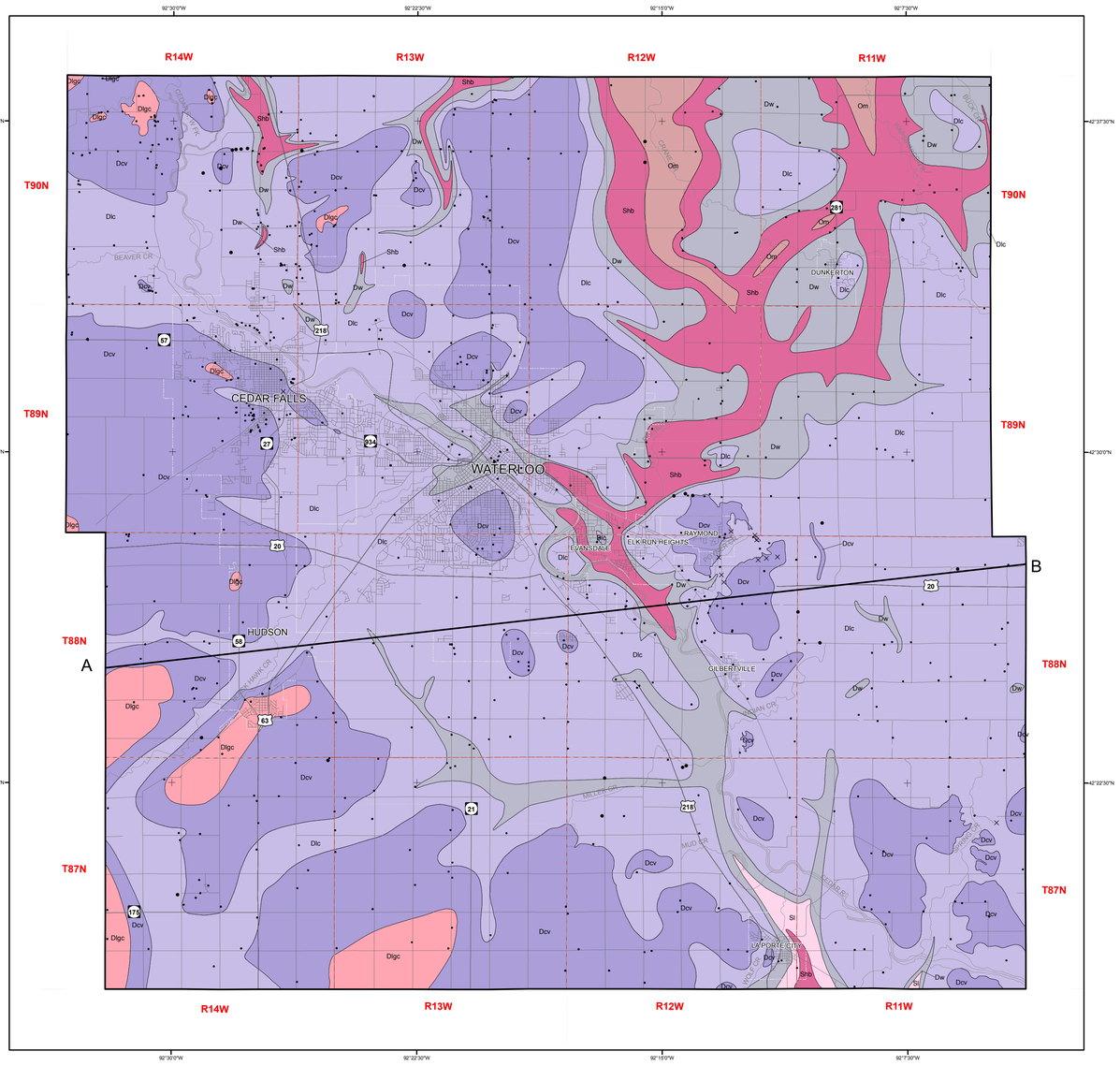
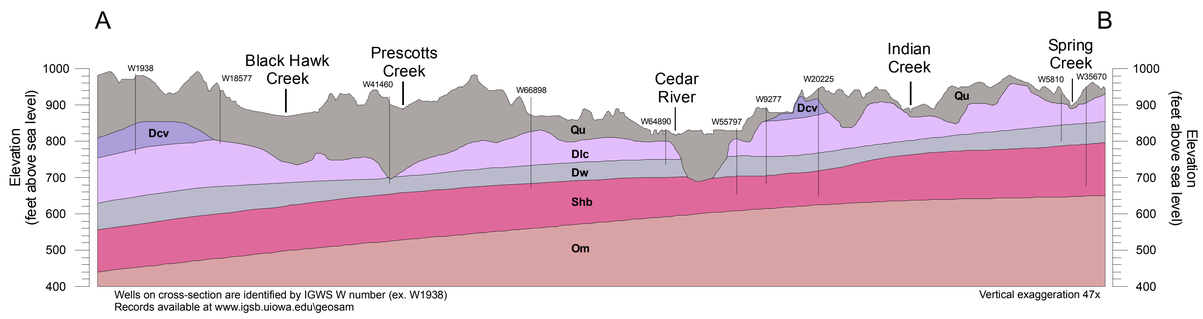
Bedrock Geology of Black Hawk County, Iowa



