit is maintaining a relatively constant elevation along a generalized contour.

References used in the digital mapping include 1-meter LiDAR hillshades and 1-meter 2020 U.S. Department of Agriculture – Farm Services Agency (USDA-FSA) National Agriculture Imagery Program (NAIP) digital imagery. USGS 7.5-min 1:24,000-scale topographic maps, USDA Natural Resources Conservation Service (NRCS) soil surveys, and other geologic maps and bulletins were used as supplementary references. Roads and highways are shown on the base map as represented by data from the Kansas Department of Transportation (KDOT), U.S. Census Bureau, and other sources. Additionally, USDA-FSA NAIP imagery was used to check road locations.

Shaded relief is based on 1-meter hydroflattened bare-earth DEMs from the state of Kansas LiDAR database. The DEM images, in ERDAS IMAGINE format, were mosaicked into a single output DEM and reprojected to decimal degrees. The output DEM was then converted to a hillshade, a multidirectional shaded-relief image using angles of illumination from 0°, 225°, 270°, and 315° azimuths, each 45° above the horizon, with a 4x vertical exaggeration.

This map was funded in part by the USGS National Cooperative Geologic Mapping Program, STATEMAP award number G25AC00518 (FY2025).

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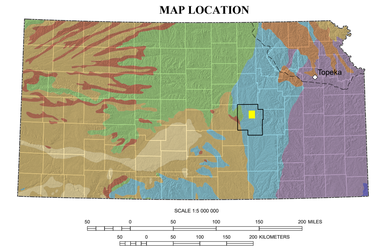
This map is a preliminary product and has had less scientific and cartographic review than the Kansas Geological Survey's M-series geologic maps. The KGS does not guarantee this map to be free from errors or inaccuracies and disclaims any responsibility or liability for interpretations made from the map or decisions based thereon.

MAP LOCATION



GENERALIZED GEOLOGY OF KANSAS

QUATERNARY SYSTEM
Holocene - Pleistocene Series
- Loess and river-valley deposits
- Sand dunes
- Glacial-drift deposits
- Limit of glaciation in Kansas

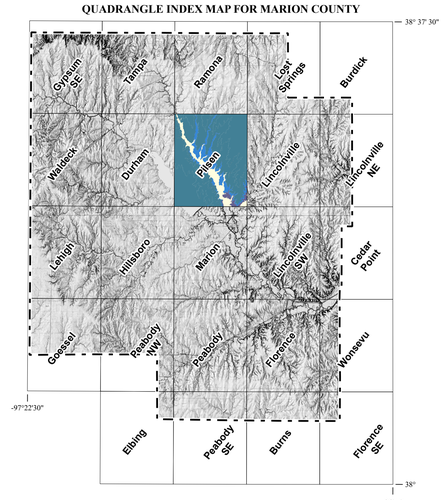
NEOGENE SYSTEM
Pliocene - Miocene Series
- Ogallala Fm

CRETACEOUS SYSTEM

PERMIAN SYSTEM

CARBONIFEROUS SYSTEM
- Pennsylvanian Subsystem
- Mississippian Subsystem

QUADRANGLE INDEX MAP FOR MARION COUNTY



SUGGESTED REFERENCE TO THE MAP

Smith, J. J., 2026, Preliminary surficial geology of the Pilsen quadrangle, Marion County, Kansas: Kansas Geological Survey, Open-File Report 2026-23, scale 1:24,000, unpublished.

Last updated: 9/9/2026