

Surficial Geologic Map of the 7.5 Minute Eureka Quadrangle, Woodford County, IL

2015

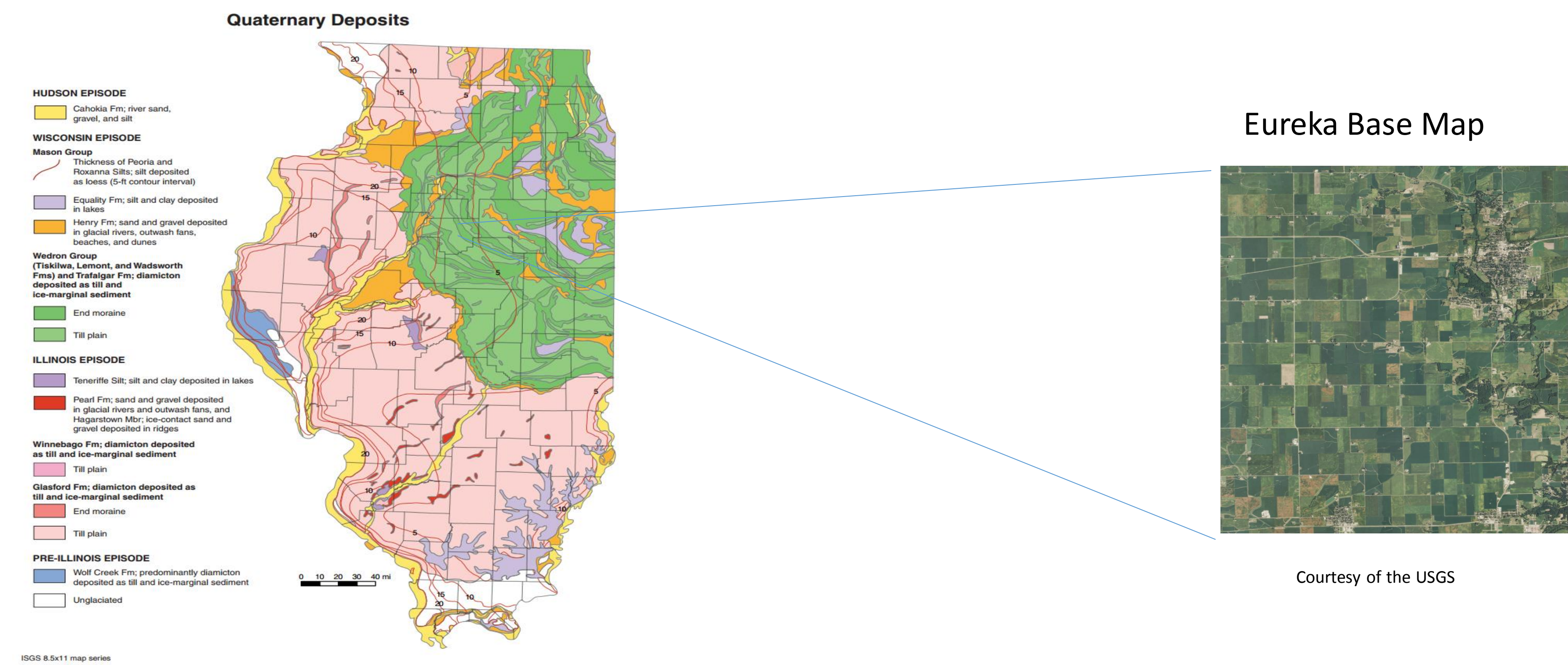
M. Bouleanu, David H. Malone, and William E. Shields, Department of Geography-Geology, Illinois State University

