

SURFICIAL GEOLOGY OF TAZEWELL COUNTY, ILLINOIS

Patrick D. Johnstone

2003

The landscape of Tazewell County has been shaped by three geologic agents; continental glaciers, rivers, and wind. All of these agents were active during the most recent geologic epochs, the Pleistocene and the Holocene, known together as the Quaternary Period.

The continental glaciers of the Pleistocene Epoch (from 2 million to about 10,000 years before present) flowed across Illinois several times, alternately eroding the bedrock and the overlying soil and sediment, and depositing thick sequences of sediment. Most deposits of the older glaciations have been removed from the region by subsequent glacial erosion. During the most recent glaciation, named the Wisconsin Episode, ice covered the eastern half of Tazewell County, while sediment-laden rivers flowing from the ice modified the landscape to the west. During glacial retreat, these rivers incised and widened their valleys and deposited thick, extensive terraces of sand and gravel.

During and immediately following glaciation, the landscape of Tazewell County was markedly different from today. Large quantities of fine-grained unconsolidated materials were deposited in the floodplains of the meltwater streams along the margins of large glaciers, and on the glacial moraines themselves. The climate was cold and windy and these floodplains generally lacked significant groundcover. The exposed fine-grained materials were eroded by the dry winds which swept across these areas, and then deposited downwind in massive dust and sand storms. Although, vegetation soon returned and stabilized the sediments, occasional major floods disturbed the floodplains and covered the vegetation. During the last 10,000 years or so, these rivers have become much smaller, and now meander across the sediments deposited in the channels of their much larger ancestors.

This map displays the geologic materials exposed at the surface within Tazewell County. The geologic units used are described below, in chronological order of their deposition, and in ascending order on the legend. Nowhere in Tazewell County are materials older than the Illinois Episode glaciation exposed at the surface, except for small, isolated outcrops of Paleozoic bedrock found in a few gullies.

The oldest Quaternary sediments exposed at the surface within Tazewell County are classified as the Glasford Formation. These deposits are primarily compact diamicton, composed of gravel within a silty or sandy matrix, with little sorting or bedding, and containing many lenses of stratified sand and gravel. Several thick sequences of well-sorted, locally cemented, and crossbedded sand and gravel of the Glasford Formation are exposed in the Illinois River bluffs above Peoria Lake.

The Glasford Formation is interpreted to be till and outwash deposited by glaciers which flowed from the northeast during the Illinois Episode, and at one time covered all of Tazewell County. These sediments were eroded later by Wisconsin Episode glaciers and streams, and eventually buried by thick deposits of that age. The Glasford Formation is mapped only where erosion has exposed the unit along steep slopes.

In the east half of Tazewell County wide, shallow ridges of several Wisconsin Episode end moraines rise above relatively flat plains underlain by till (see inset map). These moraines mark the locations where the glacial ice stopped advancing or stagnated for a period of time. The Shelbyville Moraine represents the greatest extent of the Wisconsin Episode glaciation in Tazewell County. Mapped as the Tiskilwa Formation, these deposits are predominantly diamicton, having a clay and clay loam matrix and containing thin lenses of silt and clay or of sand and fine gravel. These sediments are interpreted to have been deposited mostly as till. Most Tiskilwa Formation deposits in the county are overlain by more than 5 feet of loess and the unit is mapped where subsequent erosion along gullies or river bluffs has reduced the thickness of the loess to less than 5 feet.

In the western part of Tazewell County, the prominent surface features are broad plains rising above the floodplain of the modern Illinois River. The plains are formed of moderately- to well-stratified fine silt, sand, and gravel. These are classified as Henry Formation and are interpreted to be Wisconsin Episode glacial-fluvial silt, sand, and gravel. These materials also form fan-like deposits along the ice margin, broad river terraces within the Illinois River valley, and smaller terraces along the Mackinaw River valley.

A layer of wind-derived silt, called loess, covers the majority of Tazewell County. Loess was deposited by large windstorms during the Wisconsin Episode, and the thickness ranges from zero to more than 30 feet. In Tazewell County this loess layer is mapped as two units: as the Peoria Silt where it covers older Wisconsin and Illinois episode till units to a depth of greater than 5 feet, and as the Peoria and Roxana Silts beyond the Wisconsin episode ice margin.

