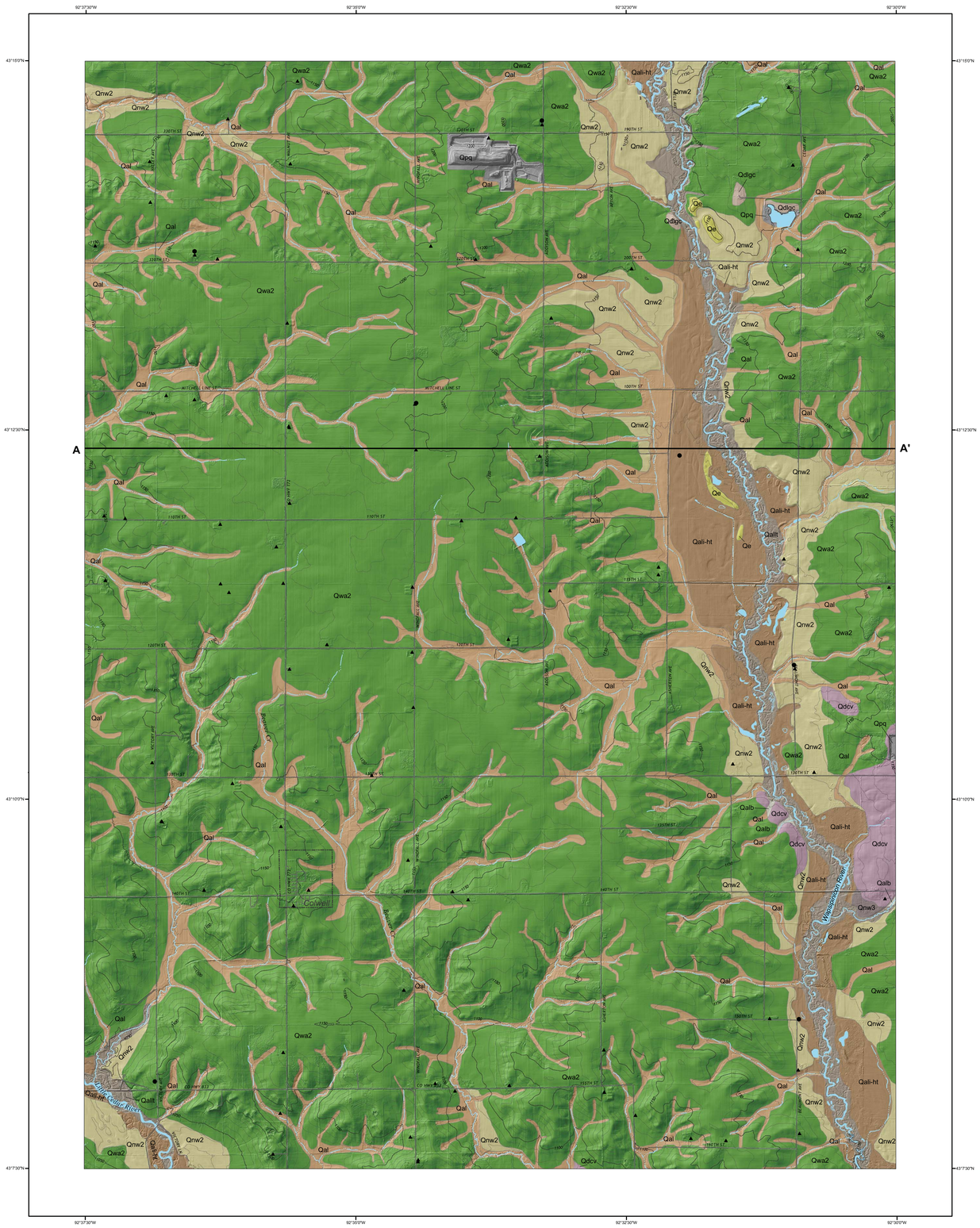
Surficial Geologic Map of the Colwell (Iowa) 7.5' Quadrangle



1:24,000

0 0.5 1 2 3 4 Miles

0 0.5 1 2 3 4 Kilometers

CONTOUR INTERVAL 10 FEET

MN 0°20' 5 MILS

GN 0°16' 1 MILS

UTM GRID AND 2017 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

LEGEND

CENOZOIC

QUATERNARY SYSTEM

HUDSON EPISODE

Qal - Alluvium (DeForest Formation- Undifferentiated) - Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, noncalcareous to calcareous, massive to stratified silty clay loam, clay loam, loam to sandy loam alluvium and colluvium in stream valleys, on hillslopes and in closed depressions. May overlie Noah Creek, Wolf Creek or Alburnett formations or fractured Devonian carbonate bedrock. Associated with low-relief modern floodplain, closed depressions, modern drainageways or toeslope positions on the landscape. Seasonal high water table and potential for frequent flooding.

