

# Surficial Geologic Materials of Polk County, Iowa

## SURFICIAL GEOLOGIC MAP OF THE DES MOINES LOBE OF IOWA Phase 5: Polk County

Iowa Geological Survey  
Open File Map 2003-3  
September 2003

Prepared by  
Deborah J. Quade,<sup>1</sup> James D. Gliglerano,<sup>1</sup> E. Arthur Bettis III<sup>2</sup> and Joe A. Artz<sup>3</sup>



Environmental Services Division  
Iowa Geological Survey and Land Quality Bureau

Supported by the U.S. Geological Survey  
Cooperative Agreement Number 02HQAG0034  
National Cooperative Geologic Mapping Program (STATMAP)  
Iowa Department of Natural Resources  
Jeffrey R. Vonk, Director

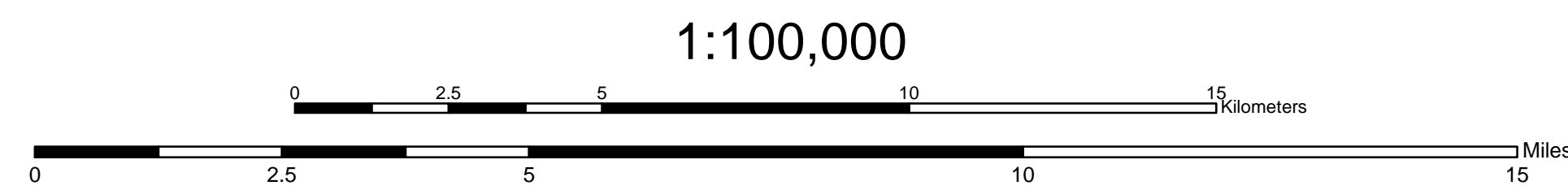
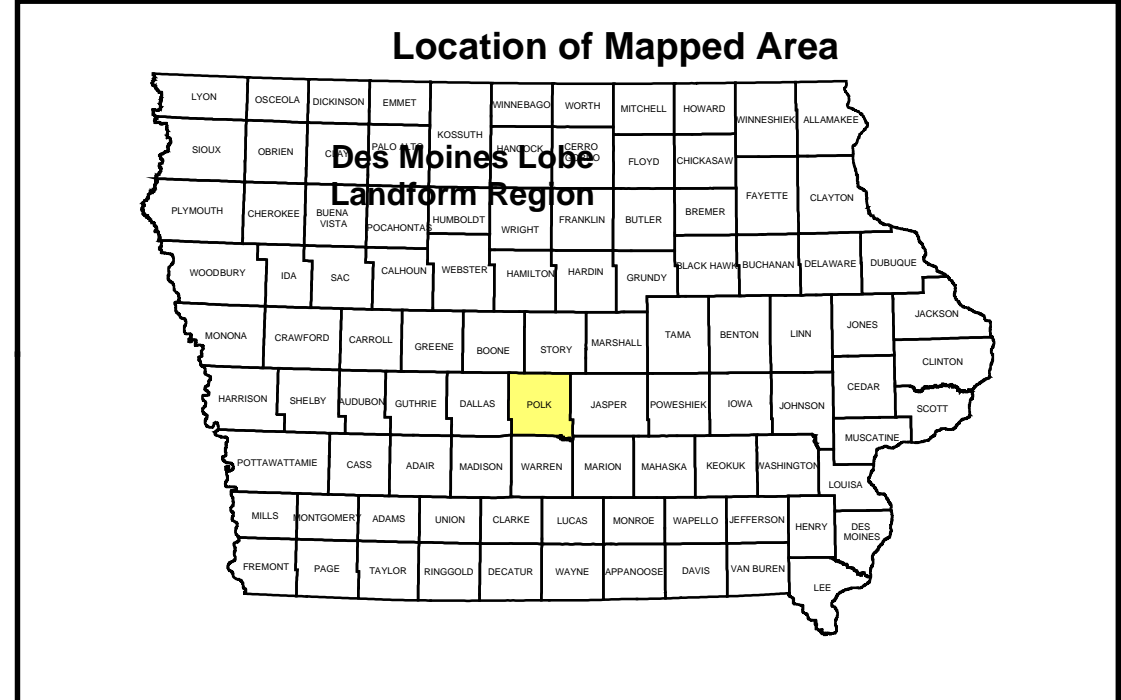
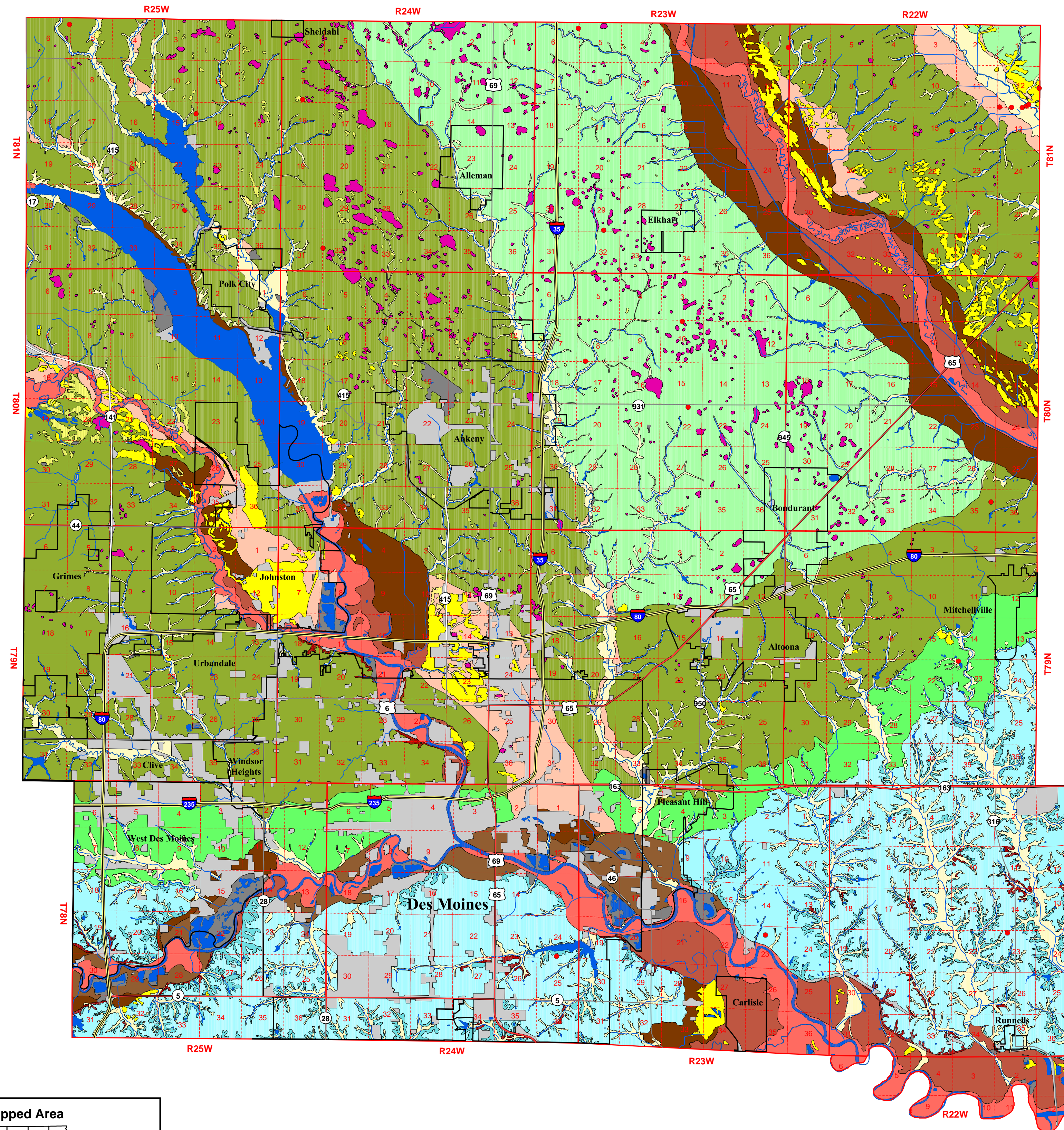
### ACKNOWLEDGEMENTS

