

# SURFICIAL GEOLOGIC MAP OF DES MOINES COUNTY, IOWA

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**IOWA** Iowa Geological Survey

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## INTRODUCTION

Des Moines County is located on the Southern Iowa Drift Plain landform region. The thickness of Quaternary materials varies widely across the county generally ranging from 0 to 23 m (0-75 ft) but may be more than 114 m (375 ft) in the eastern part of the mapping area. The region is dominated by loess-mantled till plains in the uplands, and coarse- to fine-grained alluvial deposits within tributary streams. Thick sequences of sand and gravel are found in the Skunk and Mississippi river valleys and are mantled with finer-grained deposits. Several Wisconsin-age terrace deposits are located along the Mississippi River and Flint Creek. Terrace positions in the Mississippi River valley include the Savanna and the younger Kingston, both of which are Middle Wisconsin glaciofluvial deposits related to the development of the Upper Mississippi River. Additional terraces, mapped where Flint Creek joins the Mississippi River north of Burlington, are elevated above those in the Mississippi River valley and represent slackwater deposits that predate the Savanna and Kingston terraces. These are interpreted to correlate with the St. Charles Group.

Glacial till is only exposed in drainages and steep sideslopes. Stratigraphically, the landscape is mantled with 2 to 5 m (7-15 ft) of Peoria Formation loess overlying paleosol formed in glacial till. The Peoria Formation overlies the Illinoian till plain in most of the county with the exception of a few square kilometers in the northwest corner of the county. The Illinoian glacier did not advance very far into Iowa, and the terminal moraine is evident along the boundary. The Illinoian till generally has a thickness ranging from 3 to 10 m (10-33 ft) although it reaches a maximum thickness of 15 m (50 ft) near the terminal moraine. The Illinoian till overlies Pre-Illinoian deposits with an intervening Yarmouth Paleosol. To the west of the moraine, loess overlies a well-developed Yarmouth-Sangamon paleosol formed in Pre-Illinoian till. Bedrock exposures are found along the Skunk and Mississippi rivers and their tributaries, primarily Flint Creek in the central portion of the county. Mississippian units and Pennsylvanian outliers dominate the bedrock surface. An accompanying map of the bedrock geology of Des Moines County has been published concurrently with this map (Open File Map OFM-23-1; Clark et al., 2023).

All data from previous STATEMAP quadrangle surficial map projects in Des Moines County were incorporated into this final surficial geologic map of Des Moines County. Data collected for this mapping project included 28 drill cores and 32 passive seismic data points, as well as investigation of 64 exposures, five abandoned and three active quarries. Sixteen abandoned bedrock quarries were identified from historical aerial photography. Additional subsurface information was derived from the analysis of more than 1,100 water well records, over 100 of which have cutting samples that were described as part of this mapping project. Additional information about the surficial mapping units and stratigraphy may be found in the Summary Map Report of Des Moines County, Iowa.

## DESCRIPTION OF MAP UNITS

### 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, stratified silty clay loam, clay loam, loam to sandy loam alluvium and colluvium in stream valleys, on hill slopes, and in closed depressions. May overlie Pre-Illinoian or Illinoian formation glacial till, Peoria Formation loess, or Noah Creek Formation sand and gravel. This unit may include local fan deposits in smaller drainages. Associated with low-relief modern floodplain, closed depressions, modern drainageways, or topsoil positions on the landscape. Seasonal high water table and potential for frequent flooding. The depth to bedrock may be less than 8 m (26 ft) along tributaries of the Skunk and Mississippi rivers.
- 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, associated with the modern channel belts of Flint Creek, and the Skunk and Mississippi river valleys and their tributaries. Overlies Noah Creek or Henry formation sand and gravel. Occupies the lowest position on the floodplain (i.e., modern channel belts). Includes islands and landforms within the Mississippi River channel. Seasonal high water table and frequent flooding potential.
- Qali-ht** - **Intermediate-High Terrace** (DeForest Formation-Gunder Member) Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, noncalcareous, silty clay loam to loam alluvium or colluvium. Overlies Noah Creek or Henry formation sand and gravel. Occupies terrace and valley margin positions 1 to 2 m (3-7 ft) above the modern floodplain. Two terrace levels are present in some areas. In the Mississippi River valley it may be buried by or interfinger with the alluvial fan (Qaf) unit. Seasonal high water table and low to moderate flooding potential.
- Qaf** - **Alluvial Fan** (DeForest Formation-Corrington Member) Variable thickness of 2 to 5 m (7-16 ft) of dark brown to yellowish brown, noncalcareous, silt loam to loam with interbedded lenses of fine sand and silts. A pebble clay is commonly found at or near the fan surface. Overlies thick sand and gravel of the Henry Formation along the Mississippi River valley as steep angled fans at the base of low order drainages and colluvial slopes. In these settings, the fan unit may exceed 6 m (20 ft) in thickness. May bury Wisconsin terrace units or interfinger with Holocene units.

