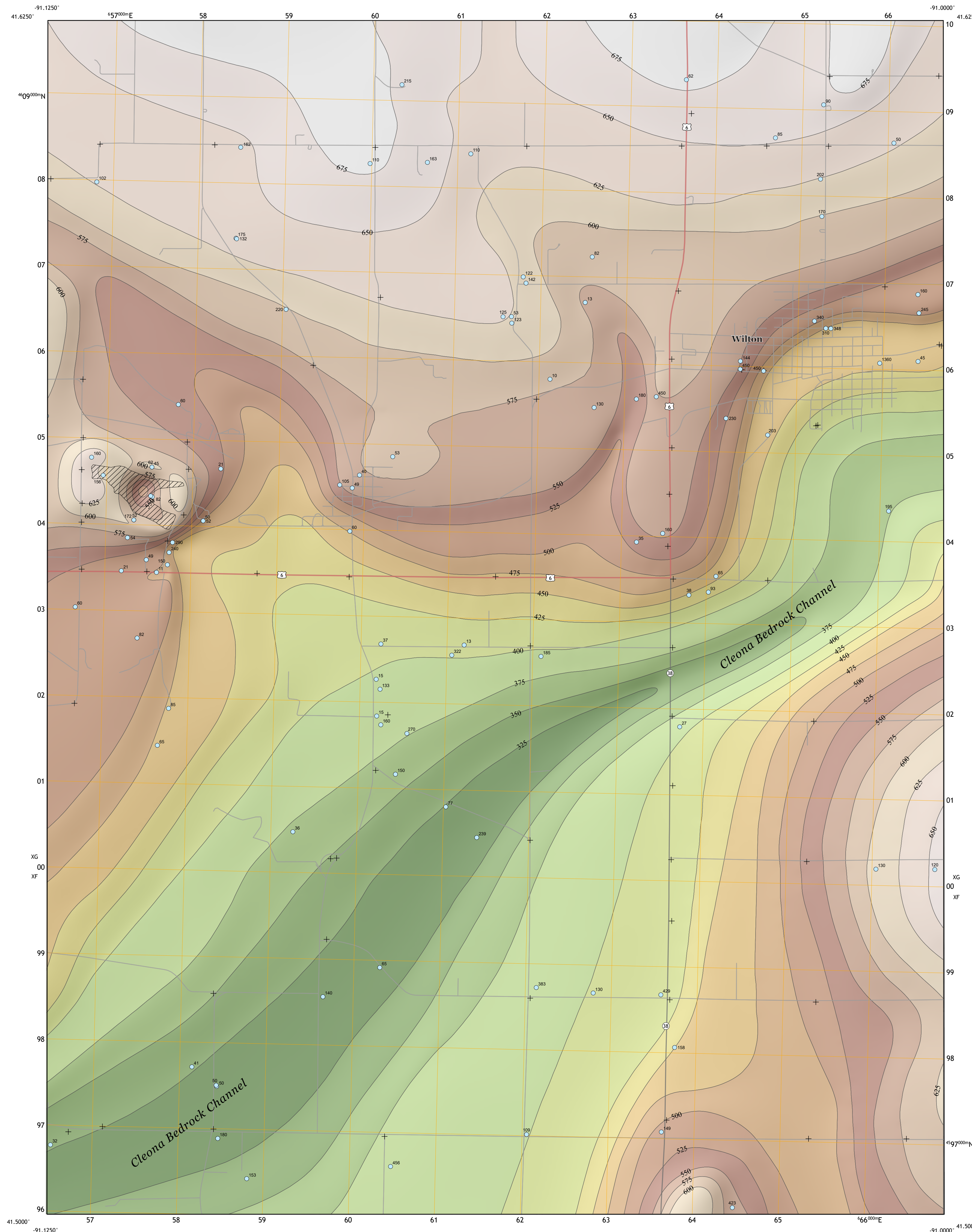


Alyssa Bancroft and Phil Kerr
Iowa Geological Survey, IIHR-Hydroscience & Engineering, University of Iowa, Iowa City, Iowa