In the southwestern part of the county, sandy alluvium was reworked by the same winds, resulting in the deposition of sheet-like layers and dunes of fine sand. This is classified as the Parkland facies of the Henry Formation. These sediments are finer-grained and more stratified than the glacial-fluvial sand and gravel they cover.

The most prominent modern landforms of Tazewell County are the Illinois and Mackinaw River valleys. These valleys were formed predominantly during the last glaciation when sediment-laden meltwater torrents extended across the entire width of the valley, from bluff to bluff. Today, the smaller modern Illinois and Mackinaw rivers meander slowly back and forth across the wide floodplains. These modern streams, along with their major tributaries, have laid down thin deposits of moderately stratified sand and silt, with some gravel and clay. These floodplain deposits are classified as Cahokia Formation. This unit overlies all other map units with the exception of Peoria Silt, which was not deposited in, or has been eroded away from, active stream channels, and the Grayslake Peat.

The Grayslake Peat was, and continues to be, deposited where organic material collected in areas of poor drainage. As the Mackinaw and Illinois rivers migrated naturally across their respective valley floors, they frequently abandoned parts of their channels. When rain or groundwater collects in these depressions, plant material accumulates as muck and peat. Periodic floods and continued channel migration results in an interfingering of the Grayslake Peat and the Cahokia sediments. Also, layers of peat that are commonly buried by subsequent flood deposits may be mapped as part of the Cahokia Formation.

Disturbed Ground is mapped in places where human activity has extensively modified the geological character of the surface. In these areas, the sediments have been disturbed by activities such as the extraction of aggregate resources, and construction of buildings, roads, landfills, or dikes.

