KANSAS GEOLOGICAL SURVEY
The University of Kansas

PRELIMINARY SURFICIAL GEOLOGY OF THE LINN COUNTY PORTION OF THE GARNETT SE QUADRANGLE, KANSAS

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GIS compilation and cartography by Kolbe D. Andrzejewski

2026

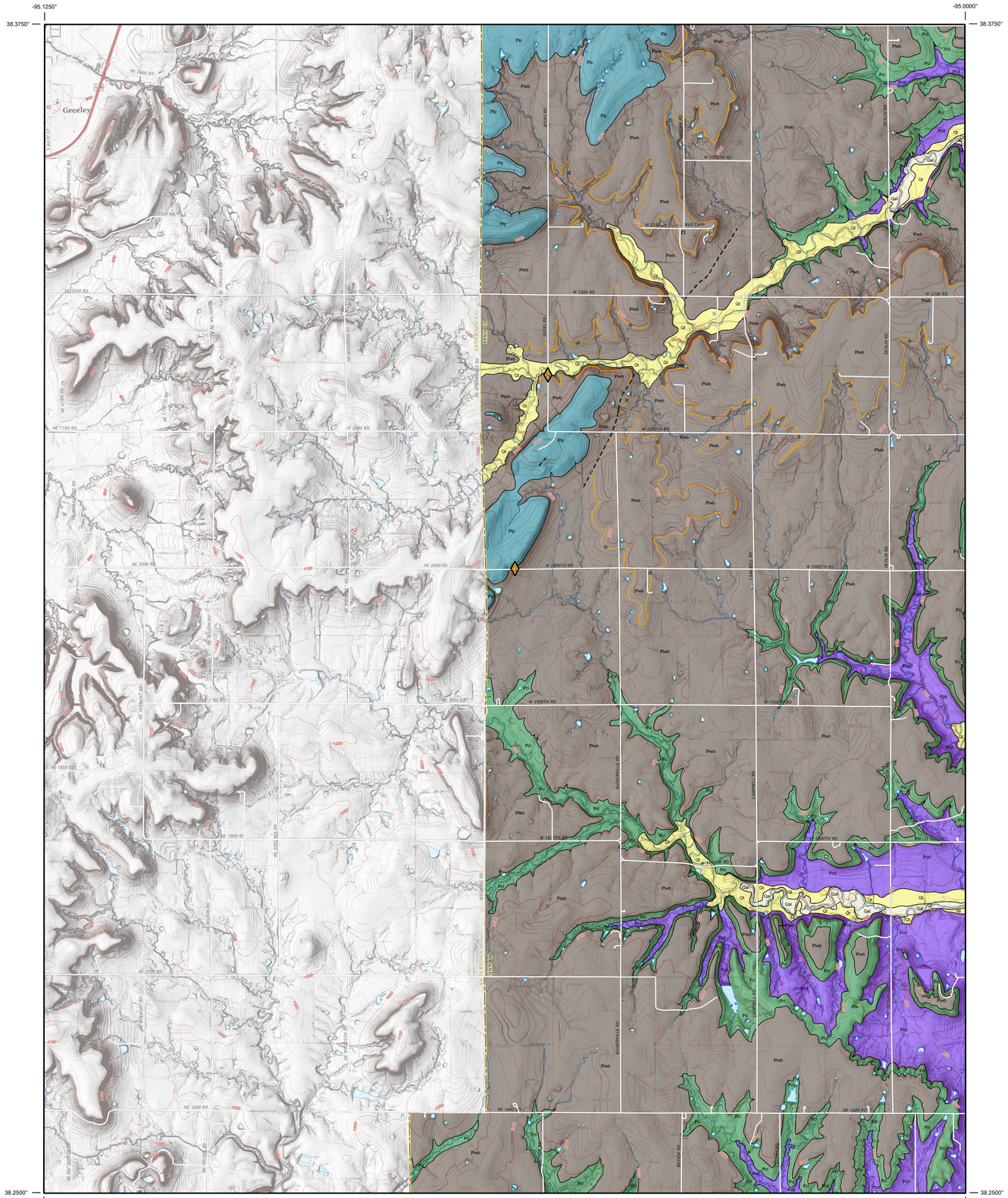
Open-File Report 2026-8

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

GARNETT SE QUADRANGLE
KANSAS
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 15S
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, August 2017 - September 2017
Roads.....U.S. Census Bureau, 2015 - 2018
Names.....GNIS, 2008 - 2021
Hydrography.....National Hydrography Dataset, 2000 - 2018
Contours.....National Elevation Dataset, 2016
Boundaries.....Multiple sources; see metadata file 2019 - 2021
Public Land Survey System.....BLM, 2018
Wetlands.....FWS National Wetlands Inventory 1985

UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

U.S. National Grid
100,000-m Square ID
UC
Grid Zone Designation
15S

SCALE 1:24 000

KILOMETERS 2 1 0.5 0 1 2
METERS 1000 500 0 1000 2000
MILES 1 0.5 0
FEET 1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

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.

