Illinois Department of Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY
William W. Shilts, Chief

Three-dimensional Geologic Model
Kane County, Illinois

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2007

Illinois County Geologic Map
ICGM Kane-3D

Intoduction

A three-dimensional-geological model of the Kane County has been produced as a part of *Kane County Water Resources Investigations: Final Report on Geologic Investigations* (Dey et al. 2007e) as part of a contract report for a project entitled the *Water-Resources Investigations for Kane County, Illinois* (Meyer et al. 2002). The Illinois State Geological Survey and Illinois State Water Survey have examined the groundwater resources of Kane County through three-dimensional geologic mapping and groundwater flow modeling to estimate sustainable yields from major aquifers in Kane County and to aid groundwater resource management.

Three-dimensional Geologic Model

The geologic model consists of 21 regionally significant lithostratigraphic units identified in Kane County, which include 15 Quaternary units and 6 bedrock units. Only the Quaternary units are depicted individually here. Some simplification of the geology was necessary to prevent the model from becoming overly complex. These simplifications are summarized in the description accompanying each unit. A simplification most units share is that they are assumed to have uniform lithology; that is, lenticular bodies present within a modeled unit were not shown, because they were regarded as being insignificant to groundwater flow on a county scale. The Glasford Formation is an exception and was modeled as three fine-textured layers and two coarse-textured layers.

The geologic model was produced from lithostratigraphic assignments made on data from logs of 5,456 water wells, engineering and stratigraphic borings, and outcrops; 2,613 of the data points were in Kane County and another 2,833 data points were used in a buffer area extending six miles out from the county boundary. The buffer zone was used to prevent distortions of interpretations near the county line. An attempt was made to verify the location of all data points used, either by confirming the location in the field or using plat books, tax records, or other sources in the office. Forty-nine percent of all data points had their location verified in the field, 50% had their locations verfied by documentation in the office, and 1% of the data points have unverified locations.

The elevations of the upper and lower boundary of each unit were identified where possible from data sources. These elevations were used to create an upper and lower surface for each unit. The methods used to construct these surfaces and compile the model are described in *Kane County Water Resources Investigations: Interim Report on Three-dimensional Geologic Modeling* (Dey et al. 2005). Dey et al. (2007e) summarizes those methods and presents the distribution of the data used to produce the model and individual layers.

The geologic model is being used to study the hydrogeology of Kane County and the hydraulic relationships between the various lithostratigraphic units on a county-wide scale. The model has been used to produce maps of major Quaternary aquifers (Dey et al. 2007a), aquifer sensitivity to contamination (Dey et al. 2007b), and geology of the bedrock surface (Dey et al. 2007c). Geologic cross sections have also been produced from the model (Dey et al. 2007d). The model has been used to assist potentiometric surface mapping (Locke and Meyer 2005). The model was used to identify the lithostratigraphic layers in which wells were finished. The model has been incorporated into a groundwater flow model by the Illinois State Water Survey. Results from the groundwater flow model are expected to be published in December 2007 (Meyer et al. 2002).

The images presented were created by separating each geologic unit from the three-dimensional model and displaying them in a consistent projection. The projection is a view from the southeast at 25 degrees above the horizontal. The scale is variable, with a vertical exaggeration of 20×.

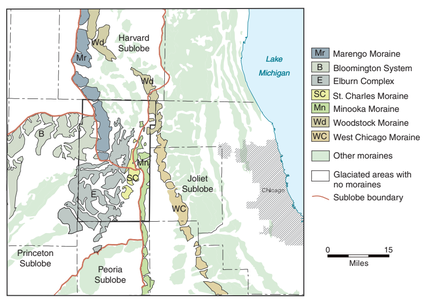

Figure 1 Wisconsin Episode moraines in northeastern Illinois. Moraines were formed near the terminus of glacial ice during various positions of the Lake Michigan Lobe. Glacial ice advanced in a westerly and southwesterly direction into Illinois from the Lake Michigan basin. The older moraines of this figure occur generally to the west and the younger moraines to the east. On this map, modified from Willman and Frye (1970) and Hansel and Johnson (1996), Kane County is outlined in black.

