# Surficial Geology Map for the Freeport East 7.5 Minute Quadrangle, Stephenson County, Illinois

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Not much is known of the large-scale geology of Stephenson County. Though numerous wells have been drilled within the Freeport East Quadrangle, the geologic data provided from these wells have not been collected, organized, and analyzed. The principal focus of this project will be to create a surficial geologic map of the Quaternary and overlying units within the region. The surficial geology map is needed to understand the local geology and will assist in future geologic and hydrogeologic investigations within the Freeport area. Due to the composition of the partially buried bedrock valley and the current downcutting of the Pecatonica into the surrounding geology there is a need to assess both shallow and deep aquifer sensitivity within the region. There is also potential for aggregate resource development as there are currently eighteen small quarries within the region.

The Freeport East 7.5' Quadrangle, 1:24,000 scale, is located in the northwestern corner of Illinois within Stephenson County. Stephenson County is bounded to the north by the Wisconsin border, to the east by Winnebago County, and to the west by Jo Daviess County. The quadrangle is located in the area between 89°37'30W and 89°30'W longitude and 42°22'30N and 42°15'N latitude. The Freeport East Quadrangle includes the eastern portion of Freeport, Illinois, which serves as the largest municipality in the county with a population of 24,161 individuals. The drainages in the quadrangle include the Pecatonica River, Crane Grove Creek, Silver Creek, Winneshiek Creek, and Yellow Creek. The area can be accessed by US 20, Illinois Route 75, and Illinois Route 26 and dozens of country roads and city streets.

Much of the glacial deposits in the Freeport East Quadrangle were deposited during the late Pleistocene (Doyle, 1965). Nearly all the valleys within the area were filled with glacial drift as the glacier advanced from the east on a S75°W trend. Stream diversion channels, thinness of drift throughout the area, the absence of end-moraines, and the presence of kames and eskers are all evidence that once the glacier stagnated over the Freeport East quadrangle and melted from the top down. (Doyle, 1965). The glacial deposits that cover the area are generally referred to as the Glasford Formation. The drift is predominantly composed of glacial till, outwash sands and gravels, and silts.

In the Freeport area there is approximately 2400ft of Paleozoic material that rest on a Precambrian basement (Cote et al., 1970). The bedrock geology of the area is dominated by Ordovician strata of the Ancell, Galena, Platteville, and Maquoketa Groups (Kolata et al., 1978; Kolata and Graese, 1983; McGarry, 2000). The Ancell Group consists of the St. Peter and Glenwood Formations. The Galena and Platteville Groups are collectively more than 100 m (320 ft) in thickness and consist of layers of dolostone. The dolostone ranges from coarsely fossiliferous to micritic, and is locally cherty and/or heavily bioturbated. Thin layers of bentonite also are present.

The major surface drainage feature within the Freeport region is the Pecatonica River. The Pecatonica River flows eastward along the northern border of Freeport, cutting through the northeastern portion of town. The river is approximately 30 m wide with a gradient of approximately 0.13 m per km (Williams and Booth, 2002). The watershed associated with the Pecatonica River covers a total of 2,000 km<sup>2</sup> in Winnebago, Stephenson, Jo Daviess, and Carroll counties (Illinois Environmental Protection Agency, 2009). The watershed consists of a total 655

km of stream (Illinois Environmental Protection Agency, 2009). Data used to create this map were compiled from Illinois State Geological Survey water borehole records, field observations, seismic refraction analysis, and the United States Department of Agriculture soil survey maps. Electronic files were gathered from multiple state and federal agency websites to determine elevation contours, roads, railroads, and water channels.

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Elevation Contour

### Surficial Geology Map for the Freeport East 7.5 Minute Quadrangle, Stephenson County, Illinois

## **Quaternary System**

deposit that is primarily composed of stratified

Organic silt and clay. Intertongues with Cahokia Formation.

Stratified sands and gravels of moderate to considerable thickness. A glaciofluvial deposit that is channelized along stream and river vallevs during glacial retreat

(loess) with some thin lenses of sandy loam. Commonly associated with ground moraines. Occurs as an eolian deposit in uplands, colluvium along slopes, and reworked alluvium within stream and river vallev

Diamicton (till). Reddish-brown sandy clay loam with distinct clay films on ped faces. 5-10% gravel.

Dolomitic silty, clayey, shale. Om Lenses of dolomitic limestone are interbedded throughout.

Dolomitic limestone with chert Ogp nodules. Partially weathered at surface with evidence of karstic