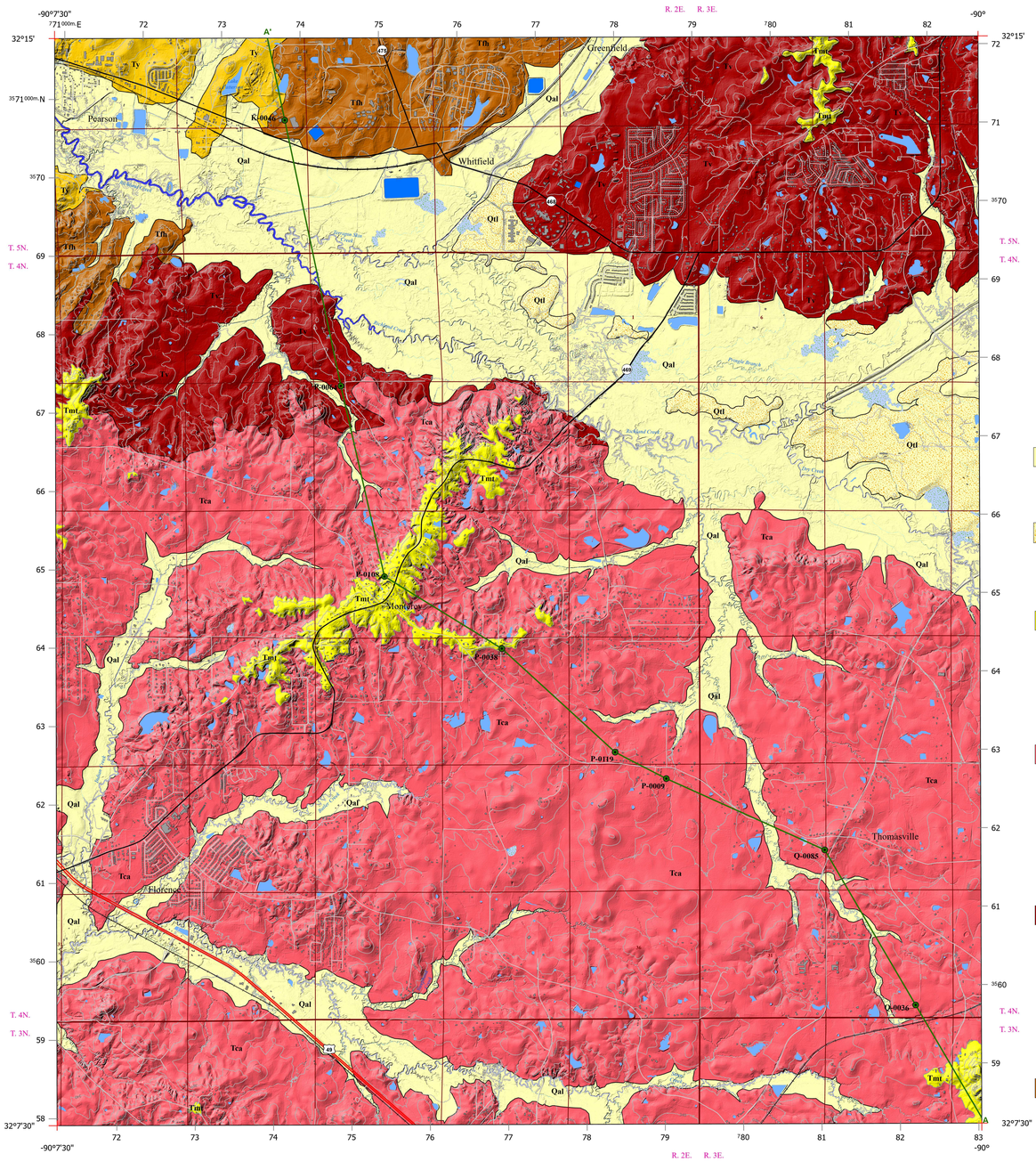
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF GEOLOGY SURFACE MAPPING DIVISION
MISSISSIPPI GEOLOGICAL SURVEY

Prepared in cooperation with
UNITED STATES GEOLOGICAL SURVEY
NATIONAL COOPERATIVE GEOLOGIC MAPPING PROGRAM



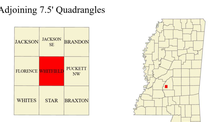
Base map produced by the Mississippi Office of Geology
PCS: NAD 1983 UTM Zone 15N
GCS: GCS North American 1983
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter
Declination: USGS MS Whitfield 2024 Topographic Map
MDEM base map data from MARIS
Borehole data from Mississippi Office of Geology.

Scale 1:24000

Contour Interval 20 feet
North American Vertical Datum 1988 Geoid 12A

This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program under STATEMAP award number #G25AC00474.

