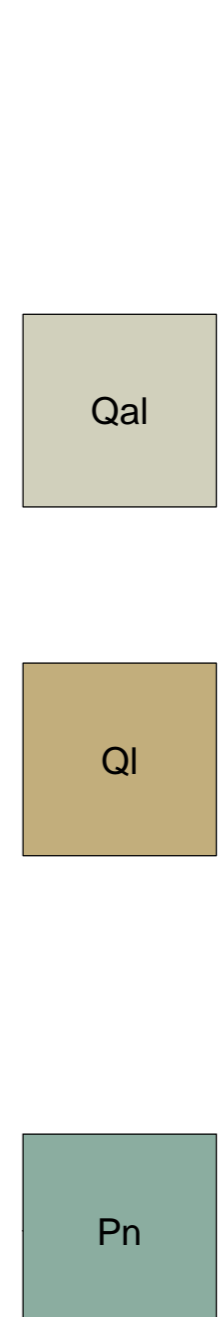
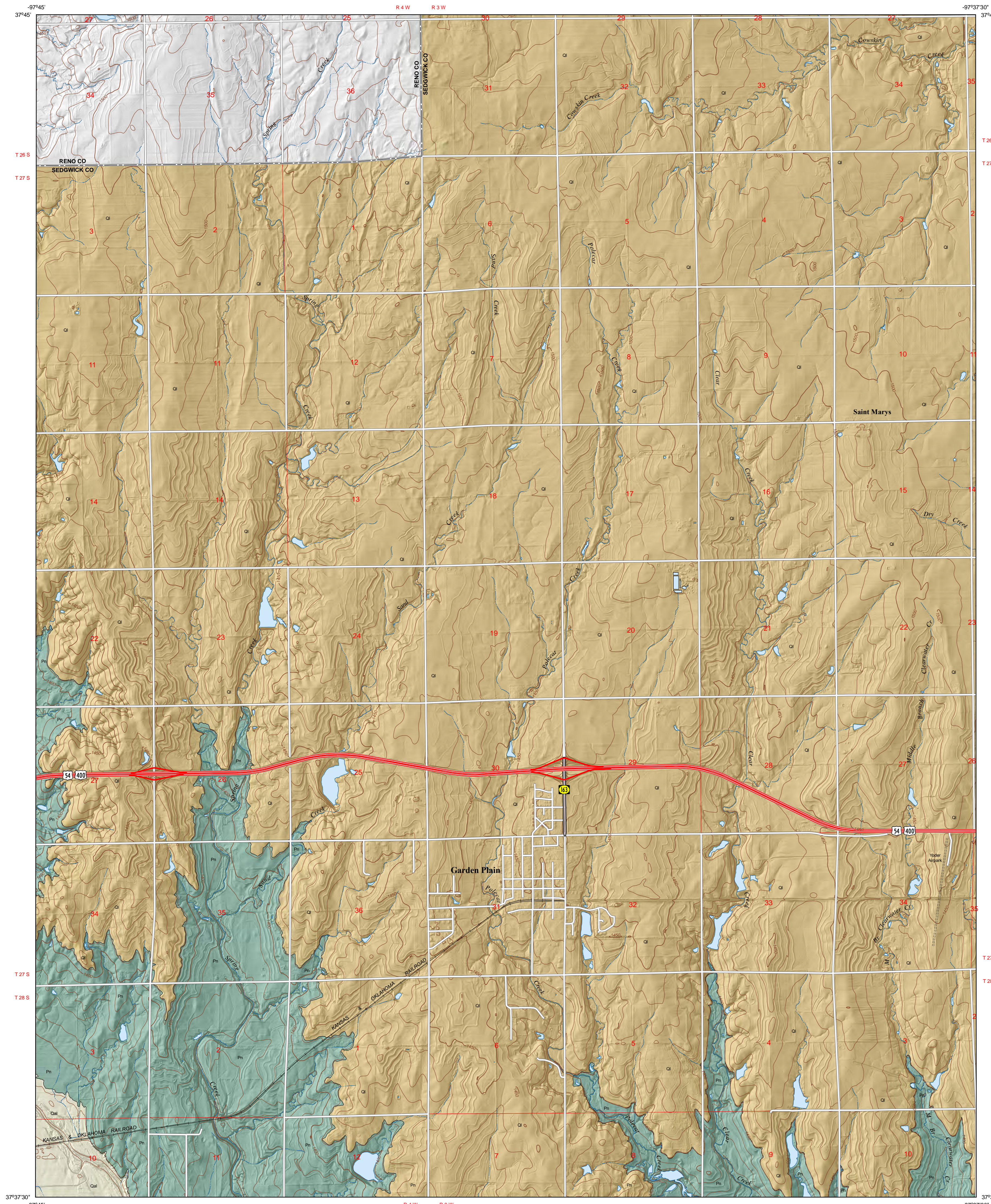