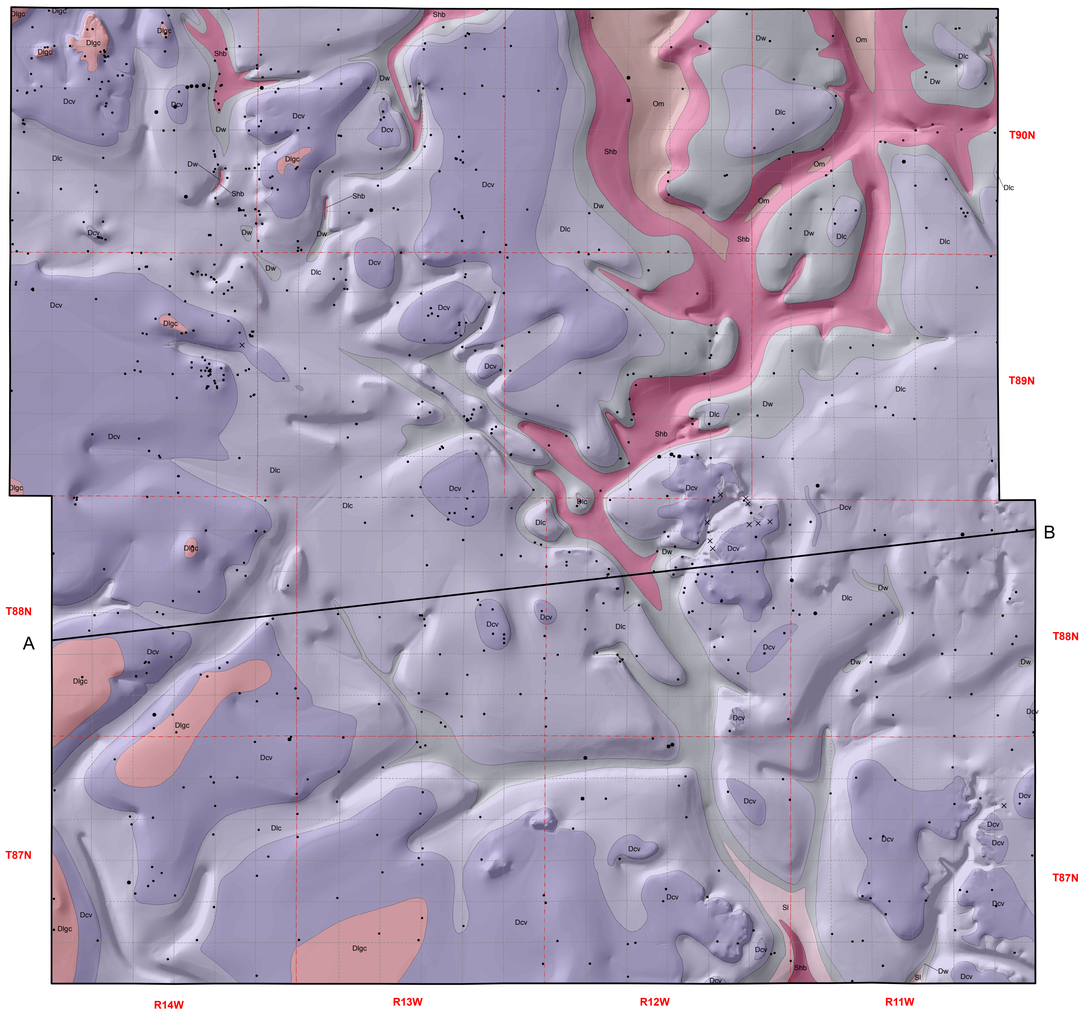
GEOLOGIC CROSS-SECTION A-B



Wells on cross-section are identified by IGWS W number (ex. W1938)
Records available at www.igsb.uiowa.edu\geosam

Vertical exaggeration 47x

BEDROCK GEOLOGY WITH SHADED RELIEF OF BEDROCK SURFACE



LEGEND

CENOZOIC

QUATERNARY SYSTEM

Qu – **Undifferentiated unconsolidated sediment**. This map unit consists of loamy soils developed in loess and glacial till of variable thickness, and alluvial clay, silt, sand, and gravel. The total thickness can be up to 73 m (240 ft) in the bedrock valleys within the county. This unit is shown only on the cross-section, not on the map.

PALEOZOIC

DEVONIAN SYSTEM

Dlgc - Dolomite, Limestone, and Shale (Lithograph City Formation) Middle to Upper Devonian. The total thickness of this map unit is up to 30 m (97 ft), consisting of interbeds of laminated lithographic and sublithographic limestone and dolomitic limestone with scattered to abundant brachiopods, corals and/or stromatoporoids. This unit occurs on some bedrock highs in the western one third of the county.

Dcv - Limestone and Dolomite (Coralville Formation) Middle Devonian. The thickness of this map unit varies between 0 and 31 m (0-100 ft) within the county. The lower Gizzard Creek Member is a fossiliferous carbonate with an abundant marine fauna and is dominated by dolomite and dolomitic limestone, becoming slightly argillaceous in part, with common calcite filled vugs; the low