Qalb - Alluvium Shallow to Bedrock (DeForest Formation- Undifferentiated) - Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, noncalcareous to calcareous, stratified silty clay loam, clay loam, loam to sandy loam alluvium and colluvium in stream valleys, on hillslopes and in closed depressions. May overlie the Noah Creek Formation or Devonian carbonate bedrock. Bedrock surface is within 5 m (16 ft) of the land surface. Associated with low-relief modern floodplain, closed depressions, modern drainageways or toeslope positions on the landscape. Seasonal high water table and potential for frequent flooding.

Qallt - Low Terrace (DeForest Formation- Camp Creek and Roberts Creek members) - Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, noncalcareous, stratified silty clay loam, loam, or clay loam. Overlies the Noah Creek Formation. Occupies the lowest position on the floodplain, i.e. modern channel belts in the Little Cedar and Wapsipinicon river valleys. Seasonal high water table and frequent flooding potential.

Qali-ht - Intermediate-High Terrace (DeForest Formation- Gunder Member) Variable thickness of less than 1 m to 5 m (3-16 ft) of very dark gray to brown, noncalcareous, stratified silty clay loam to loam that overlies the Noah Creek Formation. Occupies the intermediate to high terrace position in the Little Cedar and Wapsipinicon river valleys. Seasonal high water table and frequent flooding potential.

HUDSON and WISCONSIN EPISODE

Qe - Sand Dunes and Sand Sheets (Peoria Formation- sand facies) - Generally less than 3 m (10 ft) of yellowish brown, massive, calcareous loamy sand to fine sand. It occurs as sand stringers or dunes overlying Holocene terraces unnamed erosion surface loamy sediments.

Qdlgc - Loamy Sediments Shallow to Limestone, Dolomite, or Shale (DeForest, Noah Creek, or Lithograph City formations) - 0 to 2 m (0-7 ft) of yellowish brown to gray, massive to weakly stratified, well to poorly sorted loamy, sandy and silty alluvial sediments that overliethe Middle to Upper Devonian bedrock surface. Bedrock outcrop may be present in isolated areas. A detailed description of the Lithograph City Formation is provided below.

Qdcv - Loamy Sediments Shallow to Limestone or Dolomite (DeForest, Noah Creek, or Shell Rock formations) - 0 to 2 m (0-7 ft) of yellowish brown to gray, massive to weakly stratified, well to poorly sorted loamy, sandy and silty alluvial sediment that overlies theMiddle Devonian bedrock surface. Bedrock outcrop may be present in isolated areas. A detailed description of the Coralville Formation is provided below.

Qnw2 - Sand and Gravel (Noah Creek Formation) - 2 to 12 m (7-40 ft) of yellowish brown to gray, poorly to well sorted, massive to well stratified, coarse to fine feldspathic quartz sand, pebbly sand, and gravel with few intervening layers of silty clay. Thickness in the Wapsipinicon River valley may exceed 10 m (33 ft). Along many valleys, a thin mantle of loess, reworked loess, or fine-grained alluvium (Qal) may be present. This unit includes silty colluvial deposits derived from the adjacent map units. This unit encompasses deposits that accumulated in low-relief stream and river valleys during the Wisconsin and Hudson episodes.

WISCONSIN EPISODE

Qnw3 - Sand and Gravel Shallow to Bedrock (Noah Creek Formation) - 1 to 3 m (3-10 ft) of yellowish brown to gray, poorly to well sorted, massive to well stratified, coarse to fine feldspathic quartz sand, pebbly sand, and gravel may be overlain by up to 2 m (7 ft) of silty alluvial sediments. In places mantled with fine to medium well-sorted feldspathic quartz sand derived from wind reworking of the alluvium. Fractured carbonate bedrock is less than 5 m (16 ft) below the land surface.

Qwa2 - Loamy Sediments Shallow to Glacial Till (Unnamed erosion surface sediment) - 1 to 6 m (3-20 ft) of yellowish brown to gray, massive to weakly stratified, well to poorly sorted loamy, sandy and silty erosion surface sediment. Map unit includes some areas mantled with less than 1 m (3 ft) of Peoria Formation (silt or sand facies). Overlies massive, fractured, extremely firm glacial till of the Wolf Creek or Alburnett formations.