BEDROCK ELEVATION

QUATERNARY THICKNESS



INTRODUCTION

The Wilton 7.5' Quadrangle in Muscatine and Cedar counties, Iowa is located within the Southern Iowa Drift Plain (SIDP) and Iowa-Cedar Lowland (ICL) landform regions. The SIDP is an area with a topography defined by loess-mantled uplands and slopes, whereas the ICL is a low-relief floodplain consisting of sediment deposited by the Cedar River. The top of the till package of the SIDP in the map area is likely Pre-Illinoian-age diamict of the Wolf Creek/Alburnet formations. The ICL is a broad, flat lowland of outwash deposited during the Late Wisconsin Episode and the Cedar River has formed Holocene terraces in this valley. The shape of the ICL does not directly correspond with the underlying bedrock valley (Cleona Channel).

The Cleona Channel is a buried bedrock valley that trends in a southwest – northeast direction across the entirety of the map area, and this channel can be up to 325 feet deep below the modern land surface. Although entirely buried by Quaternary deposits, the bedrock surface of the Wilton 7.5' Quadrangle is dominated by Middle Devonian (Givetian) strata of the Little Cedar Formation (Cedar Valley Group) and the Pinicon Ridge Formation (Wapsipicon Group). Silurian strata of the Gower and Scotch Grove formations make up the bedrock surface of the Cleona Channel. In the west-central area of the quadrangle these Paleozoic stratigraphic units, specifically the Devonian succession, are exposed in the Moscow Quarry (Wendling Quarries Inc.). In the southeastern portion of the quadrangle there is a small erosional outlier of Lower and Middle Pennsylvanian strata of the Raccoon Creek Group (Muscatine [formerly "Caseyville"] and Tradewater formations), which unconformably overlie Middle Devonian strata.