#### WISCONSIN EPISODE

- Qptlp** - **Late Phase High Terrace (LPHIT)** (Peoria Formation-silt and/or sand facies) 2 to 7 m (7-23 ft) of yellowish brown to gray, massive, jointed, calcareous or noncalcareous, silt loam and intercalated fine to medium, well sorted, sand. Grades downward to poorly to moderately well sorted, moderately to well stratified, coarse to fine feldspathic quartz sand, loam, or silt loam alluvium. Occurs along Flint Creek.
- Qps** - **Loess** (Peoria Formation-silt facies) Generally 2 to 5 m (7-15 ft) of yellowish to grayish brown, massive, jointed calcareous or noncalcareous silt loam to silty clay loam. May overlie a grayish brown to olive gray silty clay loam to silty clay (Pisgah Formation - eroded Farmdale Geosol) which is less than 1.5 m (5 ft) thick. The Pisgah Formation is in the same stratigraphic position as the Roxanna Silt which is mapped in Illinois. The Farmdale Geosol may be welded to an older Sangamon Geosol developed in loamy glacial till of the Wolf Creek or Alburett formations. This mapping unit encompasses upland divides, ridgetops, and convex sideslopes. Well to somewhat poorly drained landscape.
- Qps-gla** - **Loess** (Peoria Formation-silt facies) Generally 2 to 5 m (7-15 ft) of yellowish to grayish brown, massive, jointed, calcareous or noncalcareous silt loam to silty clay loam. May overlie a grayish brown to olive gray silty clay loam to silty clay (Pisgah Formation - eroded Farmdale Geosol) which is less than 1.5 m (5 ft) thick. The Pisgah Formation is in the same stratigraphic position as the Roxanna Silt which is mapped in Illinois. The Farmdale Geosol may be welded to an older Sangamon Geosol developed in loamy glacial till of the Glasford Formation. This mapping unit encompasses upland divides, ridgetops, and convex sideslopes. Well to somewhat poorly drained landscape.
- Qhm** - **Outwash Sand and Pebble Sand** (Henry Formation-Muscataine Member) Yellowish brown to gray, moderately to well sorted, massive to well stratified, coarse to fine feldspathic quartz sand and pebbly sand with gravel zones at depth. May be mantled with up to 2 m (7 ft) of eolian sand. Comprises the Kingston Terrace complex in the Mississippi River valley. Lies 3 to 6 m (10-20 ft) above the modern floodplain.
- Qhs** - **Outwash Sand and Pebble Sand** (Henry Formation-Sabula Member) Yellowish brown to gray, moderately to well sorted, massive to well stratified, coarse to fine feldspathic quartz sand and pebbly sand with gravel zones at depth. May be mantled with up to 5 m (16 ft) of eolian sand. Comprises the Savanna Terrace complex in the Mississippi River valley. Lies 6 to 12 m (20-40 ft) above the modern floodplain and may contain more than one terrace level.
- Qh** - **Outwash Sand and Pebble Sand** (Henry Formation-Undifferentiated) Yellowish brown to gray, moderately to well sorted, massive to well stratified, coarse to fine feldspathic quartz sand and pebbly sand with gravel zones at depth. Underlies alluvial units in the Mississippi River valley. This unit is shown only on the cross-section.
- Qsl** - **Slackwater Deposits** ("St. Charles Group") Massive to stratified dense reddish brown to gray silty clay to clay loam mantled with up to 5 m (16 ft) of Peoria Formation loess. Occurs as slackwater deposits in tributaries to the Mississippi River. Low-relief landforms expressed as broad, long, narrow longitudinal terraces or cusped-shaped top terraces that may be more than 18 m (60 ft) above the modern valley. Unit is benched on a gray, calcareous, massive, dense clay loam diamicton of the Glasford, Alburett, or Wolf Creek formations or bedrock. Interpreted to be correlative with the St. Charles Group deposits. No flooding potential.

