

# PRELIMINARY SURFICIAL GEOLOGY OF THE SEDGWICK COUNTY PORTION OF THE GREENWICH QUADRANGLE, KANSAS

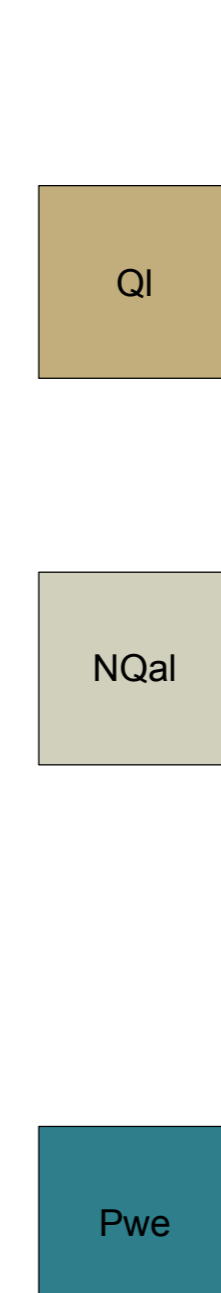
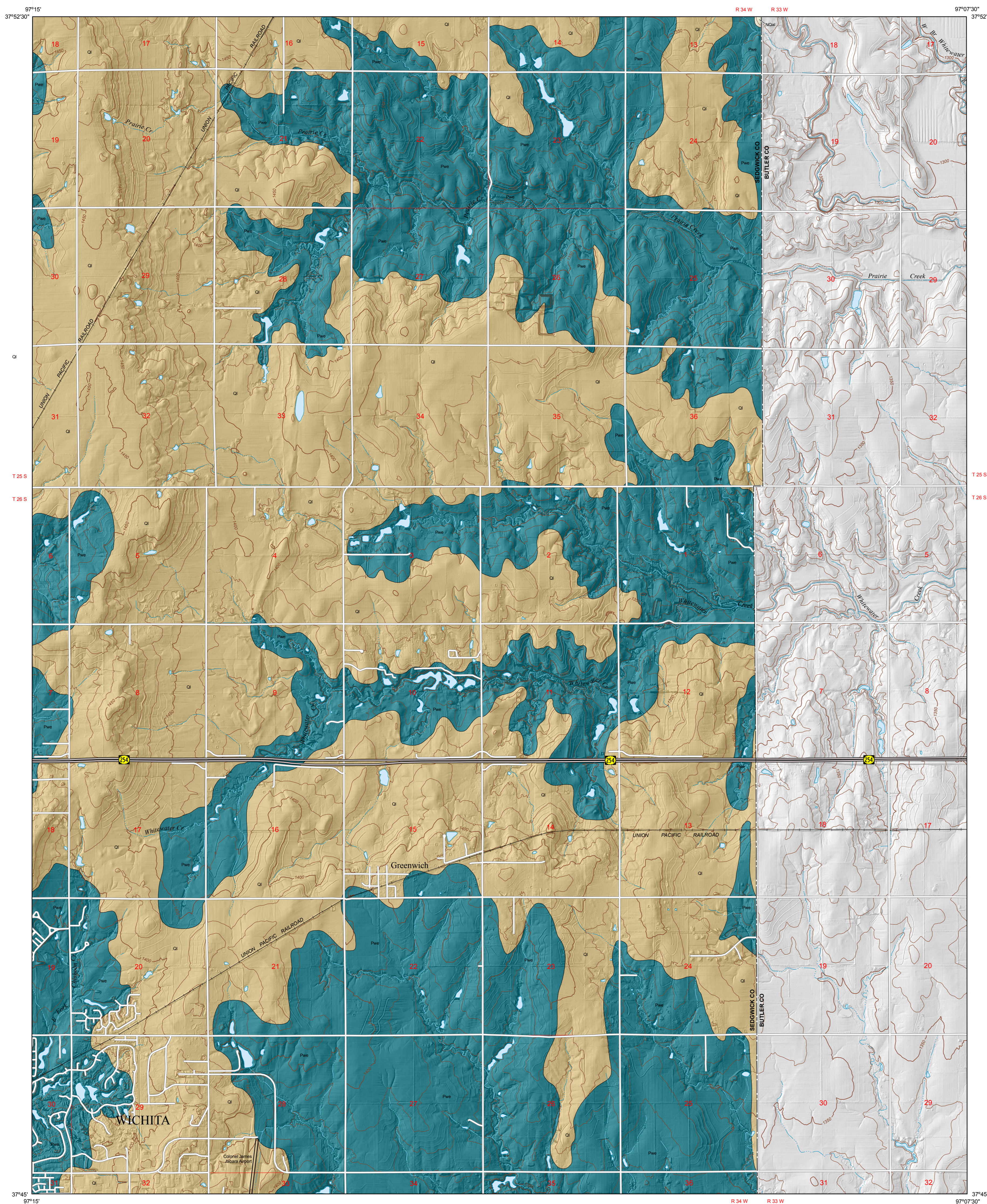
Geology by William C. Parcell, Jacob T. Sinclair, and Melissa L. Lahey