Recognized for direct contributions to map's production: Andrew B. Asell, Mary Pat Heitman, Lois Bair, and Mary Skopce. Drilling was provided under contract by Aquadrell of Iowa City; a special thanks to Diane Joslyn, Jay Joslyn and drilling crew members who worked at times in challenging drilling conditions. Assistance in describing solum cores was provided by the Natural Resources Conservation Service, Storm Lake Office personnel, Robin Wiener. A special thanks to the following individuals who graciously allowed access to their land for drilling: Ira Cory, Bassi Dawson, Betty Enfield, Ben Ferner, Darrell Gentler, Mike Howard, Lowell Huggins, Fred and Roger Link, Harley Moore, Don Nowby, Harold Silver, Darrell Snider, Walter Stewart, Nick Volez, and the staff of the Polk County Conservation Board and the Department of Natural Resources for allowing access on public lands.

<sup>1</sup> Iowa Department of Natural Resources, Iowa Geological Survey  
109 Trowbridge Hall, Iowa City, IA 52242-1319

<sup>2</sup> Department of Geoscience, The University of Iowa, 121 Trowbridge Hall, Iowa City, IA 52242

<sup>3</sup> Office of State Archaeologist, The University of Iowa, Iowa City, IA 52242



### LEGEND

#### Description of Mapping Units

#### Hudson Episode

- Qo - Depressions** (DeForest Formation-Woden Mbr.) Generally 2.5 to 6 meters of black to very dark gray, calcareous, muck, peat and silty clay loam colluvium and organic sediments in drained and undrained, closed and semi-closed depressions. Overlies gray, calcareous, massive, dense loam diamicton (Dows Fm.- Alden Mbr.) or Noah Creek Fm. sand and gravel. Associated with low relief features that occupy depressions and low sags on the landscape. Supports wetland vegetation and can be permanently covered by water. High water table.
- Qal - Alluvium** (DeForest Formation-Undifferentiated) Variable thickness less than 1 to 5 meters 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 Dows Formation (Morgan or Alden Mbrs.), Noah Creek Formation, or Pennsylvanian bedrock. Associated with low-relief modern floodplain, closed depressions, modern drainage ways or toe slope positions on the landscape. Seasonal high water table and potential for frequent flooding.
- Qalt - Racoon River, Des Moines River, Skunk River and Beaver Creek Valley - Low Terrace** (DeForest Formation-Camp Creek Mbr. and Roberts Creek Mbr.). Variable thickness of less than 1 to 5 meters of very dark gray to brown, noncalcareous, stratified silty clay loam, loam, or clay loam, associated with the modern channel belt of the Des Moines, Racoon, Skunk and Beaver Creek valleys. Overlies Noah Creek Formation. Occupies lowest position on the floodplain i.e. modern channel belts. Seasonal high water table and frequent flooding potential.
- Qalt - Racoon River, Des Moines River, Skunk River and Beaver Creek Valley - Intermediate Terrace** (DeForest Formation-Camp Creek Mbr., Roberts Mbr. and Gunder Mbr.). Variable thickness of less than 1 to 5 meters of very dark gray to brown, noncalcareous, stratified silty clay loam to loam that overlies Noah Creek Formation. Occupies low terrace position. Seasonal high water table and frequent flooding potential.
- Qalt - Racoon River, Des Moines River, Skunk River and Beaver Creek Valley - Intermediate-High Terrace** (DeForest Formation-Gunder Mbr.). Variable thickness of less than 1 to 5 meters of very dark gray to brown, noncalcareous, silty clay loam to loam alluvium or colluvium that overlies Noah Creek Formation. Occupies terrace and valley margin position 1 to 2 meters above the modern floodplain. Seasonal high water table and low to moderate flooding potential.
- Qalt - Racoon River, Des Moines River, Skunk River and Beaver Creek Valley - High Terrace** (DeForest Formation-Gunder and Corrington Mbrs.). Variable thickness of less than 1 to 7 meters of very dark gray to brown, noncalcareous, silty clay loam, loam alluvium or colluvium. Overlies Noah Creek Formation. Occupies terrace and valley margin position 2 to 3 meters above the modern floodplain, steep-angled fans at the base of lower order drainages, and colluvial slopes along the margin of major river valleys. Seasonal high water table and rare flooding potential.