SUGGESTED REFERENCE TO THE MAP

Peterson, A. E., 2026, Preliminary surficial geology of the Linn County portion of the Garnett SE quadrangle, Kansas: Kansas Geological Survey, Open-File Report 2026-8, scale 1:24,000, unpublished.

EXPLANATION

Transportation
- Paved road
- Railroad

Hydrology
- Perennial stream
- Intermittent stream
- Waterbody

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

Geology
- Observed contact
- Fault
- W — Wyandotte Limestone marker bed
- Photo location

CORRELATION OF UNITS

CENOZOIC — QUATERNARY — HOLOCENE / PLEISTOCENE
- Qal
- Qt

UNCONFORMITY

CENOZOIC — CARBONIFEROUS — UPPER PENNSYLVANIAN
- Plp
- Plwb
- Pci
- Pcd

The following unit descriptions are derived from a compilation of several sources including field notes and measured sections, geological reports from Linn and surrounding counties, water well drillers logs, soil survey data, high resolution imagery, and LiDAR.

GEOLOGIC UNITS

Qal

Undifferentiated floodplain alluvium

This unit is composed of silt, clay, sand, and gravel in and adjacent to present day rivers and streams. Coarser sediment is typically found in the lowest few feet of the alluvial valley fill. These sediments are likely less than 60 ft (18 m) thick in the Marias Des Cygnes River Valley and less than 30 ft (9 m) in stream valleys in Linn County.

Qt

Alluvial terrace deposits

This unit is composed of silt, clay, sand, and gravel underlying a low terrace adjacent to major streams. Within the major river valleys and streams it is 3 - 6 ft (1 – 2 m) higher than the modern floodplain.

Plp

Plattsburg Limestone

The Plattsburg Limestone is divided into three members: the Merriam Limestone, Hickory Creek Shale, and Spring Hill Limestone. The Merriam Limestone Member is named after the town of Merriam in Johnson County, Kansas. It is composed of an upper massive and lower blocky limestone bed separated by a thin calcareous shale. It ranges in thickness from 1 to 3 ft (0.3 - 1 m). Both limestone beds within the Merriam weather to a buff color but are gray on a freshly broken surface. The Hickory Creek Shale Member is a yellow, calcareous shale averaging 2 feet in thickness. The Spring Hill Limestone Member weathers yellow/brown and is gray on a freshly exposed surface. It forms algal mound complexes in surrounding counties and thus, varies in thickness in Linn County. Only an erosional remnant remains in the northwest corner of the county. The overlying Vilas Shale is absent in the county.

Plwb
W

Bonner Springs Shale, Wyandotte Limestone, and Lane Shale

The Bonner Springs Shale is a gray to buff shale with a persistent sandstone bed at the base. The Bonner Springs Shale varies in thickness along the outcrop belt in Kansas as does the Wyandotte Limestone. In eastern Kansas where the Wyandotte Limestone thins, the Liberty Memorial Shale generally thickens. The Bonner Springs Shale varies in thickness in Miami County from 0.5 to 64 ft (0.15 - 19.5 m) and is approx. 50 ft (15 m) thick in Allen County. The Wyandotte Limestone varies in thickness in Miami County from 2.6 to 66.8 ft (0.8 - 20.4 m). North, in Miami County, it has five members including the Island Creek Shale, Lower Farley Limestone, Middle Farley Shale, Upper Farley Limestone, and Bonner Springs Shale. In Linn County, the limestone beds pinch out making member identification difficult. The Wyandotte Limestone is approx. 27 feet thick in the northwest corner of Linn County and thins to the south where it disappears and the accommodation space is filled by the Liberty Memorial Shale. The Wyandotte Limestone is a light bluish-gray, wavy -bedded limestone. The Lane Shale Formation is a bluish-gray, clay shale in Linn County. The total thickness of the Lane Shale there is approx. 56 ft (17 m) where the Argentine Limestone is present so that a measurement is possible.

Pci

Chanute Shale and Iola Limestone

In Linn County, the thickness of the Chanute Shale Formation ranges from 30 to 40 ft (9 – 12 m). The upper portion of the Chanute shale is composed of sandstone while the lower portion is composed of olive-green, clay shale. A coal bed of up to 1 ft in thickness separates the upper and lower portions of the Chanute Shale. The Iola Limestone is 11 to 16 ft (3.4 - 4.9 m) in the county. It is composed of three members. The Paola Limestone Member is a dense, dark blue limestone that ranges between 2 and 3 ft (0.6 – 1 m). It is not continuous across Linn County. The Muncie Creek Shale Member is a phosphatic black, platy shale ranging in thickness from a few inches to approx. 3 ft (0.1 – 1 m). The Raytown Limestone Member is a yellowish -brown to nearly white limestone unit that has distinctive limonite staining along bedding planes within the wavy- bedded unit. Its thickness ranges from 9 to 13 ft (3 – 4 m).