diversity fauna are characterized by crinoid debris and brachiopods and rare gastropods and bryozoans. The upper Iowa City Member is carbonate dominated, with laminated, brecciated, or evaporitic textures and some restricted marine faunas; the restricted marine fauna is dominated by favositid corals and/or branching and domal stromatoporoids. Stromatoporoid rich biostromal intervals occur within and around the map area.

Dlc - Dolomite and Limestone (Little Cedar Formation) Middle Devonian. The thickness of this map unit ranges from 0 to 40 m (0-130 ft) within the county. The map unit is dominated by slightly argillaceous to argillaceous dolomite and dolomitic limestone, usually vuggy and partially laminated and/or cherty. This unit is commonly fossiliferous and brachiopods are especially abundant in the lower portion. The upper portion (Hinkle Member) is a dense unfossiliferous lithographic or sublithographic limestone or dolomitic limestone, with laminated, pelleted, intraclastic, and bird's eye fabrics.

Dw - Dolomite, Limestone, Shale, and minor Sandstone (Wapsipinicon Group) Middle Devonian. This map unit contains only the Pinicon Ridge Formation of the group, with a total thickness that varies from 0 to 24 m (0-80 ft) in the mapping area. It is dominated by laminated or brecciated, unfossiliferous limestone and dolomite that is sometimes sandy and cherty at its base. This unit occurs in some deeper bedrock valleys within the map area.