References

Dey, W.S., A.M. Davis, C.C. Abert, B.B. Curry, and J.C. Sieving, 2005, Kane County water resources investigations: Interim report on three-dimensional geologic modeling: Illinois State Geological Survey, Open File Series 2005-6, 50 p.

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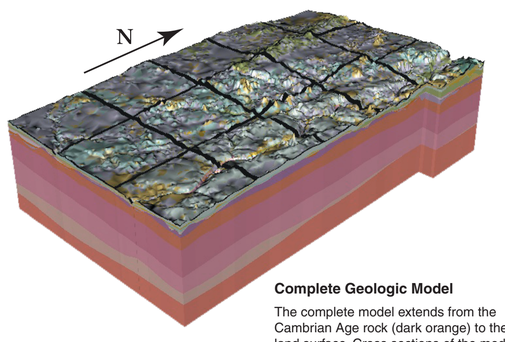
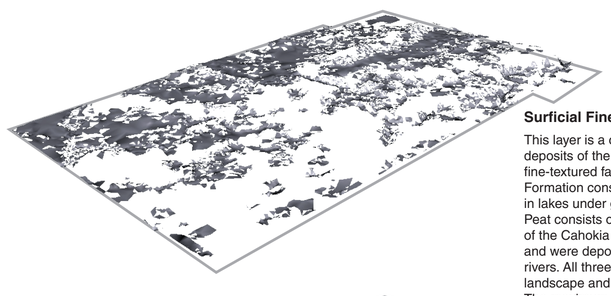
Meyer S.C., D.D. Walker, S.M. McConkey, W.S. Dey, B.B. Curry, C.C. Abert, and E.Mehnert, 2002, Water-resources investigations for Kane County, Illinois: Illinois State Water Survey and Illinois State Geological Survey, A proposal to Kane County Development Department, 55 p.

Willman, H.B., and J.C. Frye, 1970, Pleistocene stratigraphy of Illinois: Illinois State Geological Survey, Bulletin 94, 204 p.



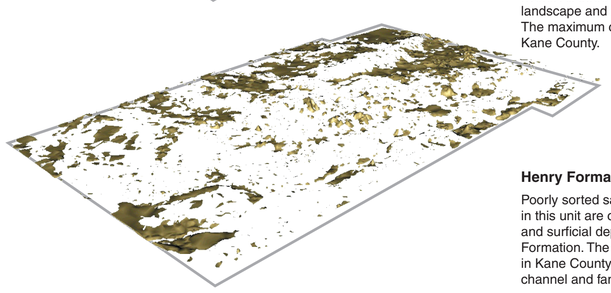
Complete Geologic Model

The complete model extends from the Cambrian Age rock (dark orange) to the land surface. Cross sections of the model are available (Dey et al. 2007a).



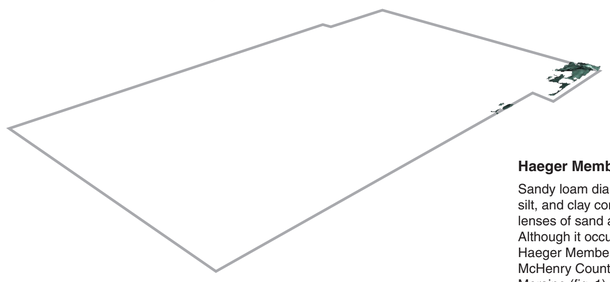
Surficial Fine-textured Layer

This layer is a compilation of the surface and near-surface deposits of the Equality Formation, Grayslake Peat, and the fine-textured facies of the Cahokia Formation. The Equality Formation consists of silt, clay, and fine sand that were deposited in lakes under glacial and postglacial conditions. The Grayslake Peat consists of peat, marl, and sand. Fine-textured occurrences of the Cahokia Formation are composed of silt, clay, or diamicton and were deposited by slow-moving water along streams and rivers. All three units tend to occupy low-lying areas on the landscape and commonly occur in association in Kane County. The maximum combined thickness of these units is 54 feet in Kane County.