#### ILLINOIS EPISODE

- Qgla** - **Till** (Glasford Formation) Generally 3 to 10 m (10-33 ft) of very dense, massive, fractured, loamy glacial till of the Illinoian Glasford Formation with or without a thin loess mantle (Peoria Formation - less than 2 m) and intervening clayey Farmdale-Sangamon Geosol. The maximum thickness reaches 15 m (50 ft) near the terminal moraine. Overlies the Yarmouth Paleosol formed in Pre-Illinoian till. This mapping unit encompasses narrowly dissected interfluvial and side slopes, as well as side valley slopes. Drainage is variable from well drained to poorly drained.
- Qwa3** - **Till** (Wolf Creek or Alburett formations) Generally 10 to 18 m (33-60 ft) of very dense, massive, fractured, loamy glacial till of the Wolf Creek or Alburett formations with or without a thin loess mantle (Peoria Formation - less than 2 m) and intervening clayey Farmdale-Sangamon Geosol. May exceed 90 m (295 ft) in bedrock channels. This mapping unit encompasses narrowly dissected interfluvial and side slopes, and side valley slopes. Drainage is variable from well drained to poorly drained. This unit is shown only on the cross-section.

#### OTHER MAPPING UNITS

- Qbr** - **Loamy Sediments Shallow to Dolostone, Limestone, Shale, and Sandstone** (DeForest, Noah Creek, Peoria, Glasford, Wolf Creek, and Alburett formations) Generally 1 to 2 m (3-7 ft) of yellowish brown to gray, massive to weakly stratified, well to poorly sorted loamy, sandy, and silty sediments that overlie the Pennsylvanian or Mississippian bedrock surface. All areas of bedrock outcrop or shallow to bedrock soils are shown in red on the map, regardless of the bedrock mapping unit. Bedrock units are shown on the cross-section and may be identified on the bedrock map of Des Moines County (OFM-23-1).
- Qpq** - **Pits and Quarries** Sand and gravel pits and rock quarries. Extent mapped as shown on the county soil survey and as identified on aerial imagery and LiDAR hillshade.

## CORRELATION OF MAP UNITS

General Lithology	Shallow Bedrock	Tributary Valleys	Major Valleys	Illinoian Till Plain	Pre-Illinoian Till Plain	Episode	Series	Stage
Alluvium		Qallt Qali-ht Qaf		Qal		Hudson	Hudson	Quaternary
Eolian		Qptlp		Qps-gla Qps		Wisconsin	Wisconsin	Quaternary
Outwash	Qbr		Qh* Qhs			Wisconsin	Wisconsin	Quaternary
Slackwater Deposits		Qsl				Illinoian	Illinoian	Quaternary
Glacial Till			Qgla			Illinoian	Illinoian	Quaternary
			Qwa3*			Pre-Illinoian	Pre-Illinoian	Quaternary
Bedrock			Mpsl*			Mississippian	Mississippian	Devonian
			Mws*					
			Mkeo*					
			Mb*					
			Mk*					
			Der*					
		Dss*			Devonian	Devonian		
		Dgc*						