Abstract

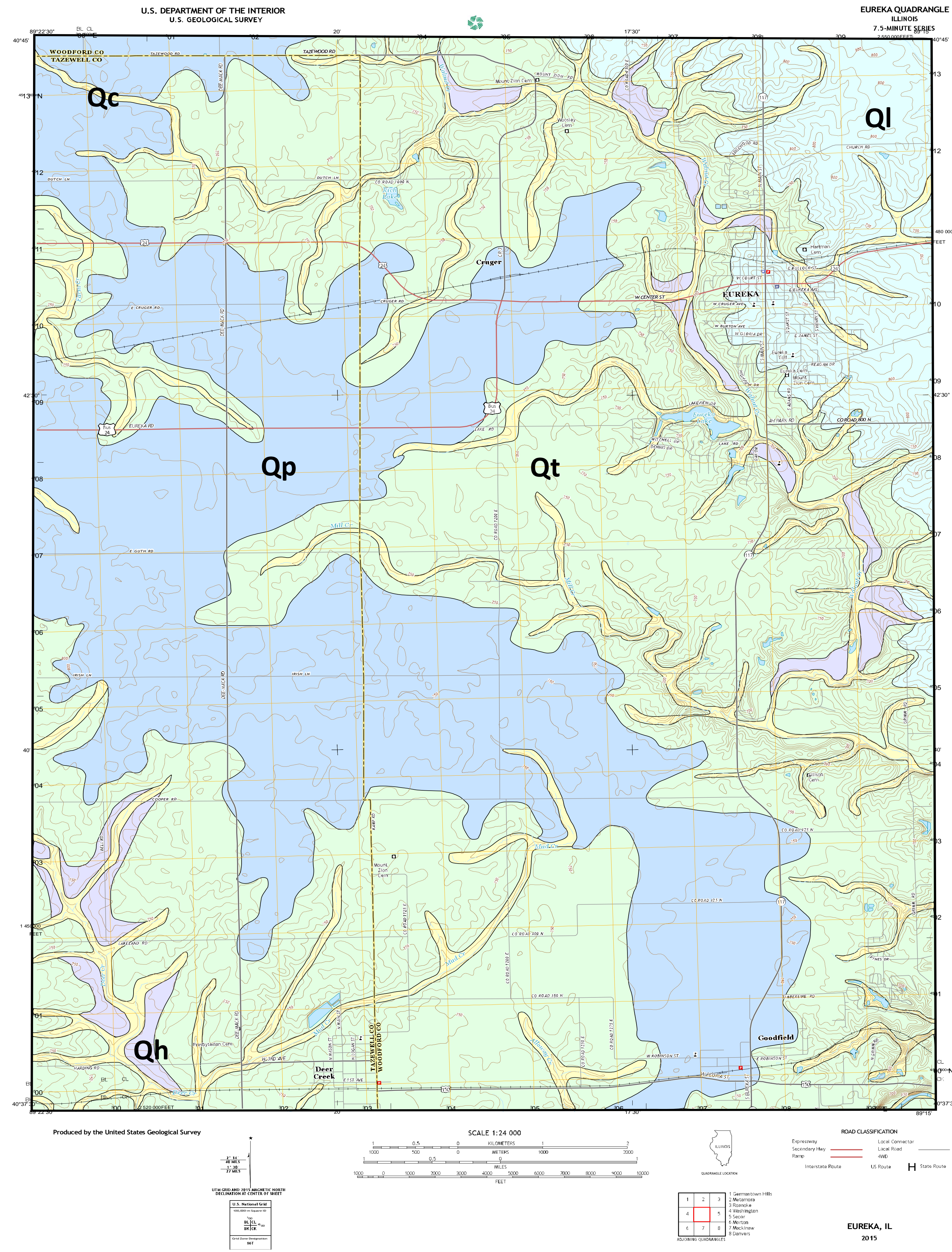
This study was conducted in order to map the surficial geologic units of the Eureka, IL Quadrangle located at 89°15' to 89°22'30" latitude to 40°45' to 40°37'30" longitude at the scale of 1:24,000. This Quadrangle includes sediment units deposited during and after the Wisconsin Glacial Episode. The Quadrangle also contains the Eureka Moraine. The methodology used to map this quadrant involved the conversion of soils data, LiDAR data, well water log data and field work. There are five geologic units which are Quaternary age that make up the surficial geology in the Eureka Quadrangle. These units are the Cahokia Alluvium, Peoria Silt, Henry Formation the Tiskilwa Formation, and the Lemont Formation. The Cahokia Alluvium layer is a brown, silt and clay layer which is interbedded with fine sand and redeposited bedrock clasts interpreted to be a post glacial loess and till that has been redeposited on stream beds and valley floors. The Peoria Silt is a light yellow to grey sandy silt which was deposited in an eolian environment and is interpreted to be a pro-glacial loess derived from glacial meltwater channels. The Henry Formation contains stratified layers composed of sand and gravel with cobbles and boulders interpreted to be upland outwash and alluvial fans. The Tiskilwa Formation is a red-gray diamicton associated with gravel, sand, silt and clay interpreted to be derived directly from glacial ice. Lastly, the Lemont Formation is composed of unstratified diamictons, cobbles, boulders and discontinuous layers of sand, gravel, silt and clay which are interpreted to be derived directly from glacial ice and overlain by a thin covering of loess. The distribution of the Cahokia Alluvium is alongside river beds and valleys. The Peoria Silt is just west of the Eureka Moraine and is only mappable if the silt is greater than sixty inches thick. The Henry Formation's distribution is the smallest amount and is present as outwash alongside river beds. The Tiskilwa Formation is distributed entirely west of the Eureka Moraine. Lastly the Lemont formation is contained in the north-east corner of the map within the Eureka Moraine.