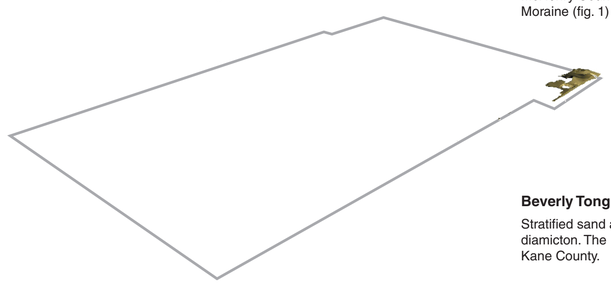
Henry Formation (Surficial Deposits)

Poorly sorted sand and gravel and well-sorted sand; included in this unit are coarse-textured facies of the Cahokia Formation and surficial deposits of the Wasco facies of the Henry Formation. The surficial Henry Formation is up to 88 feet thick in Kane County and occurs along rivers and streams and as channel and fan deposits in front of moraines.



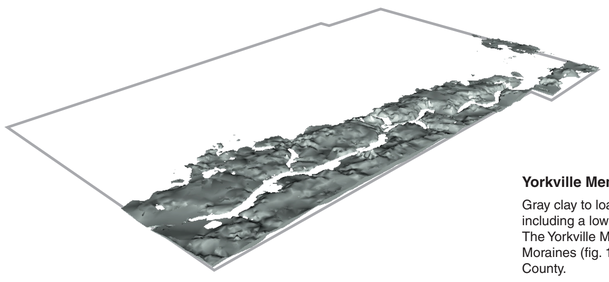
Haeger Member of the Lemont Formation

Sandy loam diamicton (an assorted mixture of gravel, sand, silt, and clay commonly called till) with abundant discontinuous lenses of sand and gravel and thin beds of silt and clay. Although it occupies a very small part of Kane County, the Haeger Member constitutes much of the surficial diamicton of McHenry County. The Haegar Member forms the Woodstock Moraine (fig. 1) and is up to 81 feet thick in Kane County.



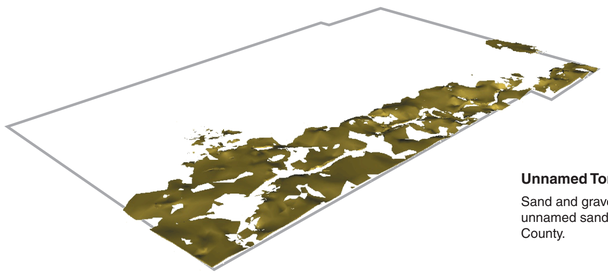
Beverly Tongue of the Henry Formation

Stratified sand and gravel overlain by Haeger Member diamicton. The Beverly Tongue is up to 64 feet thick in Kane County.



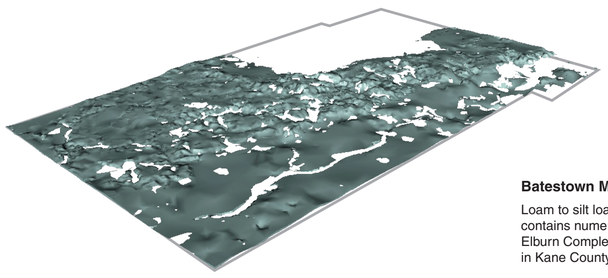
Yorkville Member of the Lemont Formation

Gray clay to loam diamicton. Three textures are recognized, including a lower clay, a middle loam, and an upper silty clay. The Yorkville Member forms the St. Charles and Minooka Moraines (fig. 1). The diamicton is up to 127 feet thick in Kane County.



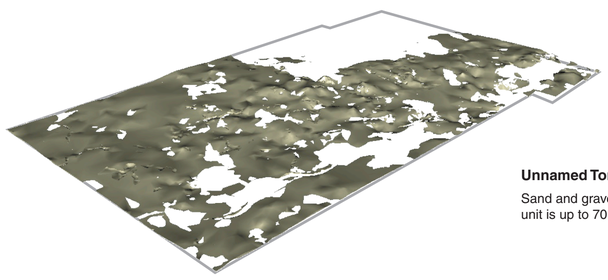
Unnamed Tongue of the Henry Formation

Sand and gravel overlain by the Yorkville Member. This unnamed sand and gravel is up to 69 feet thick in Kane County.