\*Units only shown on the cross-section

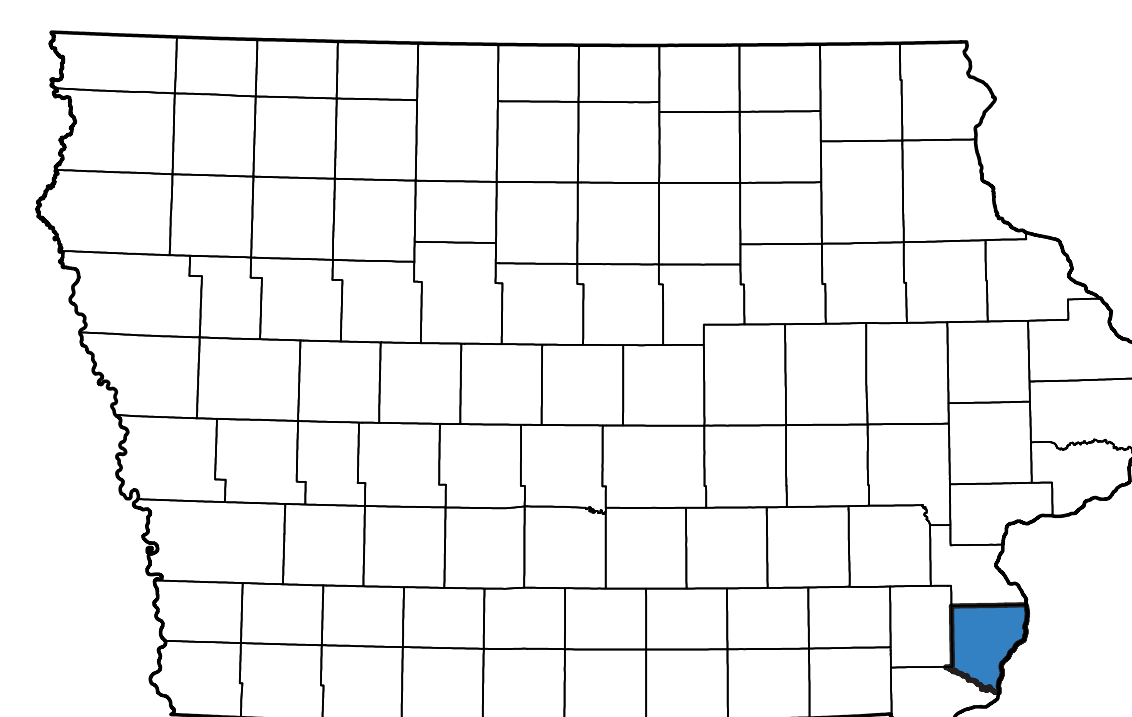
