Drift Thickness of Crystal Lake Quadrangle
McHenry and Kane Counties, Illinois

Department of Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY
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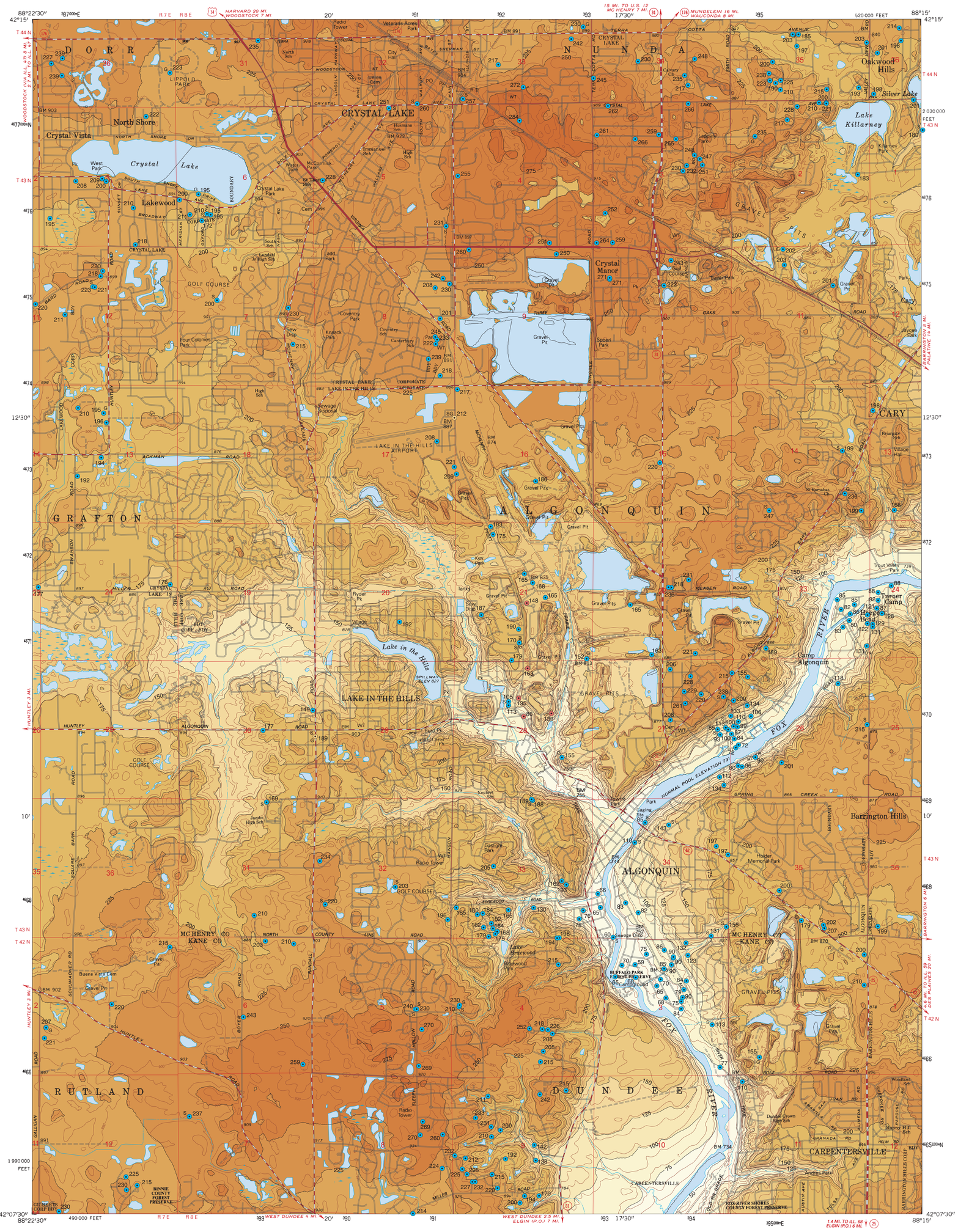
2005

Illinois Geologic Quadrangle Map
IGQ Crystal Lake-DT



Introduction

This map provides an estimate of the glacial drift thickness in the Crystal Lake 7.5-minute Quadrangle. Mapping the thickness of this material provides basic information for land use, planning, and economic development decisions.

Drift refers to geologic materials from various sedimentary environments that resulted directly or indirectly from continental glaciation. Drift includes till, sand and gravel outwash, lake sediment, loess (wind-blown silt), alluvium, peat, and debris flows. It also includes deposits from mass movement, such as landslides or down-slope soil creep. Drift is important for two reasons: the fine-grained materials offer some measure of protection from surface contaminants for underlying bedrock aquifers, and drift is an important economic factor in the development of bedrock quarries. To assess bedrock aquifer vulnerability fully, however, additional information such as the porosity and permeability of the sediment constituting the non-aquifer and aquifer materials are necessary. As available sand and gravel aggregate resources become depleted in northeastern Illinois, aggregate companies have increasingly become interested in developing underground bedrock aggregate mines, such as the currently operating Conco-Western Quarry in North Aurora. The expense of developing underground mines increases with thicker drift.

Methods

This drift thickness map was produced with the computer program Vertical Mapper 2.0 using the nearest neighbor algorithm. A 100-meter (328-foot) grid of drift thickness values was determined by subtracting the elevation value grid of the bedrock topography from that of the ground surface. The gridded values of ground surface elevations have an accuracy of ± 5 feet (USGS 1999). Figure 1 is a shaded relief map of the 10-meter digital elevation model of the ground surface. Values of drift thickness were calculated from 342 water wells and 8 stratigraphic borings. These data are available from the Illinois State Geological Survey Geological Records Unit and are identified on a 1:24,000-scale map (Curry 2005a). Both the bedrock surface contours of Curry (2005b) and drift thickness data points were used in the gridded model of the bedrock surface topography.

Figure 1 Shaded relief map of the Crystal Lake Quadrangle using the 10-meter USGS digital elevation model of the quadrangle. The Woodstock and Barlina Moraines are shaded green (modified from Hansel and Johnson 1989, Willman and Frye 1970). Scale is 1:100,000.

Discussion

Drift thickness in the Crystal Lake Quadrangle varies from about 25 feet to more that 275 feet. Because the bedrock surface has half the relief of the surface topography (100 feet vs. 200 feet), patterns of drift thickness are more of a reflection of the surface topography. Low-lying areas, such as the valley of the Fox River and its tributaries, are underlain by thinner drift. The Woodstock Moraine (Hansel and Johnson 1989) and Barlina Moraine (Willman and Frye 1970) (fig. 1) are underlain by thicker drift. The Woodstock Moraine is an end moraine formed of thick sand and gravel overlain by relatively thin, loamy, poorly sorted sediment (diamicton) (Curry 2005c). The Barlina Moraine is formed by thin deposits of diamicton and sorted sediment associated with the Yorkville and Batestown Members (Lemont Formation) draped over a thick succession of diamicton of the Tiskilwa Formation (Curry 2005c). The irregular edges of the moraines, especially the Barlina Moraine, are attributed to postglacial erosion by the Fox River and its tributaries.

References

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1905-2005 ISGS Illinois State Geological Survey

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