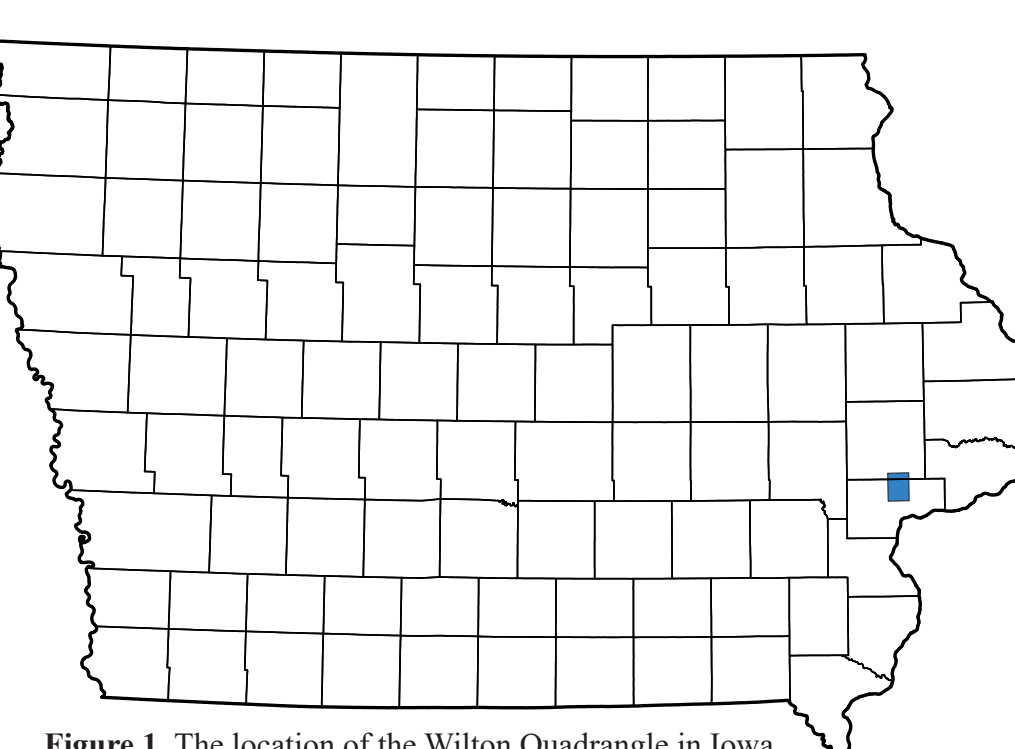
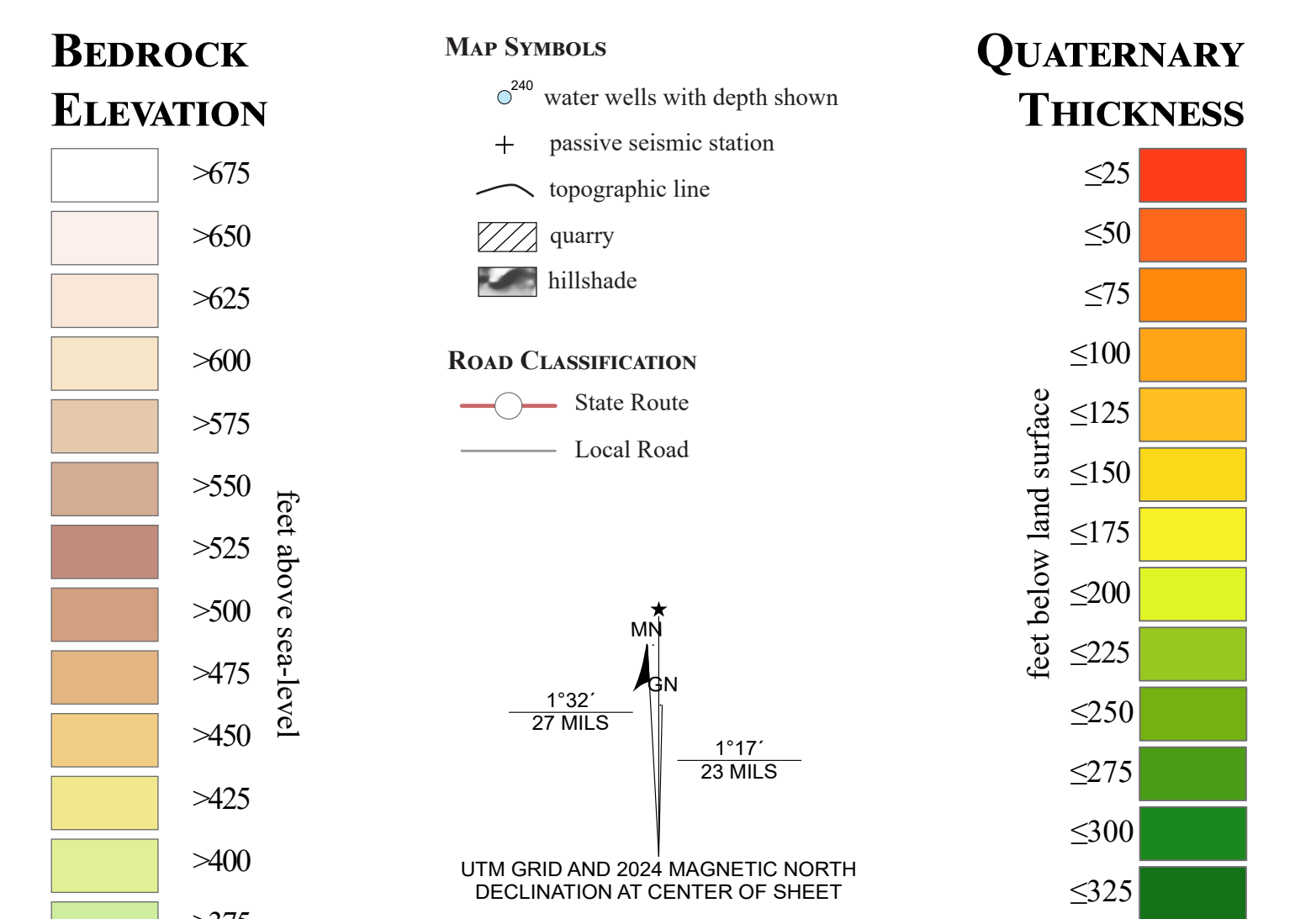
The Bedrock Elevation and Quaternary Thickness Maps of the Wilton 7.5' Quadrangle were produced concurrently with the Bedrock Geologic Map (IGS Open File Map OFM-24-01). Like much of Iowa, the bedrock surface within the quadrangle is entirely concealed by glacial deposits and further information about the Quaternary geology in the area can be found on the Surficial Geologic Map of the Wilton 7.5' Quadrangle of Muscatine and Cedar Counties, Iowa (IGS Open File Map OFM-22-08). The boundary between Paleozoic bedrock and unconsolidated Quaternary deposits is likely just as irregular as the land surface itself, as a result, the thickness of the Quaternary varies widely across the quadrangle and ranges from 25 to 325 feet (7 to 100 m).

