# Preliminary Map Showing Quaternary Geology of the Trafalgar 7.5-Minute Quadrangle, Indiana

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# INTRODUCTION

The Trafalgar 7.5-minute quadrangle is situated near the maximum limit of Wisconsin Episode glacial deposits in southwestern Johnson County, Indiana. Till of Wisconsin Episode age (Trafalgar Formation) dominates the surficial geology of the quadrangle. Minor areas of Wisconsin Episode outwash and colluvium are found in valleys and former meltwater pathways. Kame deposits (sand and gravel) are found in the northeast part of the quadrangle and are part of a larger kame complex in central Johnson County. Holocene (postglacial) alluvium is found in the valleys of the North and South Prongs of Stotts Creek and tributaries. It is also found in two tributary valleys (Barnes Creek and Goose Creek) of Indian Creek in the southwestern sector of the quadrangle. Unconsolidated sediment thickness generally increases from west to east across the quadrangle, from less than 15 ft along the western margin of the quadrangle to over 150 ft thick in the east-central part of the quadrangle. The west-to-east transition of bedrock topography represents the buried northern end of the Knobstone Escarpment. Based on water-well data, the bedrock topography of the western half of the quadrangle is highly variable (relief of ca. 75 ft), similar to that of the bedrock-dominated topography immediately to the south in Brown County. Mississippian Borden Group bedrock subcrops beneath the Quaternary sediments of the quadrangle.

The Wisconsin Episode maximum limit is located less than one mile south of the southern boundary of the quadrangle. Radiocarbon ages from an exposure along Lick Creek south of Trafalgar indicate the Laurentide Ice Sheet reached its maximum extent just after 23,700 years ago. A second glacial limit, marked by the Crawfordsville Moraine (Wayne, 1965), crosses the quadrangle from northwest to southeast. The Crawfordsville Moraine represents the limit of a readvance which occurred 21,700 years ago. This preliminary geologic map is an interim geologic map product that documents progress in mapping the Quaternary geology of Johnson County, Indiana. The stratigraphic framework of the Quaternary units of Indiana (Wayne, 1963) was used in assigning map units.

# REFERENCES

Wayne, W. J., 1963, Pleistocene formations in Indiana: Indiana Geological Survey Bulletin 25, 85 p.

Wayne, W. J., 1965, The Crawfordsville and Knightstown Moraines in Indiana: Indiana Geological Survey Report of Progress 28, 15 p.

# **Martinsville Formation (Holocene)**

# Qm1 Alluvium

Silt/clay loam alluvium generally less than 10 ft thick. First- and second-order tributaries generally have alluvium less than 5 ft thick. Unit overlies Mississippian Borden Group bedrock or diamicton (till) of the Trafalgar Formation (map unit Qt).

Atherton Formation (Wisconsin Episode)

#### Qao Outwash

Sand and gravel, up to 20 ft thick. Generally covered by less than 5 ft of loess (Peoria Loess Member, Atherton Formation).

#### Qak Kame sediments

Sand and gravel, up to 15 ft thick. Generally covered by less than 5 ft of loess (Peoria Loess Member, Atherton Formation).

# Qaf Colluvium

Clayey, sandy silt up to 10 ft thick found on footslope and toeslope positions on hillslopes in valleys in the western part of the quadrangle. Colluvial surface typically covers or grades into outwash terraces. Colluvium is dominantly composed of reworked Peoria Loess (Peoria Loess Member, Atherton Formation).

#### Trafalgar Formation (Wisconsin Episode)

# Qtcg Center Grove Till Member

Silt loam diamicton generally less than 30 ft thick. Generally covered by less than 5 ft of Wisconsin Episode loess (Peoria Loess Member, Atherton Formation). Maximum age of 23,700 cal yr BP, from radiocarbon dating of wood fragments below till from an exposure along Lick Creek in the southernmost part of the quadrangle.

# Qtc Cartersburg Till Member

Silt loam diamicton generally less than 30 ft thick. Generally covered by less than 5 ft of Wisconsin Episode loess (Peoria Loess Member, Atherton Formation). Maximum age of 21,500 cal yr BP based on correlation of the Crawfordsville Moraine in Johnson and Morgan Counties (Wayne, 1965). Separated from the underlying Center Grove Till Member by a fossiliferous silt, the *Vertigo alpestris oughtoni* bed (Wayne, 1963).

#### Undifferentiated (Quaternary)

# Qr Residuum

Weathered siliciclastic Mississippian Borden Group bedrock generally less than 5 ft in thickness. Less than 5 ft of loess (Peoria Loess Member, Atherton Formation) can mantle or be incorporated into residuum, especially on hillslopes.

- ——— Contact—Identity and existence certain, location accurate
- Calibrated radiocarbon age in thousands of years (calibrated 14C yr BP; 2 sigma uncertainty)
- Gamma-ray log (IGS, 2012)
- Water wells (IDNR, 2019)
- Crawfordsville Moraine

# ACKNOWLEDGMENTS AND DISCLAIMER

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# MAP INFORMATION

Digital cartography by Matthew R. Johnson



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Topographic shading based on 2011–2013 Indiana Lidar data.

 $Transportation \ network \ from \ OpenStreetMap.org ( © \ OpenStreetMap \ contributors).$ 

Hydrography from U.S. Geological Survey National Hydrography Dataset (local resolution).

Projection: Universal Transverse Mercator (UTM), Zone 16N.

Horizontal Datum: North American Datum of 1983 (NAD83).

Indiana Department of Natural Resources, Division of Water, Resource Assessment Section (IDNR), 2019, WATERWELLS\_IDNR\_IN.SHP: Water Well Locations in Indiana (Indiana Department of Natural Resources, Point Shapefile)

Indiana Geological Survey (IGS), 2012, GAMMA\_RAY\_LOGS\_IGS\_IN: Wells with Natural Gamma-Ray Logs or Physical Samples in Unconsolidated Sediments in Indiana (Indiana Geological Survey, 1:100,000, Point Shapefile)

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