2015

Computer compilation and cartography by John W. Dunham and Hillary C. Crabb

Open-file Report 2015-13

Funded in part by the  
USGS National Cooperative  
Geologic Mapping Program



### GEOLOGIC UNITS

#### CENOZOIC

##### Quaternary System

##### Pleistocene-Holocene

**Loess** — Wind-blown loess deposits in Sedgwick County are tan to pink-tan calcareous silt with zones of caliche and fine sand (Bevans, 1989). The loess ranges from Pleistocene to Holocene in age. Loess covers many of the upland surfaces in Sedgwick County (Welch and Hale, 1987) and rests unconformably on the Permian Wellington Formation and stratigraphically below thick (~5ft) soils.

**Neogene System, Pliocene, to Quaternary System, Pleistocene-Holocene**

**Alluvium** — Alluvium in Sedgwick County is fine to coarse sand and fine to coarse arkosic gravel containing minor amounts of silt and clay that grades upward into clayey silt. Alluvium from the Arkansas River is composed of unconsolidated gravel, sand, and silt and has an estimated thickness of 75 feet (Williams and Lohman, 1949). Pleistocene-age alluvium is present to a depth of nearly 50 feet and Pleistocene to possibly Pliocene to a depth of over 180 feet total depth (Lane and Miller, 1965). Alluvium of Quaternary age lines the floodplain of the Little Arkansas River with limited extension up smaller creeks. In certain areas alluvium may form low terraces of 10-20 feet above the floodplain (Aber, 1991). Alluvium found in smaller creeks is composed of finer sediments and is variable in lithology (Moore, Jewett, and O'Connor, 1951). Its source is the shales and carbonates in the Permian Wellington and Pleistocene loess.

#### PALEOZOIC

**Wellington Formation** — The Wellington Formation in Sedgwick County is predominantly soft, calcareous, gray and blue-gray shale with thin beds of gypsum, argillaceous limestone, and minor siltstone (Ver Wiebe, 1937). In northeastern Sedgwick County, minor beds of gypsum crop out where the Wellington is exposed along streams or lakes. The thick Hutchinson Salt Member, present in western Sedgwick County (Bass, 1929), is missing in the eastern portion of the county due to dissolution (Schumacker, 1966). Thin beds of the Carlton Limestone Member, a lenticular, dolomitic limestone with fossil insects, crops out in the eastern portion of the mapping area (Williams and Lohman, 1949). The uppermost member of the Wellington, the Milan limestone, is not present in central Kansas. The contact between the Wellington Formation and overlying Ninneschale Shale is placed where the shale changes color from gray to brick red (Zeller, 1968). The Wellington Formation in the western Kansas subsurface can be up to 700 feet thick, but in south-central Kansas, the exposed formation is 150 to 200 feet thick (Williams and Lohman, 1949). Outcrops of Wellington closely follow drainage system patterns where streams have cut through loess deposits to expose the underlying bedrock. In non-drainage areas, the Wellington is overlain by either Quaternary alluvium deposits or Pleistocene loess.

#### CITED REFERENCES

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

Bass, N. W., 1929. The geology of Cowley County, Kansas: Kansas Geological Survey, Bulletin 12, 203 p.

Bevans, H. E., 1989. Water resources of Sedgwick County, Kansas: U.S. Geological Survey, Water Resources Investigations Report 88-4225, 119 p.

Lane, C. W., and Miller, D. E., 1965. Geohydrology of Sedgwick County, Kansas: Kansas Geological Survey, Bulletin 176, 100 p.

Moore, R. C., Jewett, J. M., and O'Connor, H. G., 1951. Geology, mineral resources, and ground-water resources of Chase County, Kansas, part 1 — Rock formations of Chase County: Kansas Geological Survey, Volume 11, p 1-16. <http://www.kgs.ku.edu/General/Geology/Chase/>

Schumacker, R. D., 1966. Kansas Permian evaporite formations: unpublished M.S. thesis, Department of Geology, Wichita State University, Wichita, Kansas, 87 p.