METHODOLOGY

The Bedrock Elevation and Quaternary Thickness Maps of the Wilton 7.5' Quadrangle were constructed using the same datasets as the Bedrock Geologic Map (Open File Map OFM-24-01). Geologic information from Muscatine County and the surrounding area was used, and this includes drilling records housed in the Iowa Geological Survey (IGS) Geologic Sampling Database (GeoSam), existing maps and technical reports, Iowa Department of Transportation (IDOT) data, horizontal-to-vertical spectral ratio (HVSR) passive seismic geophysical data (collected using a Tromino[®]), and reports from engineering projects and quarry operators.

More than 100 boring records from the IGS GeoSam Database, including both driller's logs and lithologic descriptions of well cutting samples (striplugs), were evaluated for the Wilton 7.5' Quadrangle and the area surrounding the quadrangle. Each record was checked for locational accuracy using information from the driller's logs, historic plat books, county assessor information, and direct communication with landowners. The depth to the surficial bedrock contact was determined for each well and assigned an elevation value by subtracting it from the surface digital elevation model (DEM). These data points provided the framework for the Bedrock Elevation Map. Additional information was gained from an assessment of the Natural Resources Conservation Service (NRCS) County Soil Survey by identifying soil series that indicate shallow bedrock.

To create the Bedrock Elevation Map, bedrock elevation contours (drawn at a 25-foot contour interval) were digitized manually onscreen using Esri ArcGIS Pro 3.0 software. The bedrock elevation raster was then generated using interpolations of the bedrock surface created with the "Topo to Raster" geoprocessing tool (ArcGIS Pro 3.2). The Quaternary Thickness Map was created by subtracting the bedrock elevation raster values from the surficial DEM raster. The resulting surface was rounded to the nearest integer and contours were generated from this result and then smoothed.



ACKNOWLEDGEMENTS

We sincerely appreciate John Tuhill and Kyle Emery (Wendling Quarries Inc.) for providing us with access to quarries in and around the mapping area. University of Iowa (UI) Department of Earth and Environmental Sciences (EES) students: Dan D. Bloch and Rachel S. Walencus helped update well locations in Muscatine County and Cameron J. Parrelly, Nathan C. Platt, Rachel S. Walencus, Avery W. Norman, and Justyn A. Wyatt collected and/or processed passive seismic data. Special thanks to Joseph A. Devera (Illinois State Geological Survey) for ongoing discussions about the Paleozoic stratigraphic succession. Thanks to Richard (Rick) J. Langel of the Iowa Geological Survey (IGS) for managing the Iowa Geologic Sampling Database (GeoSam). Additional funding for students was provided by the National Science Foundation (NSF) Award #2119888 (NSF IUSE-GEOPATHS, GP-GO: Iowa Environmental Internship Pathways Program). Administrative support was provided by Suzanne G. Doershad, Melissa S. Eckrich, Teresa R. Gaffey, and Rosemary Tiwari.

Base map from U.S. Geological Survey (USGS) Wilton 7.5' Quadrangle map, published by the USGS in 2022. Bedrock topography raster created internally for this map project Wilton_IRR_3d.mxd, version 7/01/24 (ArcGIS Pro 3.2). Map projection and coordinate system based on Universal Transverse Mercator (UTM) Zone 15N, datum NAD83.

The map and cross-section are based on interpretations of the best available information at the time of mapping. Map interpretations are not a substitute for detailed site-specific studies. 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.

Supported in part by the USGS Cooperative Agreement Number G23AC0007 National Cooperative Geologic Mapping Program (STATMAP).