PRE-ILLINOIS EPISODE

Qwa3 - Glacial Till (Wolf Creek or Alburnett formations) - 3 to 85 m (10-278 ft) of very dense, massive, fractured, clay loam glacial till of the Wolf Creek or Alburnett formations. This mapping unit can be buried by unnamed erosion surface sediments, loess, or alluvium. This unit is shown only on the cross-section.

PALEOZOIC

DEVONIAN SYSTEM

Dlgc - Limestone, Dolomite, and Shale (Lithograph City Formation) Middle to Upper Devonian. This map unit mostly occurs on the bedrock surface in the northeast part of the quadrangle. The regional thickness of this unit is around 21 to 30 m (70 -100 ft), but it is less than 6m (20 ft) in the mapping area because of erosion. This unit consists of limestone, dolomitic limestone, dolomite, and minor shale. It is usually characterized by interbeds of laminated lithographic and sub-lithographic limestone and dolomitic limestone, in part argillaceous. "Birdseye" structures, vugs and calcite vug-fills are common. Some intervals are fossiliferous and stromatoporoid-rich.

Dcv - Limestone and Dolomite (Coralville Formation) Middle Devonian. This map unit occurs at the bedrock surface in the east part and the southwest corner of the quadrangle. The thickness of this map unit varies between 12 and 21 m (40 -70 ft) in the mapping area. It consists of limestone, dolomitic limestone, and dolomite, in part laminated, argillaceous, or shaly. Brachiopods, echinoderm debris and corals usually occur in the limestone facies. This unit is shown only on the cross-section.

Dlc - Dolomite, Limestone, and Shale (Little Cedar Formation) Middle Devonian. This formation dominates the bedrock surface of the western part of the quadrangle beyond the deep bedrock valley. The thickness of this formation ranges from 24 to 30 m (80-100 ft) in the mapping area. This unit is dominated by slightly argillaceous to argillaceous dolomite and dolomitic limestone, usually vuggy and partially cherty. A shaly layer about 3 to 6 m (10-20 ft) thick commonly occurs in the upper part of the formation. This unit is commonly fossiliferous, and brachiopods are especially abundant in the lower portion. This unit is shown only on the cross-section.

Dpr - Dolomite and Dolomitic Limestone (Pinicon Ridge Formation) Middle Devonian. This map unit occurs at the bedrock surface along the deep bedrock valley throughout the western part of the quadrangle. This formation consists of dolomite and dolomitic limestone with varying textures (shaly, laminated, brecciated, sandy, and/or cherty). The thickness of this unit usually ranges from 6 to 14 m (20-45 ft). Compared to other Devonian strata in the mapping area, this formation is usually unfossiliferous. This unit is shown only on the cross-section.

Dsp - Dolomite (Spillville Formation) Middle Devonian. This map unit only occurs at the bedrock surface within the deep bedrock valley in the western part of the quadrangle. This unit is dominated by medium to thick bedded dolomite with scattered to abundant fossil molds, with a maximum thickness of approximately 21 m (70 ft) in the mapping area. Its basal part, where present, is variably sandy, shaly, and/or conglomeratic with reworked Ordovician cherty clasts. This unit is shown only on the cross-section.

OTHER FEATURES

Qpq - Pits and Quarries - Sand and gravel pits and rock quarries. Extent mapped as shown on the county soil surveys and as identified on aerial imagery.

Water features - Rivers, lakes and small ponds. Extent mapped as shown in the county soil survey and as identified on aerial imagery.

Incorporated city boundary

New drill holes for this map project

IGS GEOSAM data points - records available at www.iowageologicalsurvey.org

W29402 **Wells used for geologic cross-section**

CORRELATION OF MAP UNITS

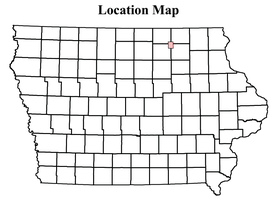
	Iowan Surface			Episode	Series	System
	Till Plain		Shallow Rock			
Alluvium	Qal	Qallt / Qalit	Qalb	Hudson	Holocene	Quaternary
Eolian	Qe			Hudson and Wisconsin		
Colluvium	Qnw2		Qnw3		Pleistocene	
Erosion Surface	Qwa2			Wisconsin		
Glacial	Qwa3*			Pre-Illinois		
Bedrock			Qdlgc	Devonian		
			Qdcv			
	Dlgc*					
	Dcv*					
	Dlc*					
	Dpr*					
	Dsp*					