Geologic Units at the Surface

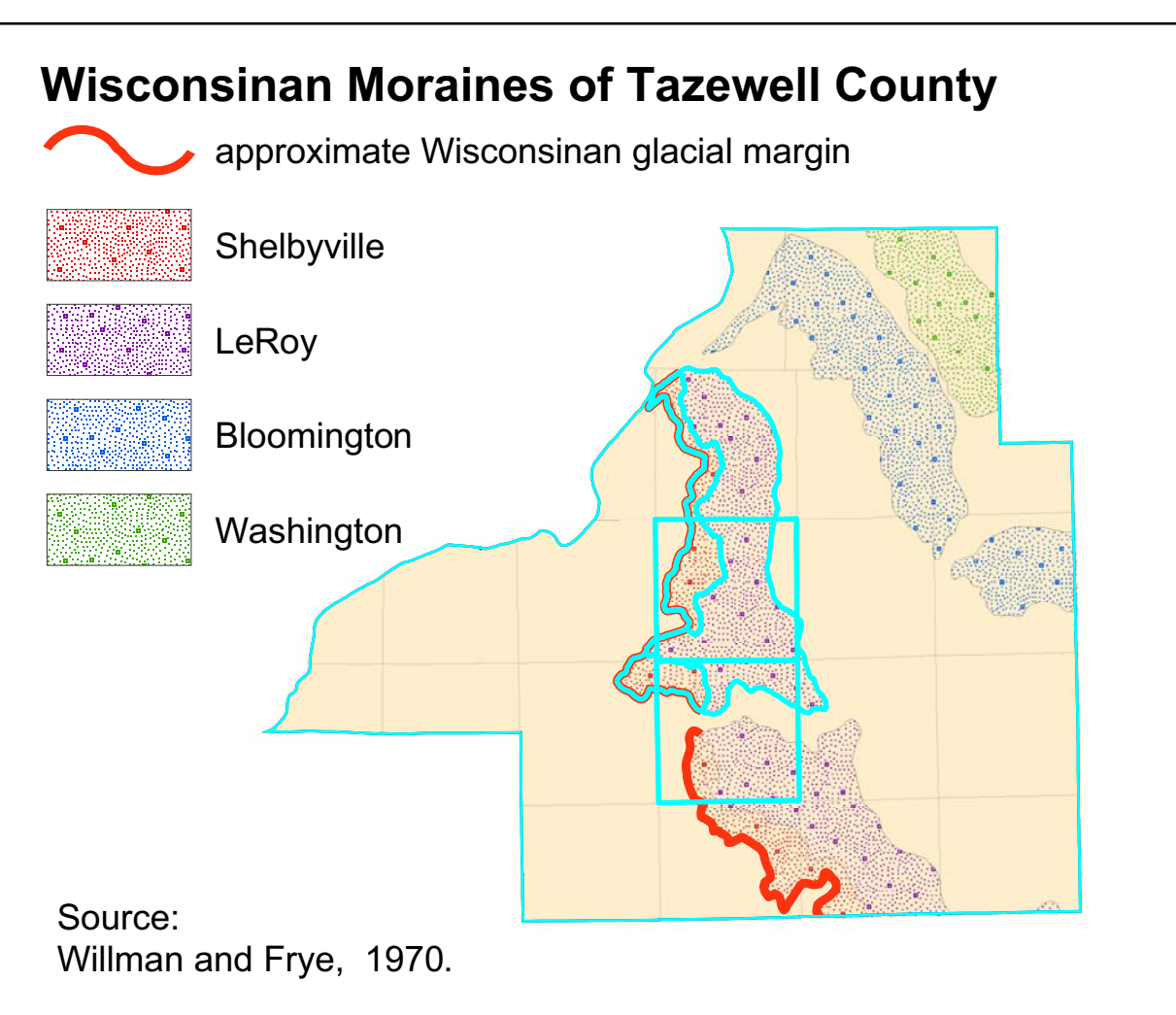
MATERIAL	MAP UNIT	INTERPRETATION
HUDSON EPISODE (postglacial)		
Fill and disturbed earth in areas of human activity such as roads, pits, landfills and urbanization.	Disturbed Ground	Anthropogenic materials.
Silt, sand and gravel with lesser amounts of clay poorly to well stratified.	Cahokia Formation	Alluvium and flood deposits in modern stream channels and floodplains.
Peat or muck, with some silt interbeds, deposited in swampy depressions or in intermittent lakes.	Grayslake Peat	Organic deposits.
WISCONSIN EPISODE		
Silt to silt loam, yellow-brown to grey. Mapped only where thickness exceeds 5 feet, and overlying Tiskilwa or Glasford formations.	Peoria Silt (covering till)	Loess. Windblown silt deposited on tills.
Silt to silt loam, yellow-brown to grey (Peoria) overlying pink-brown silt loam (Roxana). Mapped only beyond Wisconsin Episode ice margin.	Peoria and Roxana Silts	Loess. Thick windblown silt deposited on Illinois Episode glacial and outwash materials.
Sand and silt, well sorted, forming sheet-like deposits and dunes, underlain by coarser Henry Formation deposits.	Henry Formation (Parkland Facies)	Aeolian sands. Henry Formation deposits re-worked by wind.
Sand and gravel, mostly well sorted. Forms broad terraces in the Illinois River valley and smaller terraces in Mackinaw valley. May be overlain by thin (<5ft) deposits of Peoria Silt.	Henry Formation	Glacial-fluvial deposits of the Illinois and Mackinaw river valleys associated with the Wisconsin glacial episode.
Clay loam to loam diamicton containing lenses of gravel, sand, silt and clay, red-grey to grey. Mapped only where overlying silt is less than 5 feet.	Tiskilwa Formation	Till and associated deposits of the Wisconsin glacial episode.
ILLINOIS EPISODE		
Compact silt to sand diamicton with sand and gravel lenses. Includes thick sequences of stratified and cemented sand and gravel. Mapped only where overlying silt is less than 5 feet thick.	Glasford Formation	Till and associated deposits of the Illinois glacial episode.

Mapping Methods

Production of this map involved the initial analysis of the Soil Survey of Tazewell County, Illinois (Teater 1996). Primary units were delineated using parent material data, rectified with topographic features from USGS 1:24,000 quadrangle maps. Additional information from other maps (Lineback, 1979; Hansel et al., 2000), and from the ISGS well log and field note archives, was used to further define unit boundaries. Additional regional stratigraphic information and unit descriptions were obtained from published reports (Hansel and Johnson, 1996; Lineback et al., 1979; Willman and Frye, 1970) and from consultation with ISGS staff.