# PRELIMINARY SURFICIAL GEOLOGY OF THE SEDGWICK COUNTY PORTION OF THE GARDEN PLAIN QUADRANGLE, KANSAS

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2020



**GEOLOGIC UNITS**  
**CENOZOIC**  
**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 grade upward into clayey silt. Alluvium from the Arkansas River is composed of unconsolidated gravel, sand, and silt and has an estimated thickness of 75 ft (23 m) (Williams and Lohman, 1949). Pleistocene-age alluvium is present to a depth of nearly 50 ft (15 m) and Pleistocene to possibly Pliocene alluvium to a depth of more than 180 ft (55 m) total (Lane and Miller, 1965). Alluvium is of Quaternary age and lines the floodplain of the Little Arkansas River with limited extension up smaller creeks. In certain areas, alluvium may form low terraces 10–20 ft (3–6 m) above the floodplain (Aber, 1991). Alluvial sediment in smaller creeks is composed of finer sediment and variable in lithology (Moore et al., 1951) and sourced from weathering and erosion of silt, shale, and carbonates in the Permian Wellington Formation and Pleistocene loess.

**Loess**—Loess sediments in Sedgwick County are wind-deposited tan to pink-tan calcareous silt with zones of caliche and fine sand (Bevans, 1989). Loess ranges from Pleistocene to Holocene in age. These deposits cover upland areas (Welch and Hale, 1987) and are considered a mappable unit where loess exceeds 10 feet in thickness, coinciding with a visible rise in landscape of 10 to 20 ft (3–6 m). In the mapping areas, loess deposits occur below soils that reach 5 ft (1.5 m) thick and sit unconformably above the Permian Wellington Formation.

**PALEOZOIC**  
**Permian System**  
**Leonardian Series**

**Ninnescah Shale**—The Ninnescah Shale in Sedgwick County, Kansas, is composed largely of red shale and silt with minor green shale along with thin argillaceous limestone near the base (Williams and Lohman, 1949). Secondary veins of gypsum are present in the red and green shales (Walters, 1961). The Ninnescah forms bedrock under overlying Quaternary loess and soil. In south-central Kansas, the Ninnescah can be observed along tributaries to the Ninnescah River (Norton, 1939) and creates low relief with poor exposures. The formation conformably overlies the Wellington Formation, and the Kansas Geological Survey classifies the Ninnescah as the middle formation of the Sumner Group, Leonardian Series (Zeller, 1968).

**CITED REFERENCES**

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

**EXPLANATION**

- Boundaries and Locations**
- County boundary
  - Township/range line
  - Section line
- Transportation**
- U.S. highway
  - State highway
  - Local road
  - Unimproved road
  - Railroad
  - Unpaved landing strip
- Hydrology and Topography**
- Perennial stream
  - Intermittent stream
  - Water body
  - Water body—manmade shoreline
  - Elevation contour (50-foot interval)
  - Elevation contour (10-foot interval)
- Geologic Unit Boundaries**
- Observed contact

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.