*units only shown on the cross-section

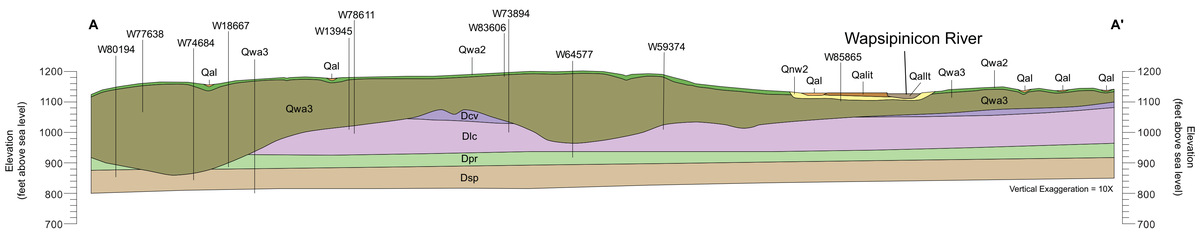
Adjacent 7.5' Quadrangles

NEW HAVEN	RICEVILLE	SARATOGA
FLOYD	COLWELL	ELMA
CHARLES CITY	BASSETT	IONIA

Location Map



GEOLOGIC CROSS-SECTION A-A'



SURFICIAL GEOLOGIC MAP OF THE COLWELL 7.5' QUADRANGLE, CHICKASAW, FLOYD, HOWARD, AND MITCHELL COUNTIES, IOWA

Iowa Geological Survey
Open File Map OFM-17-4
June 2017

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IOWA GEOLOGICAL SURVEY

Iowa Geological Survey, Robert D. Libra, State Geologist

Supported in part by the U.S. Geological Survey
Cooperative Agreement Number G16AC00193
National Cooperative Geologic Mapping Program (STATEMAP)
Completed under contract with the Iowa Department of Natural Resources

ACKNOWLEDGMENTS

Special thanks to John Caroline, John Gunzalles, Matt Hugel, and Carl Knapp for allowing samples to be collected on their property. Thanks to Shirley Kohlska, Dorothy & Dana Martin, Joe Meirick, and Gerald Reiss for permitting access to bedrock outcrops in their properties. Zachary Dennaert of the Iowa Geological Survey (IGS) and University of Iowa students Samantha Moser, Ryan McKeen, and Gia DoBartolo prepared well cutting samples for stratigraphic logging. New subsurface geologic data was generated by Tanner Hartsock and Diar Ibrahim, University of Iowa Department of Earth and Environmental Sciences (EES) students, by producing descriptive logs of water well drilling samples.Katie Goff assisted with field work. Thanks also to Rick Langel (IGS) for managing the Iowa geologic sampling database (GeoSam). Also, special thanks to Kathy Woida, Natural Resources Conservation Service (NRCS), Deborah Quade, Iowa Department of Natural Resources (IDNR), and Art Bettis, (EES), for assistance with core description and for numerous valuable discussions regarding the geology of north-central Iowa. Contract drilling was provided by Cahoy Well and Pump Service; special thanks to Mark Claassen, driller, and Jon Small, drilling assistant. Additional drilling was provide by the NRCS, special thanks to driller Jamie Johnson. Casey Kohrt and Chris Kahle of (IDNR) and Andrew Roers of IIHR Hydroscience & Engineering provided GIS technical help. Administrative support was provided by Megan Delaney, Rosemary Tiwari, Teresa Gaffey. Angi Roennerman, and Carmen Langel.

Introduction to the Surficial Geologic Map of the Colwell 7.5' Quadrangle, Chickasaw, Floyd, Howard, and Mitchell Counties, Iowa

The Colwell 7.5' Quadrangle is located in north-central Iowa on the Wisconsinan-age Iowan Surface (IS) landform region (Prior and Kohrt, 2006). It lies within Chickasaw, Floyd, Howard, and Mitchell counties. The map area is dominated by unnamed loamy sediments (IS materials) of variable thickness overlying Pre-Illinoian Wolf Creek or Alburnett formation glacial sediments and small areas of shallow Devonian carbonate bedrock. Small areas outcrop or areas with less than 5 m (16 ft) of loamy material over rock are present, especially along the Wapsipinicon River. The thickness of Quaternary deposits in the Colwell Quadrangle is generally greater than 20 m (65 ft) in the quadrangle, though deposits reach a maximum thickness of 90 m (295 ft) in a bedrock valley found on the western half of the mapping area.