SILURIAN SYSTEM

Sl – Limestone, Dolomitic Limestone and Dolomite (LaPorte City Formation) upper Llandovery-lower Wenlock Lower Silurian. This unit is a limestone facies that correlates with the upper Hopkinton-lower Scotch Grove formations. These rocks are unconformably overlain by the Wapsipinicon Group. The total thickness of the map unit is up to 43 m (140 ft). The formation is dominated by dense, fossiliferous limestone that is cherty to very cherty. Secondary lithologies include dolomitic limestone and dolomite. Minor lithologies include argillaceous to shaly chert residuum at the top of the interval (may be basal Wapsipinicon Group) and green-gray shale. This unit occurs in a bedrock valley within the southeastern part of the county.

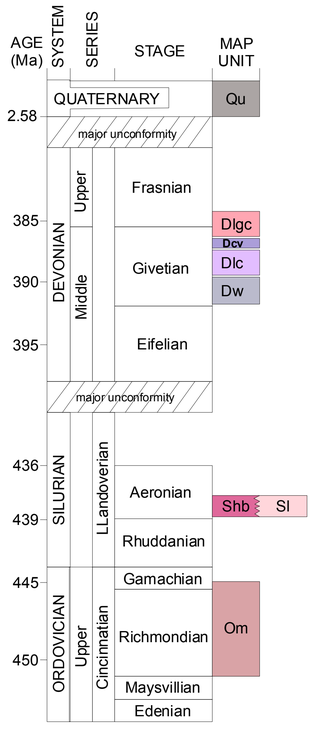
Shb – Dolomite with Chert (Hopkinton and Blanding formations) Lower Silurian. The total thickness of this map unit is up to 49 m (160 ft). The unit is fossil-moldic to vuggy dolomite and cherty to very cherty with nodular to bedded chert in the upper part of the Blanding Formation. Fossils include corals, brachiopods, and stromatoporoids. The Hopkinton rocks are generally more fossiliferous and less cherty than the underlying Blanding rocks. This unit occurs in some of the deeper portions of the bedrock valleys within the map area.

ORDOVICIAN SYSTEM

Om – Shale and Dolomite (Maquoketa Formation) Upper Ordovician. The total thickness of this map unit is up to 91 m (300 ft). The unit is comprised of interbedded green to gray dolomitic shale and shaly dolomite with minor limestone, variably cherty and variably fossiliferous with brachiopod and graptolites; thin brown to brown-gray dolomitic shale layers occur in the lower 10 m (33 ft). This unit occurs in the deepest portions of the bedrock valleys in the northeast part of the map area.

- **Wells**
- **Drill Holes**
- × **Outcrops**

CORRELATION CHART



BEDROCK GEOLOGY OF BLACK HAWK COUNTY, IOWA

Iowa Geological and Water Survey
Open File Map OFM-13-3
September 2013

prepared by

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Introduction to the Bedrock Geology of Black Hawk County

Black Hawk County, Iowa, is located in the south-central portion of the Iowan Surface landform region, which is characterized by various episodes of erosion before the Wisconsinan glacial events (Prior, 1991).

The county is covered by various Quaternary glacial deposits with a maximum thickness of up to 73 m (240 ft) occurring in bedrock valleys. Eleven bedrock outcrops (five quarries, five road cuts and one excavation for a lift station) were found in the map area during the field investigation. Subsurface information for the bedrock mapping was mostly derived from the analysis of water well materials and drill-hole information collected by the Iowa Geological & Water Survey (IGWS) and stored in the GEOSAM database of IGWS. A total of 822 private and public wells and 26 drill holes were reviewed within the map area. Bedrock information from 10 quarries in Black Hawk County and quarries in surrounding counties was also helpful in mapping the bedrock geology of the county.

In the mapping area, Middle Devonian rocks form the major bedrock surface, and water wells are developed in both Devonian and Silurian rocks. Being part of the Iowa Basin, the stratigraphy of the regional area has been intensively studied by IGWS staff (e.g., Belanski, 1927; Koch, 1970) and re-studied and correlated by Witzke and Bunker (1984), Witzke and others (1988, 2010), Anderson and Bunker (1998), Groves and others (2008), etc. Other studies in the area include Anderson and Garvin (1984) and Day and others (2006). The bedrock surface of two quadrangles within Black Hawk County was recently mapped by Rowden and others (2011 and 2012). Results from these studies helped in the delineation of the geologic units at the bedrock surface and the stratigraphic framework for this bedrock geologic map. The stratigraphic nomenclature and correlation in this map follow the stratigraphic framework proposed by Witzke and others (1988).