1/9 arc-second (3.4-meter) LiDAR hillshades and 1-meter U.S. Department of Agriculture – Farm Services Agency (USDA-FSA) National Agriculture Imagery Program (NAIP) 2009 digital imagery were used as references in the digital mapping. USGS 7.5-minute 1:24,000-scale topographic maps, USDA Natural Resources Conservation Service (NRCS) Web Soil Survey Geographic Database (SSURGO), and other geologic maps, bulletins, and GIS data were also used in the mapping. Roads and highways are shown on the base map as represented by data from the U.S. Census Bureau. 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-meter hydroflattened bare-earth DEMs from the City of Wichita-Sedgwick County LiDAR project. The original 1-meter DEM images, in ERDAS IMAGINE format, State Plane Kansas-South projection, North American Datum of 1983 (NAD 83), were resampled to 3-meter resolution and mosaicked into a single output DEM, which was reprojected to Universal Transverse Mercator (UTM) Zone 14. 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.

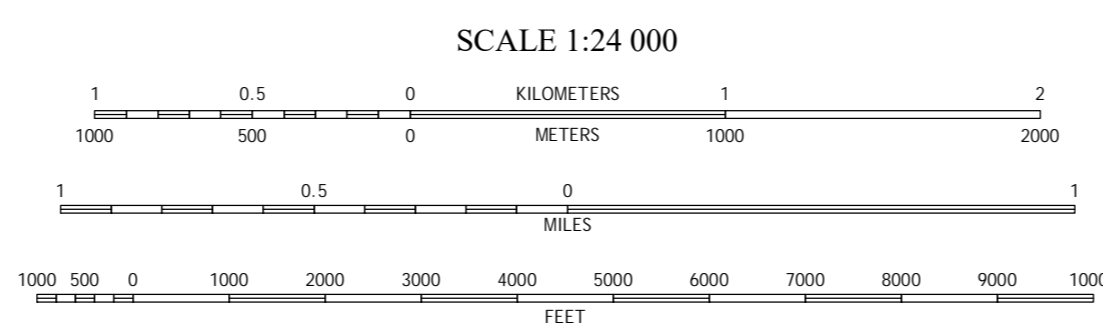
This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program, award number G19AC00231 (FY2019).

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

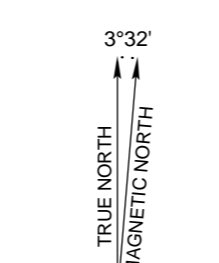
This map is a preliminary product and has had less scientific and cartographic review than the Kansas Geological Survey's M-series geologic maps. KGS does not guarantee this map to be free from errors or inaccuracies and disclaims any responsibility or liability for interpretations made from the map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

**SUGGESTED REFERENCE TO THE MAP**

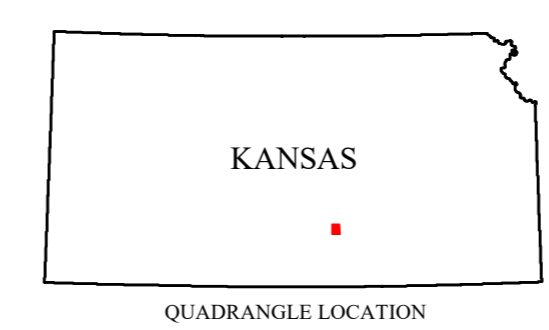
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UNIVERSAL TRANSVERSE MERCATOR PROJECTION, ZONE 14  
NORTH AMERICAN DATUM OF 1983



APPROXIMATE MEAN  
DECLINATION, 2020



Haven SE	Mount Hope	Cubick
Cheney	Garden Plain	Goddard
Cheney SE	Lake Arden	Clearwater

ADJOINING 7.5' QUADRANGLES