Iowa has a rich and complex Quaternary geologic history punctuated by at least seven periods of glaciation between 2.6 million to 500,000 years ago (Boellstorff, 1978a,b; Hallberg, 1980, 1986). In the map area, Pre-Illinois Episode glacial deposits and associated buried soils have been subaerially exposed since deposition. The most recent glacial advance of the Des Moines Lobe did not extend into the mapping area, but its influence is evident in the development of river valleys and periglacial alteration of the landforms. Statewide bedrock geologic maps by Hershey (1969), and most recently by Witzke and others (2010), illustrate the improved understanding of the complex distribution of geologic units at the bedrock surface across north-central Iowa, including the study area. Previous surficial geologic mapping completed as part of the STATEMAP program in the area include The Surficial Geologic Map of Mitchell County (Tassier-Surine et al., 2016), The Surficial Geologic Map of The Charles City Quadrangle (Streeter et al., 2016), and The Surficial Geologic Map of the Orchard Quadrangle (Kerr et al., 2016).

The soil surveys of Chickasaw, Floyd, Howard, and Mitchell counties (Buckner and Highland, 1974; Voy, 1995; Voy and Highland, 1975; Wilson, 1996) provided information regarding shallow rock areas and helped to guide valley mapping units. Subsurface information was mostly derived from the analysis of water well cutting samples reposited by the IGS. Lithologic and stratigraphic information from these samples are stored in the online GeoSam database of the IGS. Additionally, the IGS drilled 7 cores in the quadrangle to characterize the Quaternary sediments and establish unit thickness.

Results from previous mapping projects in Worth, Cerro Gordo, and Mitchell counties indicate that the Sheldon Creek glacial materials extend much farther east than were previously mapped. However, there is no evidence for this advance in this mapping area. Cores collected indicated glacial diamicton from Pre-Illinoian deposition.

A period of intense cold occurred during the Wisconsin full glacial episode from 21,000 to 16,500 years ago (Bettis, 1989). This cold episode and ensuing upland erosion led to the development of the distinctive landform recognized as the IS (Prior, 1976). A periglacial environment prevailed during this period with intensive freeze-thaw action, solifluction, strong winds, and a host of other periglacial processes (Bettis, 1997; Walters, 1996). As a result, surface soils were removed from the IS and the Pre-Illinoian till surface was significantly eroded. Thick packages of stratified loamy and sandy sediments located low in the upland landscape and adjacent to streams are remnants of solifluction lobes associated with the formation of the IS. These materials can be found along Little Cedar and Wapsipinicon rivers.

Surficial deposits in the map area are composed of three formations: DeForest, Peoria, and Noah Creek, as well as unnamed erosion surface sediments. These are underlain by the Wolf Creek and Alburnett formations. Hudson-age deposits associated with fine-grained alluvial, organic, and colluvial sediments include the DeForest Formation which is subdivided into the Camp Creek, Roberts Creek, Gunder, Corrington members. The Noah Creek Formation includes coarse sand and gravel formed from periglacial erosion and deposition during the last glacial period, as well as coarse to finer grained fluvial deposits associated with local stream and river valleys. Unnamed erosion surface sediments consist of reworked till and slopewash deposits associated with periglacial activity during the Wisconsin ice advance. Areas of Peoria Formation eolian materials are present in the flood plain of Wapsipinicon River and intermittently mantle the unnamed erosion surface mapping unit. Pre-Illinoian glacial deposits in Iowa consist of two formations: the younger Wolf Creek Formation and the Alburnett Formation. The Wolf Creek Formation is divided into the Winthrop, Aurora, and Hickory Hills members (oldest to youngest). The Alburnett Formation consists of several "undifferentiated" members.

Five bedrock mapping units (Devonian Lithograph City, Coralville, Little Cedar, Pinicon Ridge, and Spillville formations) comprise the bedrock surface in the Colwell Quadrangle, with the Lithograph City and Coralville formations representing most of the bedrock outcrops in the map area. Bedrock is exposed along the Wapsipinicon River and in an isolated area along Beaver Creek in the mapping area. Three rock outcrops including quarries are located in the map area and were investigated in the field. The Devonian rocks are dominated by carbonates and accompanied by minor shale.

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Base map from USGS Orchard 7.5' Digital Raster Graphic (IGS GIS file IA_Orchard_USGS_topo.tif) which was scanned and modified from the Colwell 7.5' Topographic Quadrangle map, published by the US Geological Survey in 2015
Land elevation contours (10' interval).

Iowa Geological Survey digital cartographic file Colwell_SurficialGeology.mxd, version 6/30/17 (ArcGIS 10.3)
Map projection and coordinate system based on Universal Transverse Mercator (UTM) Zone 15N, datum NAD83.

The map and cross-section 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.

Research supported by the U. S. Geological Survey, National Cooperative Geologic Mapping Program, under USGS award number G16AC00193. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U. S. Government.