Prairie Research Institute
ILLINOIS STATE GEOLOGICAL SURVEY

Bedrock Topography of Naperville Quadrangle

Du Page County, Illinois

Henry D. Fineberg and B. Brandon Curry

2013

Illinois Geologic Quadrangle Map
IGQ Naperville-BT

Base map compiled by Illinois State Geological Survey from digital data (500 dpi Digital Raster Graphic) provided by the United States Geological Survey. Topography compiled 1988. Planimetry derived from imagery taken 1998 and other sources. Public Land Survey System and survey control current as of 1991. Boundaries current as of 2002.

North American Datum of 1983 (NAD 83)
Projection: Transverse Mercator
10,000-foot ticks: Illinois State Plane Coordinate system, east zone (Transverse Mercator)
1,000-meter ticks: Universal Transverse Mercator grid system, zone 16

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SCALE 1:24,000
1 1/2 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

BASE MAP CONTOUR INTERVAL 10 FEET
SUPPLEMENTARY CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Geology based on field work by B. Brandon Curry and Henry D. Fineberg, 2010.

Digital cartography by Jennifer E. Carrell and Jane E.J. Domier, Illinois State Geological Survey.

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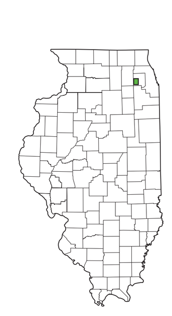

1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES
1 Geneva
2 West Chicago
3 Lombard
4 Aurora North
5 Wheaton
6 Aurora South
7 Normantown
8 Romeoville

APPROXIMATE MEAN DECLINATION, 2013

ROAD CLASSIFICATION
Primary highway, hard surface
Secondary highway, hard surface
Light-duty road, hard or improved surface
Unimproved road
Interstate Route
U.S. Route
State Route

Introduction

Bedrock topography is the surface between the base of the Quaternary glacial drift and Paleozoic bedrock. On the Naperville Quadrangle, bedrock is exposed at ground surface in a few places in the southeastern part of the quadrangle along the West Branch Du Page River and in abandoned quarries. The primary use of this map is to show (1) data point locations, (2) places where the glacial drift is thin or absent, and (3) the location of the Aurora Bedrock Valley. Deposits of sand and gravel in this bedrock valley (see cross section C–C′ in Curry and Fineberg 2012) are potential aquifers. The thickness and nature of the sand and gravel deposits have been explored by several test borings for municipal water wells, although as of yet none have been developed.

Regional Setting

The bedrock surface is a significant unconformity found throughout Illinois. Below this surface in northeastern Illinois the bedrock is more than 400,000,000 years old, and above it the sediment is less than about 500,000 years old and, in many places, less than 25,000 years old (Curry et al. 1999, Curry 2008). Most of the rock that occurs at and just below the bedrock surface was originally deposited as sediment in warm, tropical oceans during the Paleozoic Era; most of the sediment above the bedrock surface is of glacial origin and was deposited during the Quaternary Period. The bedrock surface in the Naperville Quadrangle was eroded into resistant Silurian dolomite. Drift thickness ranges from nil along southern reaches of the West Branch Du Page River valley and in nearby quarries to more than 155 feet in uplands forming the Valparaiso Morainic System east of the valley (Fineberg and Curry 2012a).

Discussion

The most significant features of the bedrock topography of the Naperville Quadrangle are the Aurora Bedrock Valley, a tributary of the St. Charles Bedrock Valley in Kane County (fig. 1; Curry and Seaber 1990), and portions of a major preglacial drainage divide. On the Naperville Quadrangle, the divide is manifest by areas higher than about 650 feet mean sea level (MSL) in the northeasternmost and southwestern part of the quadrangle; the remainder of the divide occurs to the east on the Wheaton, Illinois, 7.5-minute quadrangle (Herzog et al. 1994). The drainage divide separated preglacial drainage that flowed west via the St. Charles Bedrock Valley (and eventually to the Gulf of Mexico) from eastward flowing streams leading to the Great Lakes (and eventually to the North Atlantic Ocean).