The youngest bedrock unit within the county is the Devonian Lithograph City Formation, while the oldest rocks forming part of the bedrock surface are included in the Ordovician Maquoketa Formation. The Devonian is dominated by carbonates varying between limestone and dolomite with accompanying minor shale. Based on lithologic features and fossils, the Devonian rocks in the mapping area can be subdivided, in descending order, into the Lithograph City, Coralville and Little Cedar formations and the Wapsipinicon Group. The Silurian is comprised mostly of dolomite with varying amounts of chert and minor shale, and includes a limestone facies interval. The Silurian rocks are subdivided into the LaPorte City Formation (limestone) and the Hopkinton and Blanding formations (dolomite).

The Lithograph City Formation consists of interbeds of laminated lithographic and sublithographic limestone and dolomitic limestone with scattered to abundant brachiopods, corals, and/or stromatoporoids. This unit occurs on some bedrock highs in the western one third of the county.

The Coralville Formation occurs throughout most of the county on bedrock highs, but is absent in the northeast part of the map area. It is characterized by a lower fossiliferous carbonate member with abundant marine fauna (Gizzard Creek Member) and an upper carbonate dominated unit with laminated, brecciated, or evaporitic textures and some restricted marine faunas (Iowa City Member).

The Little Cedar Formation is the dominant bedrock surface unit in the county and is characterized by fossiliferous dolomite and dolomitic limestone in the lower part and by sparsely fossiliferous to unfossiliferous dolomite, shale, and limestone (laminated to brecciated) in the upper part.

The Wapsipinicon Group is dominated by laminated or brecciated, unfossiliferous limestone and dolomite that is sometimes sandy and cherty at its base. Within the map area, only the Pinicon Ridge Formation of the group is present, and it forms the bedrock surface in some deeper bedrock valleys in the county.

The Silurian LaPorte City Formation is a limestone facies that correlates with the upper Hopkinton-lower Scotch Grove formations. These rocks are unconformably overlain by the Wapsipinicon Group. The formation is dominated by dense, fossiliferous limestone that is cherty to very cherty. Secondary lithologies include dolomitic limestone and dolomite. Minor lithologies include argillaceous to shaly chert residuum at the top of the interval (may be basal Wapsipinicon Group) and green-gray shale. This unit occurs in a bedrock valley within the southeastern part of the county.

The Silurian Hopkinton and Blanding formations are comprised of fossil-moldic to vuggy dolomite that are cherty to very cherty with nodular to bedded chert in the upper part of the Blanding Formation. The Hopkinton rocks are generally more fossiliferous and less cherty than the underlying Blanding rocks. These rocks form the bedrock surface in some of the deeper parts of the bedrock valleys in the county.

Ordovician Maquoketa Formation rocks occur in the deepest portions of the bedrock valleys in the northeast part of the map area, and directly underlie the Silurian rocks. The Maquoketa rocks include interbedded green to gray dolomitic shale and shaly dolomite with minor limestone, and are variably cherty and fossiliferous.

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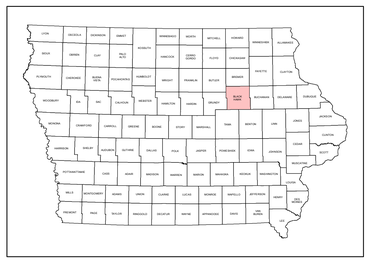
Location Map



Base map from Black Hawk County GIS data derived from IDOT Transportation Basemap files from 2009.

Iowa Geological and Water Survey digital cartographic file BlackHawkCo_Bedrock_final.mxd , version 9/16/13 (ArcGIS 10.1).
Map projection and coordinate system based on Universal Transverse Mercator (UTM) Zone 15, datum NAD83.

Map and cross-sections are based on interpretations of the best available information at the time of mapping.
Map interpretations are not a substitute for detailed site specific studies.