Ver Wiebe, W. A., 1937. The Wellington Formation of central Kansas: Wichita Municipal University of Wichita, Bulletin, vol. 12, no. 5, p. 3-18. [University Studies, Bulletin, no. 2]

Welch, J. E., and Hale, J. M., 1987. Pleistocene loess in Kansas — status, present problems, and future considerations; in: Quaternary Environments of Kansas, W. C. Johnson, ed., Kansas Geological Survey, Guidebook Series 5, p. 67-84.

Williams, C. C., and Lohman, S. W., 1949. Geology and ground-water resources of a part of south-central Kansas, with special references to the Wichita municipal water supply, with analyses by Robert H. Hess and others: Kansas Geological Survey, Bulletin 79, 455 p.

Zeller, D. E., ed., 1968. The stratigraphic succession in Kansas: Kansas Geological Survey, Bulletin 189, 81 p.; [www.kgs.ku.edu/Publications/Bulletins/189/index.html](http://www.kgs.ku.edu/Publications/Bulletins/189/index.html).

#### EXPLANATION

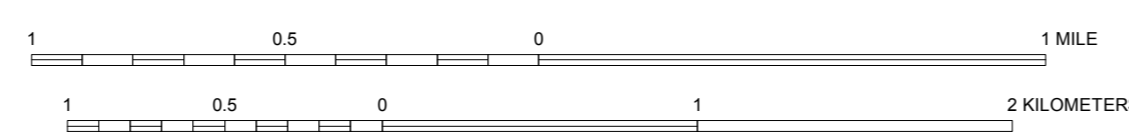
- Boundaries and Locations**
  - Township/range line (hidden)
  - Section line
- Transportation**
  - State highway
  - Local road
  - Railroad
  - Airport runway
- Geologic Unit Boundaries**
  - Observed contact
- Hydrology and Topography**
  - Perennial stream
  - Intermittent stream
  - Water body
  - Elevation contour (50-foot interval)
  - Elevation contour (10-foot interval)

	1	2	3	4	5
	6	7	8	9	10
11	12	13	14	15	16
17	18	19	20	21	22
23	24	25	26	27	28

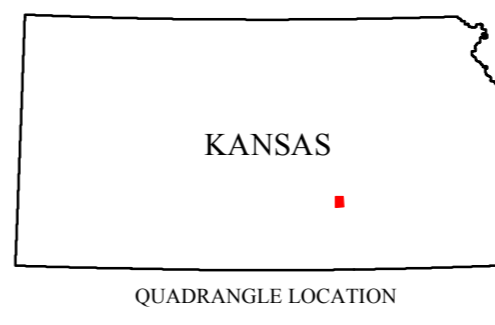
SEDGWICK COUNTY QUADRANGLES

1 Patterson	15 Wichita East
2 Bentley	16 Andover
3 Sedgwick	17 Cheney SE
4 Sedgwick NE	18 Lake Afton
5 Whitewater	19 Clearwater
6 Mount Hope	20 Bayneville
7 Colwich	21 Derby
8 Maize	22 Rose Hill
9 Valley Center	23 Norwich
10 <b>Greenwich</b>	24 Conway Springs
11 Cheney	25 Millerton
12 Garden Plain	26 Zuba
13 Goddard	27 Belle Plaine
14 Wichita West	28 Mulvane

SCALE 1:24 000



UNIVERSAL TRANSVERSE MERCATOR PROJECTION, ZONE 14  
NORTH AMERICAN DATUM OF 1983



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.

USGS National Elevation Dataset 1/9-arc-second 15 x 15 minute hillshade grids and 1-m 2009 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) Web Soil Survey Geographic Database (SSURGO), 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. U.S. Department of Agriculture-Farm Services Agency (USDA-FSA) National Agriculture Imagery Program (NAIP) imagery also was used to check road locations.

Shaded relief is based on 1/9 arc-second (approximately 3-meter) hydroflattened bare-earth DEMs from the USGS National Elevation Dataset (NED). The unprojected DEM images, in ERDAS IMAGINE format, North American Datum of 1983 (NAD 83), were mosaicked into a single output DEM. 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, award number G14AC00226 (FY2014).

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. 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.

#### SUGGESTED REFERENCE TO THE MAP

Parcell, W. C., Sinclair, J. T., and Lahey, M. L., 2015. Preliminary surficial geology of the Greenwich quadrangle, Sedgwick County, Kansas: Kansas Geological Survey, Open-file Report 2015-13, scale 1:24,000, unpublished.