#### Wisconsin Episode

- Qc - Sand Dunes and Sand Sheets** (Peoria Formation-sand facies) Generally less than 3 meters of yellowish brown, massive, calcareous loamy sand to fine sand. It may overlie yellowish-brown coarse-grained sand and gravel (Noah Creek Fm.), or it may overlie yellowish to grayish brown, usually calcareous, stratified loam to silt loam sandy loam diamicton (Dows Fm.-Morgan Mbr.). Usually restricted to a narrow belt along major river valley bottoms and adjacent uplands on the Des Moines Lobe.
- Qpl - Loess** (Peoria Formation-silt facies) Generally 2 to 4 meters of yellowish to grayish brown, massive, jointed, calcareous or noncalcareous silt loam to silty clay loam. East of the Des Moines River there is a localized, narrow band of 9 to 11 meters of thick loess that thins to the eastern boundary of the county. The loess overlies a grayish brown to olive gray silty clay loam to silty clay (Pisgah Formation-eroded Farmdale Gessol) which is less than 1.5 meters thick. The Farmdale Gessol appears to be disturbed by periglacial action and is welded to an older Sangamon Gessol developed in loess or Pre-Illinoian till (Wolf Creek or Alburnett Formations). This mapping unit encompasses upland divides, ridge tops and convex side slopes. Well to somewhat poorly drained landscape.
- Qtp1 - Till Plain with discontinuous elongated hummocky ridge forms** (Dows Formation-Morgan Mbr.) Less than 4 meters of yellowish to grayish brown, calcareous, fractured, stratified loam to silt loam sandy loam diamicton; textures can be quite variable. Overlies gray, calcareous, massive, dense loam diamicton (Dows Fm.-Alden Mbr.). The Alden Mbr. in this mapping area is thinner and extends to depths of only 8 to 15 meters, and overlies Peoria Formation-silt facies, Pisgah Formation-Farmdale Gessol or Pre-Illinoian diamicton. Low relief, (less than 3 meters of local relief), slightly undulating plains with irregular surface patterns. Discontinuous elongated ridge forms within the unit are undulant by less than 8 meters of local relief, slightly undulating plains with irregular surface patterns. Discontinuous elongated ridge forms within the unit are undulant by less than 8 meters of local relief. Overlies gray, calcareous, massive, dense loam diamicton (Dows Fm.-Alden Mbr.). Indistinct elongated hummocks are oriented transverse to glacier flow on the till plain with irregular shaped surface patterns. Ridges are predominately low relief (less than 3 meters) with some moderate relief features (3 to 8 meters). Overall landform exhibits swell and swale topography. Seasonal high water table.
- Qtp1 - Aligned ridge to discontinuous elongated hummocky ridge forms** (Dows Formation-Morgan Mbr./Pilot Knob Mbr.). Less than 8 meters of yellowish brown, calcareous, fractured, stratified sand and gravel with interbedded stratified loam diamicton or yellowish to grayish brown, calcareous, fractured, stratified loam to silt loam sandy loam diamicton; textures can be quite variable. In depressions and sags on upland surfaces, DeForest Fm.-Woden Mbr may bury the sand and gravel. Overlies gray, calcareous, massive, dense loam diamicton (Dows Fm.-Alden Mbr.). The Alden Mbr. in this mapping unit can extend to depths in excess of 30 meters and may overlie Peoria Formation-silt facies, Pisgah Formation-Farmdale Gessol or Pre-Illinoian diamicton. Low to moderate relief, (less than 8 meters of local relief), slightly undulating plains with irregular surface patterns. Aligned ridges to discontinuous elongated ridge forms within the unit are undulant by less than 8 meters of yellowish brown, often calcareous, stratified loam to silt loam sandy loam diamicton; textures can be quite variable. Evidence of shearing is sometimes present. Overlies gray, calcareous, massive, dense loam diamicton (Dows Fm.-Alden Mbr. In an area east of Big Creek and west of Four Mile Creek, a number of these elongated hummocks consist primarily of sand and gravel and exhibit evidence of syndepositional collapse (Pilot Knob Mbr.). Tracts of fine to distinct aligned ridges to elongated hummocks oriented transverse to glacier flow are prevalent across the till plain. Ridges or aligned hummocks are low to moderate relief features (3 to 8+ meters). Overall landform exhibits swell and swale topography. Seasonal high water table.
- Qtr - Till ridge** (Dows Formation-Pilot Knob Mbr./Morgan Mbr.). Generally 3 to 5 meters of yellowish to grayish brown, usually calcareous and fractured, stratified loam to silt loam; stratified sand and gravel to sandy loam diamicton; textures can be quite variable. Overlies gray, calcareous, massive, dense loam diamicton (Dows Fm.-Alden Mbr.). The Alden Mbr. in this mapping unit can extend to depths in excess of 15 meters and may overlie Peoria Formation-silt facies, Pisgah Formation - Farmdale Gessol or Pre-Illinoian diamicton. Moderate to high relief hummocky landform features exceed 3 to 8 meters of local relief. This landform is associated with the Bemis Moraine in Polk County. Seasonal high water table.

#### Pre-Illinois Episode

- Qwa3 - Till** (Wolf Creek or Alburnett Formations) Generally 10 to 35 meters of very dense, massive, fractured, loamy glacial till of the Wolf Creek or Alburnett Formations with or without a thin loess mantle (Peoria Formation - less than 2 meters) and intervening clayey Farmdale/Sangamon Gessol. This mapping unit encompasses narrowly dissected interfluvial and side slopes, and side valley slopes. Drainage is variable from well drained to poorly drained.

#### Paleozoic

- Pu - Pennsylvanian Bedrock Exposures** (Cherokee, Marmaton and Bronson Groups) Upper to Middle Pennsylvanian-Primarily light to dark gray shale, fossiliferous limestone, light gray to red mudstone and very fine to medium sandstone.
- Qpq - Pits and Quarries** Sand and gravel pits and rock quarries. Extent mapped as shown in county soil surveys.
- Qf - Fill** Areas of major land filling. Fill associated with railroad grades, highway grades and land leveling. Variable in texture ranging from loamy to sandy to concrete rubble. Extent mapped as shown in county soil surveys.
- Water Features**
- Drill Hole Locations**