References

- Hansel, A.K., and Johnson, W.H., 1996. Wedon and Mason Groups: Lithostratigraphic Reclassification of Deposits of the Wisconsin Episode, Lake Michigan Lobe Area: Illinois State Geological Survey Bulletin 104, 116p.
- Hansel, A.K., Johnson, W.H., and Stiff, B.J., 2000. Surficial Deposits of Illinois (map): Illinois State Geological Survey Open File Series 2000-7. Scale 1:500,000.
- Johnstone, P.D., 2002. Bedrock Topography of Tazewell County, Illinois (map): Illinois State Geological Survey OFS 2003-6h. Scale 1:62,500.
- Lineback, J.A., 1979. Quaternary Deposits of Illinois (map): Illinois State Geological Survey, scale 1:500,000.
- Lineback, J.A., Follmer, L.R., Willman, H.B., McKay, E.D., King, J.E., King, F.B., and Miller, N.G., 1979. Wisconsinan, Sangamonian, and Illinoian stratigraphy in Central Illinois: Midwest Friends of the Pleistocene 26th Field Conference: Illinois State Geological Survey Guidebook 13, 139p.
- Teater, W.M., 1996. Soils survey of Tazewell County, Illinois: U.S. Department of Agriculture, Soil Conservation Service, Soils Report #153, 210p. + maps.
- Willman, H.B., and Frye, J.C., 1970. Pleistocene Stratigraphy of Illinois: Illinois State Geological Survey Bulletin 94, 204p.



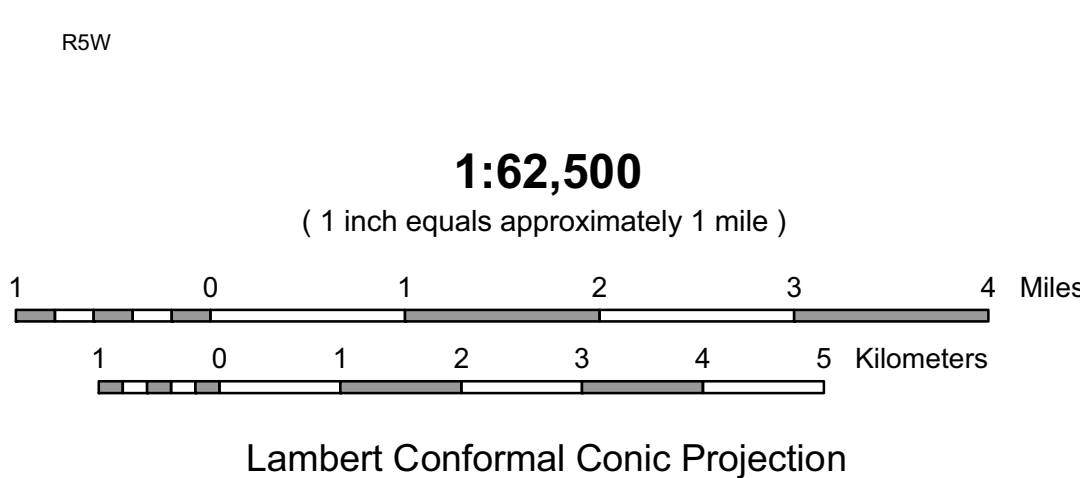
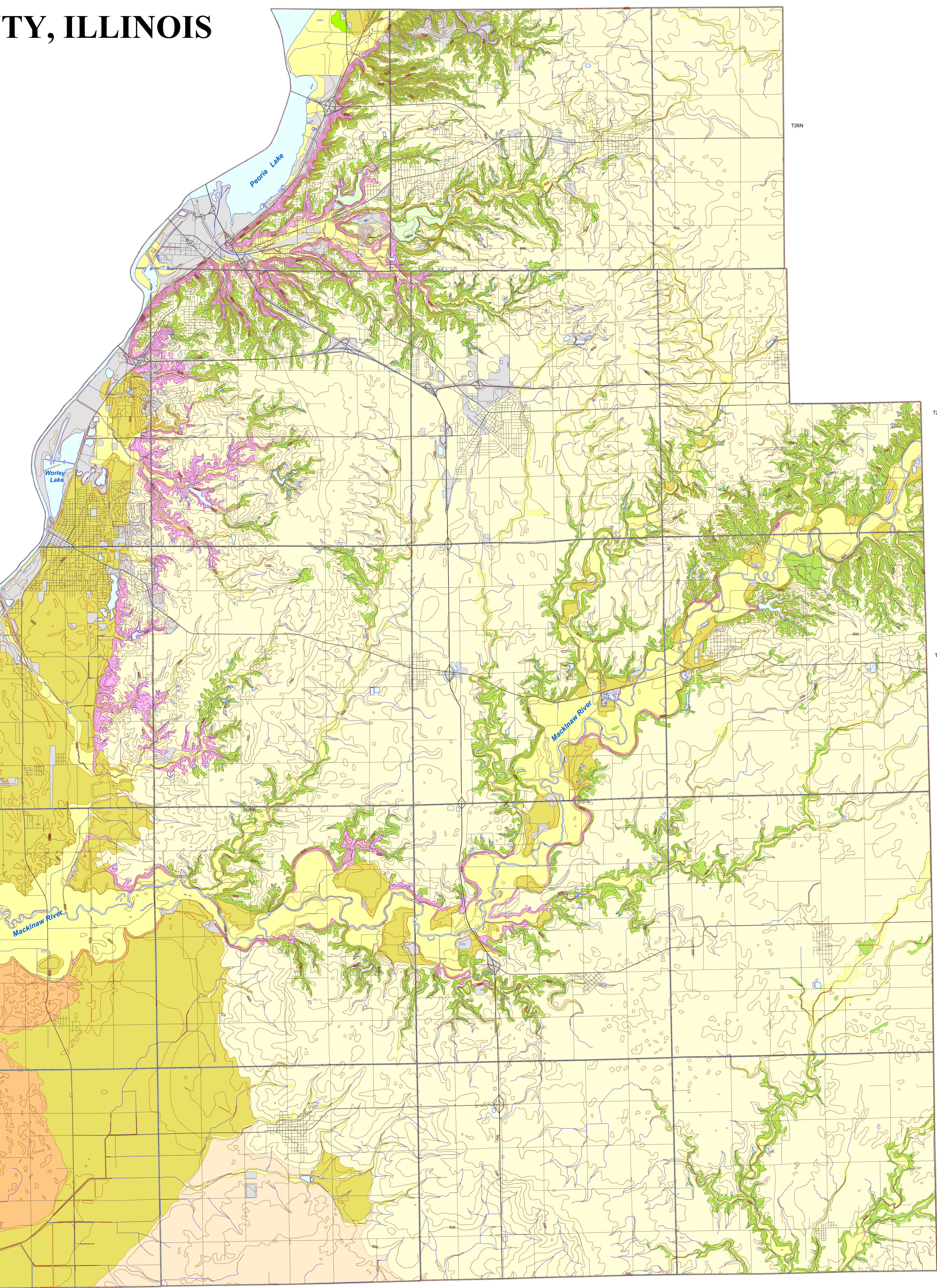
Legend