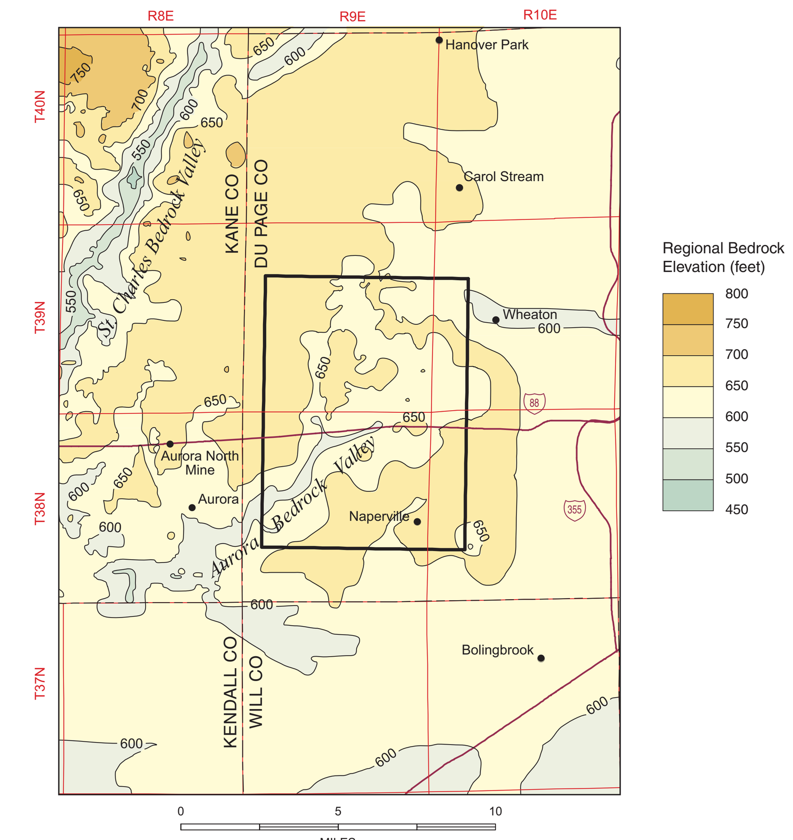

Figure 1 The generalized topography of the bedrock surface of a portion of northeastern Illinois. The area to the west of the Naperville Quadrangle (near the center of the map) was mapped at a scale of 1:100,000 by Dey et al. (2007), building on data used by Curry (2001) and Vaiden and Curry (1990) for smaller scale maps. The regional bedrock surface contours of Herzog et al. (1994) are shown north, south, and east of the Naperville Quadrangle.

Our bedrock surface contours are biased toward indicating continuous bedrock valleys as opposed to showing closed depressions. On upland surfaces, the relief and size of the some features warranted interpretation as closed depressions. These features likely have karstic origins and represent buried sinkholes. Although most local quarries do not reveal large solution cavities, some karstic features are known in the region such as shallow solutioned crevasses as much as 4 feet deep and 1 foot wide (Bauer et al. 1988) and larger, but filled features developed in the older Galena Group (Plotnick et al. 2009). Recently, caves have been discovered in the Galena Group at Lafarge North America's North Aurora mine (Freiburg 2010) located about 3 miles west of the Naperville Quadrangle (fig. 1). The largest calcite crystal-lined caverns are about 10 feet by 10 feet wide and more than 100 feet deep (Jared Freiburg, personal communication, 2010). The caverns are structurally controlled and occur along the dominant joint orientations of approximately N45°W and N35°E. Ostensibly, the orientation and location of depressions and valley segments are likely influenced by the density and orientation of joints and other discontinuities in the bedrock.

Mapping Methods

The MSL elevations of the bedrock surface were interpreted from refractive seismic data (Heigold 1990) and from the logs of water-well drillers, engineering test borings (e.g., Landon and Kempton 1971), and descriptive lithologic logs and natural gamma-ray logs of the Illinois State Geological Survey (ISGS), (e.g., Fineberg and Curry 2012b). The locations of the water wells were verified by geologists and hydrogeologists of the ISGS and the Illinois State Water Survey (ISWS). The locations of many engineering borings were verified by using aerial photographic documentation and GIS. The locations of the seismic data were estimated from topographic maps.

The MSL elevations for the bedrock surface were calculated by subtracting the thickness of unconsolidated materials from the ground surface elevation. The location and elevation of the seismic data were estimated from a topographic map by Heigold (1990). The surface elevations of water wells, engineering borings, stratigraphic borings, and gamma logs were interpolated from a Digital Elevation Model (DEM) from the Du Page County LiDAR using ESRI's ArcGIS software. The LiDAR DEM had a raster grid of 3.47 feet with an accuracy of ±0.4 feet. Using ArcGIS, the bedrock surface was created with the Topo-to-Raster interpolation method. The contours were adjusted to honor all the data points on the final bedrock topography map.

The quality of the data used to compile the map varies from very good to excellent. The engineering and stratigraphic data are of excellent quality; their locations are well documented, and they have detailed descriptive logs. Water-well logs are, in some cases, as excellent as the engineering boring logs, but many have generalized descriptions of the materials. Water-well locations have been verified as noted on drillers' logs by ISGS and ISWS personnel. Seismic data include only location and drift thickness. In many cases, two values were determined for the same point; about 30% of these data were rejected because the values were in conflict. Other data that conflicted with better quality information were also rejected. The distribution of these data is shown on the data point locations map of the Naperville Quadrangle (Fineberg and Curry, 2012b).

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Bedrock Elevation
(feet above mean sea level)

700
675
650
625
600
575
550

Data Type

- Outcrop
- Stratigraphic boring
- Water-well boring
- Engineering boring
- Seismic data
- 653 Numeric labels indicate bedrock elevation in feet above mean sea level.

Note: Most well and boring records are available online from the ISGS Web site.