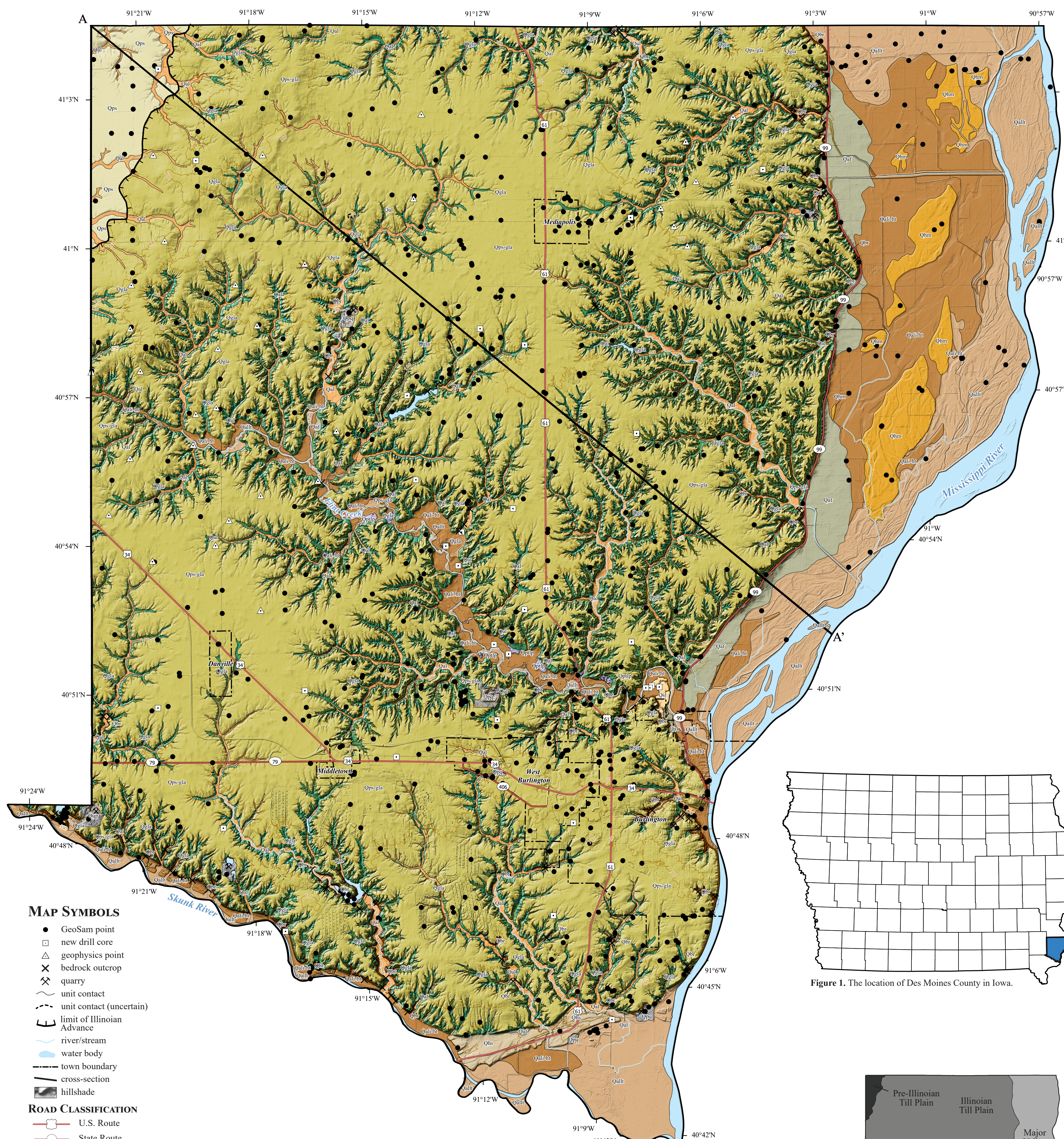