Pcd

Cherryvale Shale and Drum Limestone

The Cherryvale Shale Formation ranges in thickness from 40 to 70 ft (12 – 21 m). It is composed of five members: Fontana Shale, Block Limestone, Wea Shale, Westerville Limestone, and Quivira Shale. In Linn County, the Westerville Limestone is absent, so the Wea and Quivira Shale Members are not distinguishable. The Block Limestone thins from 1 to 7 ft (0.3 – 2.1 m) in the north portion of the county to a thin, discontinuous bed in the south portion of the county making individual shale units within the Cherryvale Shale difficult to distinguish. The Drum Limestone is composed of two limestone members locally separated by several inches of shale. The massive -bedded, deep brown Dewey Limestone Member averages approx. 1.5 ft (0.5 m). The crystalline Dewey Limestone is bluish- gray on a fresh break. The Corbin City Limestone Member forms the upper portion of the Drum Limestone where present and is a cross-stratified, oolitic limestone that ranges in thickness from 0.2 to 6 ft (0.1 – 1.8 m). The Drum Limestone varies in thickness from several inches to 9 ft (0.2 – 2.7 m) across Linn County.



Figure 1. The buff colored sandy, silty, Bonner Springs Shale. It forms slopes below the Plattsburg Limestone in the northwest portion of Linn County. Photo credit: Alan E. Peterson, University of Kansas.



Figure 2. The Wyandotte Limestone as seen adjacent to Middle Creek forms a minor escarpment along its outcrop belt. The Limestone members of the Zarah Subgroup disappear to the south, leaving only the Lane and Bonner Springs Shale. Photo credit: Alan E. Peterson, University of Kansas.

SOURCES

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Seevers, William J., 1969, Geology and ground-water resources of Linn County, Kansas: State Geological Survey of Kansas, Bulletin 193, https://www.kgs.ku.edu/General/Geology/Linn/index.html.[KA1.1]

Zeller, D.E., ed., [1968] 2008, Classification of rocks in Kansas, revised by Kansas Geological Survey Stratigraphic Nomenclature Committee; in The Stratigraphic Succession in Kansas: Kansas Geological Survey, Bulletin 189, 81 p., chart.

Elevation contours are presented for general reference. Used in the U.S. Geological Survey's current US Topo 1:24,000-scale topographic map series, they were generated from hydrographically-improved 1/3 arc-second National Elevation Dataset (NED) data and smoothed during processing for use at 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 will typically reflect topographic variation more accurately than the associated contour lines. Repeated fluctuation of an outcrop line across a contour line should be interpreted as an indication that the mapped rock unit is maintaining a relatively constant elevation along a generalized contour.

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 were used as references in the digital mapping. 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 to supplement the mapping. 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. USDA-FSA NAIP imagery also was used to check road locations.

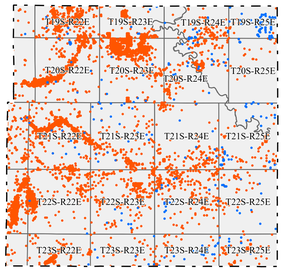
Shaded relief is based on 1-meter hydroflattened bare-earth DEMs from the state of Kansas LiDAR database. The DEM images, in ERDAS IMAGINE format, were mosaicked into a single output DEM and reprojected to decimal degrees. The output DEM was then converted to a hillshade, a multidirectional shaded-relief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

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

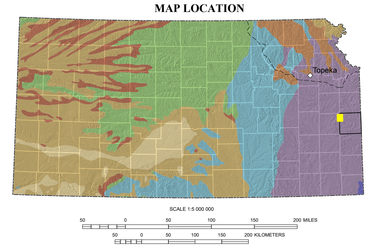
This map was produced using the ArcGIS system developed by Esri (Environmental Systems Research Institute, Inc.).

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.

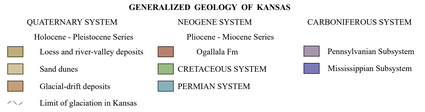
OIL/GAS AND WATER WELLS FOR LINN COUNTY



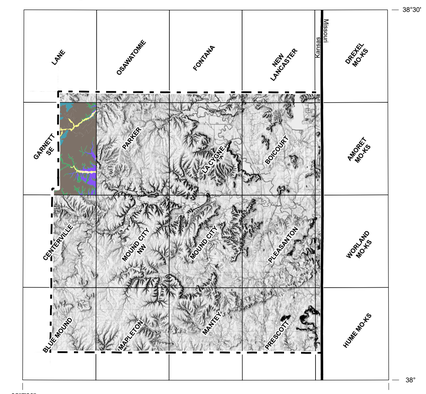
MAP LOCATION



GENERALIZED GEOLOGY OF KANSAS



QUADRANGLE INDEX MAP FOR LINN COUNTY



Last updated: 9/25/2026