- Surface Topography**
 - 20-ft contour
 - 100-ft contour
- Transportation**
 - Interstate
 - Highway
 - Other Road
- Hydrology**
 - Water Body
 - Flood Reservoir
 - Stream
- Township Boundary**



FOR ADDITIONAL INFORMATION CONTACT:
Illinois State Geological Survey
Natural Resources Building
615 East Peabody Drive
Champaign, Illinois 61820
(217) 333-4747
http://www.isgs.uiuc.edu

Released by authority of the State of Illinois: 2003



This document has been carefully reviewed and edited and meets the scientific/technical standards of the Illinois State Geological Survey. It is intended for the purposes and uses intended by its authors and presents reasonable interpretations of the geology of the area based on the data then available. The interpretations are based on data that may vary with respect to accuracy of geographic location, the type and quantity of data available at each location, and the scientific/technical qualifications of the data sources. Variations in the texture, color, and other characteristics of un lithified glacial and non-glacial sediments can make it difficult to define unit boundaries, particularly those in the subsurface. Consequently, the accuracy of unit boundaries and other features shown in this document may vary from place to place. This map is not meant to be enlarged. Enlarging the scale of a published map, by whatever means, does not increase the inherent accuracy of the information and scientific interpretations it portrays.

This document provides a conceptual model of the geology of the area on which further work can be based. This map may be used to screen the region for potentially suitable sites for a variety of purposes, but use of this document for such screening does not eliminate the need for detailed studies to fully understand the geology of a specific site. The Illinois State Geological Survey, the Illinois Department of Natural Resources, and the State of Illinois make no guarantee, expressed or implied, regarding the correctness of the interpretations presented in this document and accept no liability for the consequences of decisions made by others on the basis of the information presented here.