Figure 1. The location of Des Moines County in Iowa.

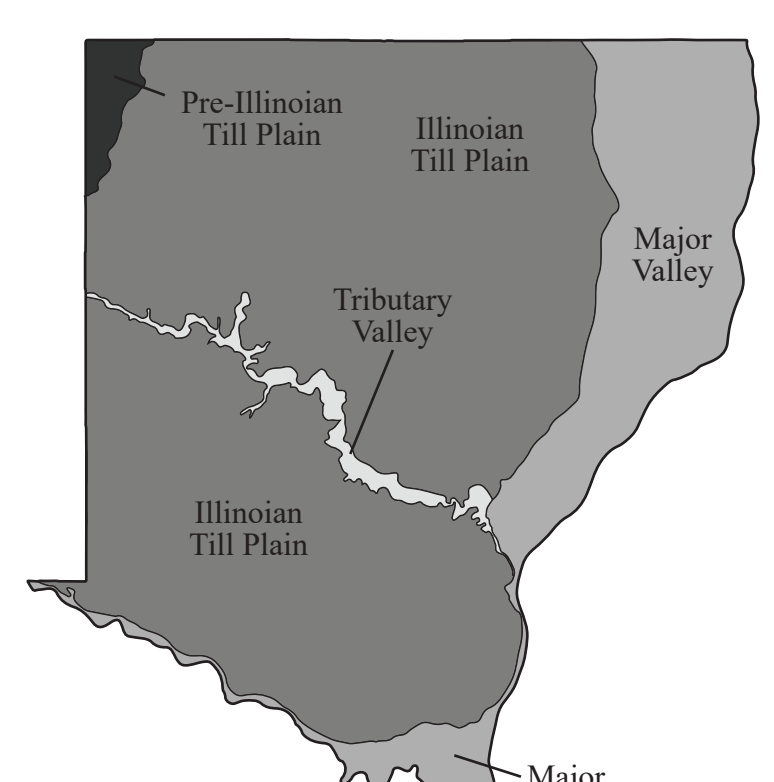


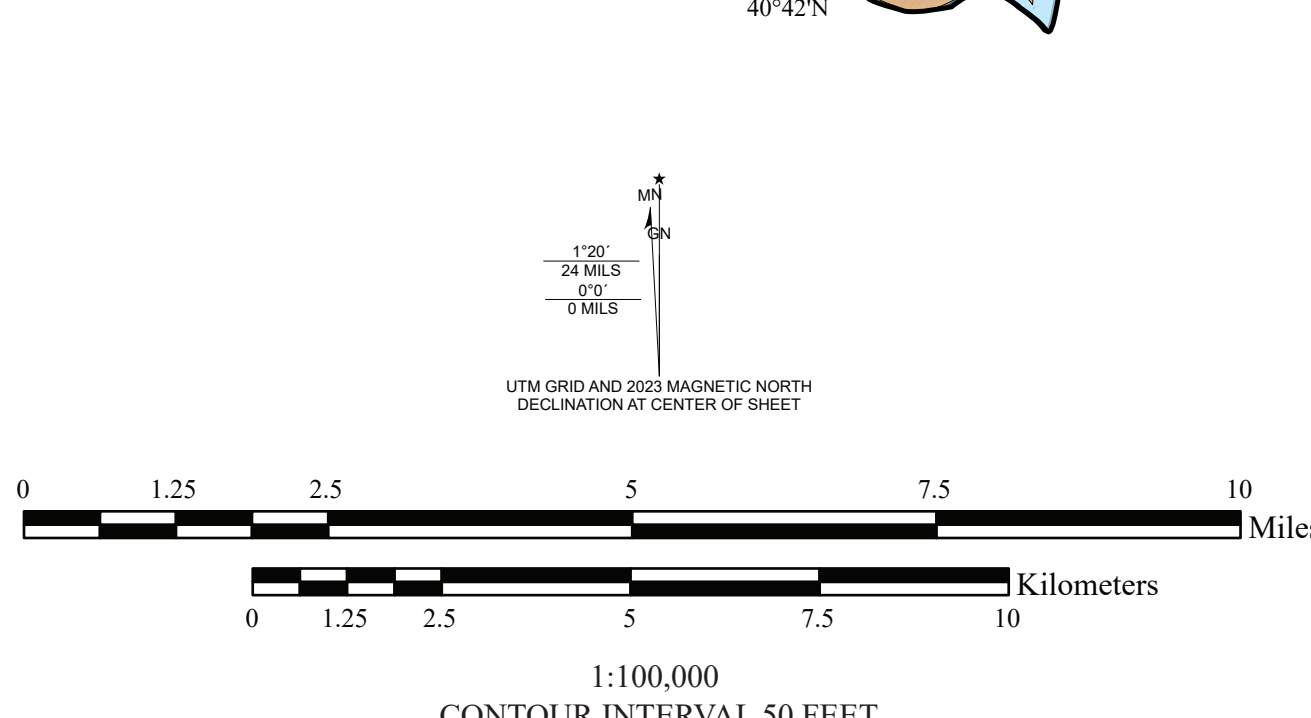
Figure 2. Locations of the major landscape groups in the correlation chart at a 1:500,000 scale. Shallow bedrock areas are not included.

### MAP SYMBOLS

- GeoSam point
- new drill core
- geophysics point
- bedrock outcrop
- quarry
- unit contact
- unit contact (uncertain)
- limit of Illinoian Advance
- river/stream
- water body
- town boundary
- cross-section
- hillshade

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Map projection and coordinate system based on WGS 1984 Web Mercator (auxiliary sphere).  
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. 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.  
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## GEOLOGIC CROSS-SECTION A-A'