Introduction: The 7.5 minute Normal East Quadrangle is located in Woodford County, central Illinois. The Wisconsin Glaciation formed the landscape in this area over 25,000 years ago. The topography of the Quadrangle allows for formation of river beds, small valleys and outwash plains. The Wisconsin Glaciation created mass transport of deposits ranging from sand to boulder sized which then buried and now overly the bedrock. While the glaciers were stagnant, meltwater drained creating long, narrow deposits of sand and gravel, called eskers. The glaciers left behind deposits of glacial debris, known as moraines, as they retreated north. The moraine formed here is present in the northeast section of the quadrangle and is called the Lemont Moraine which distinguishes the Lemont sediments from the Tiskilwa. (<https://www.isgs.illinois.edu/outreach/geology-resources/quaternary-glaciations-Illinois>)

Methods: Soil survey GIS layers were converted into formations based on parent material. Water well data were primarily used to verify geologic interpretations and were correlated stratigraphically. Glacial landforms, loess covers, and terraces were identified using a Digital Elevation Model (DEM) raster and hill shade derived from 2012 LiDAR data.



<https://www.isgs.illinois.edu/sites/isgs/files/maps/statewide/quaternary-deposits-8x11.pdf>



Explanation

- Qc** Cohokia Alluvium - Brown, silt and clay layer which is interbedded with fine sand and rediposited bedrock clasts.
- Qp** Peoria Silt - Light yellow to grey sandy silt.
- Qh** Henry Formation - stratified layers composed of yellow sand and gray gravel with cobbles and boulders.
- Qt** Tiskilwa Formation - Red-gray diamicton associated with gravel, sand, silt and clay.
- Ql** Lemont Formation - Unstratified diamictons, cobbles, boulders and discontinuous layers of sand, gravel, silt and clay.

Results: Eureka's surficial geology consists of the Cahokia Alluvium, the Peoria Silt, the Henry Formation, the Tiskilwa Formation and the Lemont Formation. All of which are Quaternary in age and were derived from glacial processes. The subsurface, which is covered here by the Quaternary deposits, consists of Pennsylvanian strata. The youngest layer, the Cahokia Alluvium, consists of brown, silt and clays which are interbedded with fine sand along with redeposited bedrock clasts. The Cohokia Alluvium is present alongside river beds and valleys as well alongside most tributaries present in the area. The Peoria Silt, which is only mappable if it is greater than 60 inches, is a light yellow to grey sandy silt. The Henry formation contains stratified layers of sand, gravel and cobbles which are present in outwash plains alongside major river beds and valleys. The Tiskilwa Formation is the largest portion of the map and is a red-gray diamicton which is associated with gravel, sand, silt and clay. Next, the boundary of the Lemont and the Tiskilwa Formations are distinguishable based on the north-west trending Eureka Moraine. This Moraine is a feature formed by the retreat of the glaciers during the Wisconsin glaciation. The oldest unit present, the Lemont Formation, consists of unstratified diamictons, cobbles, boulders and has discontinuous layers of sand, gravel, silt and clay.

Discussion: The units mapped here are interpreted to be Wisconsin in age and derived from glacial activity during the Wisconsin glaciation. These units are all present as loess and have their own unique genesis. The Cahokia is a post glacial loess interpreted to be redeposited on stream beds and valley floors. The Peoria Silt was deposited in an eolian environment and is interpreted to be a pro-glacial loess derived from glacial meltwater channels. The Henry is interpreted to be outwash and alluvial fans based on its location in outwash plains alongside rivers. The Tiskilwa has been interpreted to be derived directly from glacial ice. The Lemont formation has the same genesis as the Tiskilwa, however it has a thin cover of loess which is derived from units such as the Peoria.

Citations: D. R. Kolata and C. K. Nimz, Geology of Illinois, 2010. United States Department of Agriculture, Soil Survey of Woodford County, Illinois, 2009, pp. 7-264, <https://www.isgs.illinois.edu/ILWATER/>, <http://www.usgs.gov/>

Acknowledgements: LiDAR and well data was provided by the Illinois State Geologic Survey (ISGS). We would like to thank Crystal Williams for her excellence in GIS and for deriving the LiDAR data. We would also like to thank the ISGS for providing relevant maps as well as the USGS for providing the topographic maps as well as the base maps.