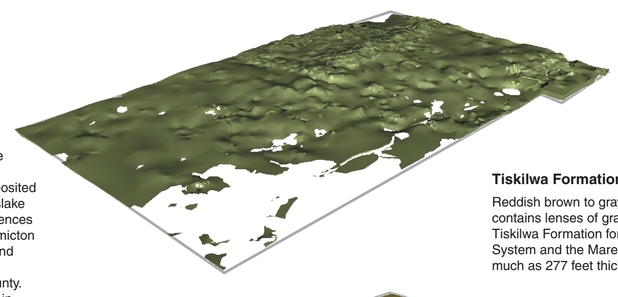
Batestown Member of the Lemont Formation

Loam to silt loam diamicton. The Batestown Member contains numerous beds of sand and gravel and forms the Elburn Complex (fig. 1). The diamicton is up to 86 feet thick in Kane County.



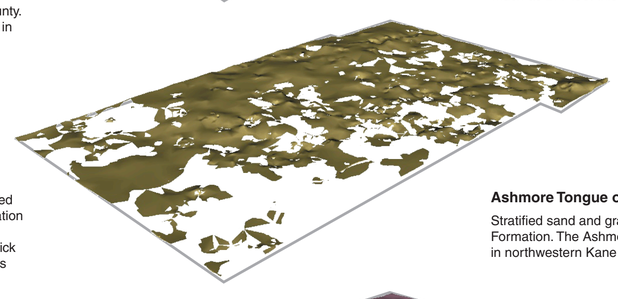
Unnamed Tongue of the Henry Formation

Sand and gravel overlain by the Batestown Member. This unit is up to 70 feet thick in parts of Kane County.



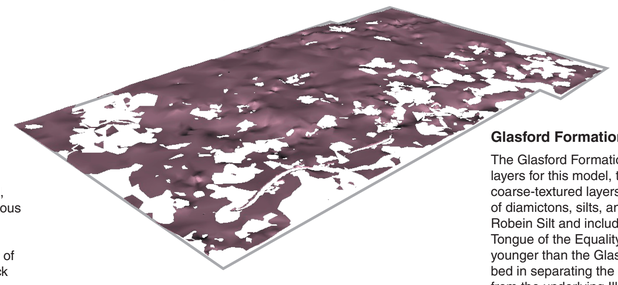
Tiskilwa Formation

Reddish brown to gray clay loam to loam diamicton that contains lenses of gravel, sand, silt, and clay. The Tiskilwa Formation forms the Bloomington Morainic System and the Marengo Moraine (fig. 1) and is as much as 277 feet thick in Kane County.



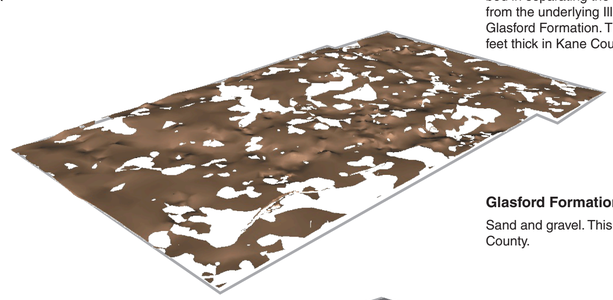
Ashmore Tongue of the Henry Formation

Stratified sand and gravel overlain by the Tiskilwa Formation. The Ashmore Tongue is up to 94 feet thick in northwestern Kane County.



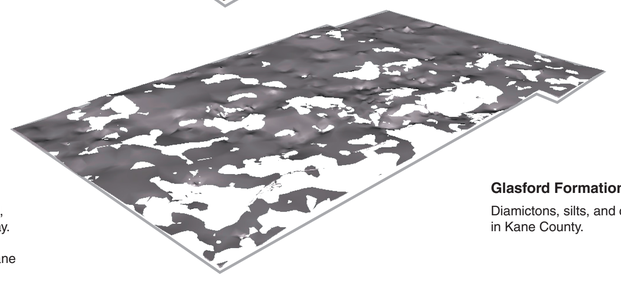
Glasford Formation, Upper Fine-textured Layer

The Glasford Formation was separated into five hydrogeologic layers for this model, three fine-textured layers and two coarse-textured layers. The upper fine-textured layer consists of diamictons, silts, and clays; it includes occurrences of the Robein Silt and includes some occurrences of the Peddicord Tongue of the Equality Formation. Although the Robein is younger than the Glasford Formation, it is an important marker bed in separating the overlying Wisconsin Episode materials from the underlying Illinois Episode materials such as the Glasford Formation. The upper fine-textured layer is up to 81 feet thick in Kane County.



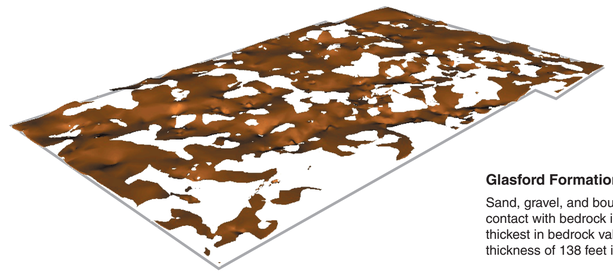
Glasford Formation, Upper Coarse-textured Layer

Sand and gravel. This unit is up to 60 feet thick in Kane County.



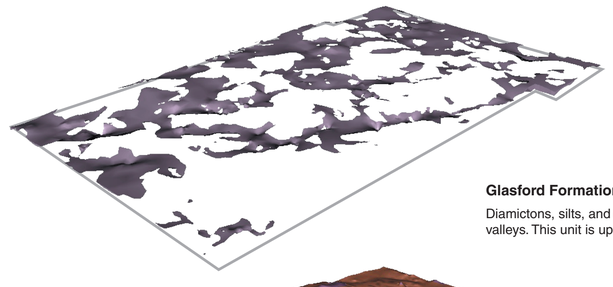
Glasford Formation, Middle Fine-textured Layer

Diamictons, silts, and clays. This unit is up to 99 feet thick in Kane County.



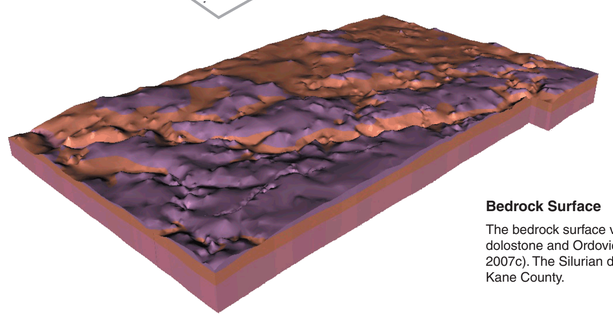
Glasford Formation, Lower Coarse-textured Layer

Sand, gravel, and boulders. Occurs as a basal unit in contact with bedrock in portions of Kane County and is thickest in bedrock valleys. This unit has a maximum thickness of 138 feet in the county.



Glasford Formation, Lower Fine-textured Layer

Diamictons, silts, and clays. Mostly occurs in the bedrock valleys. This unit is up to 111 feet thick in Kane County.



Bedrock Surface

The bedrock surface varies in composition from Silurian dolostone and Ordovician shale and dolostone (Dey et al. 2007c). The Silurian dolostone is up to 148 feet thick in Kane County.

Recommended citation:
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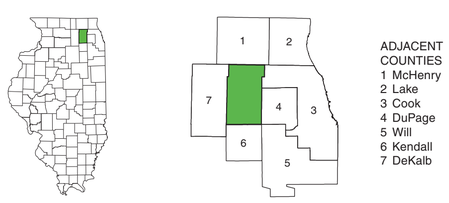

ADJACENT COUNTIES
1 McHenry
2 Lake
3 Cook
4 DuPage
5 Will
6 Kendall
7 DeKalb

Geology based on field work by W.S. Dey, A.M. Davis, and B.B. Curry, 2002–2007.

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Base map compiled from the United States Geological Survey 1:100,000-scale Digital Line Graph data. North American Datum 1983. Transverse Mercator projection.