Adjoining 7.5' Quadrangles



UTM GRID AND 2023 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

GEOLOGIC MAP of the WHITFIELD 7.5-MINUTE QUADRANGLE

Rankin County, Mississippi

2026

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Mississippi Office of Geology
Open-File Report 362

Mississippi Department of Environmental Quality
Mississippi Office of Geology - Surface Mapping Division
Mississippi Geological Survey
700 North State Street
Jackson, Mississippi 39225

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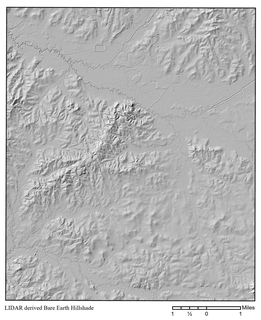
Surface Mine

Drill Hole Locality and Identification Number

Formational Contact

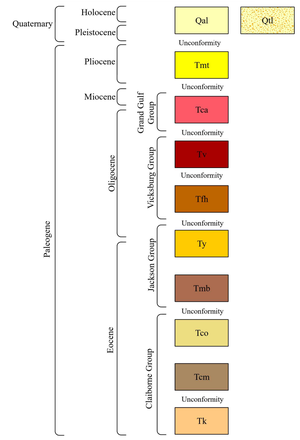
Line of Section



LIDAR derived Bare Earth Hillshade

Geologic maps are only a guide to current understanding and do not eliminate the need for detailed investigations of specific sites for specific purposes. The views and conclusions contained in this Open-File Report are those of the geologists and should not be interpreted as representing the official policies, either expressed or implied, of the State of Mississippi or of the United States Government.

Correlation of Map Units



Descriptions of Map Units

Alluvium (Pleistocene to Holocene)
Sand, yellow- to brownish-white in color, fine- to coarse-grained, subrounded to rounded, predominately quartzose, silty, clayey; humus lenses common. Streams on clay subcrop will exhibit shallow, wide alluvial plains while streams on sand subcrop tend to incise creating steep valleys with narrow alluvial plains, silicified wood common. Thickness approximately 15 feet along larger streams, thinning up tributaries.

Qal

Stream Terrace (Pleistocene)
Fluvial Plain deposits dominantly associated with base elevation change with the incision of Richland Creek; Sand, yellow- to brownish-white in color, fine- to coarse-grained, subrounded to rounded, predominately quartzose, locally graveliferous containing aggregate derived from the Pre-loess Terrace deposits, silty to clayey; humus lenses common. Silicified wood may be common. Terraces associated with stream confluences are likely locations of pre-historic archeological sites.

Qtl

Magee Terrace (Pliocene to Pleistocene)
Generally fining-upward sequence of fluvial siliciclastic deposits attributed to courses of the Pliocene ancestral Tennessee–Ohio River system. Sand is yellow, orange, purple, red, and pink; fine to coarse grained; predominantly quartzose; cross bedded to massive. Graveliferous, containing pea to cobble size clasts typically not exceeding 3 in. in length; clasts composed chiefly of chert with lesser amounts of quartz. Clay is kaolinitic, pink to white and occurs as discontinuous lenses and as basal rip up clasts. Relic floodplain silts and clays are preserved above approximately 550 ft MSL. The base of the unit is unconformable at roughly 400 ft MSL. Conglomeritic ironstone is commonly developed at the contact with the underlying Catahoula Formation.

Tmt

Grand Gulf Group

Catahoula Formation (Oligocene to Miocene)
Deltaic to marine sands, silts, clays, sandstone, and sparse gravel. Sand is gray, pale yellow to white; fine to coarse grained; cross bedded to massive. Contains rare thinly bedded pea gravel layers. Gravels consist of highly polished black chert and milky quartz, ranging from subangular to well rounded. Sand is commonly indurated near the surface to sandstone. Predominantly quartzose with lesser amounts of chert, metaquartzite, mica, and heavy minerals; slightly glauconitic in places. Silicified wood and fossil palm fragments are common. Clay is green, gray, and brown; weathers white to brown in color; silty to sandy. Lignite is common in basal clay intervals. Unit is fossiliferous in part, particularly marine bioturbated in the lower beds and commonly containing leaf fossils in the upper beds. The Catahoula Formation unconformably overlies and locally incises into the underlying Bucatunna Formation. Total thickness of the formation not achieved on this map.

Tca

Vicksburg Group

Vicksburg Limestone Undifferentiated (Oligocene)
Includes the undifferentiated successive marine units, listed in descending stratigraphic order: Bucatunna Formation, Byram Formation, Glendon Formation, Marianna Formation; and Mint Spring Formation. The Bucatunna Formation consists of carbonaceous clays dark brown to gray in color, silty to fine sandy, averaging about 45 ft in thickness. The Byram Formation is composed of sandy to clayey marl, glauconitic and fossiliferous, with a thickness of up to approximately 12 ft. The Glendon Formation consists of semi crystalline limestone interbedded with softer clayey marls and represents the marine highstand of the early Oligocene Vicksburg sequence. The underlying Marianna consists of soft clay marls. Collectively the Glendon-Marianna section reaches a maximum thickness of about 30 ft in the mapping area; The Mint Spring Formation consists of gray to green colored glauconitic and fossiliferous marly quartz sand. The Vicksburg Group is biostratigraphically characterized by the presence of the mollusk *Pecten byramensis* and the large benthic foraminifera *Lepidocyclina* sp. The Vicksburg Group unconformably overlies the Forest Hill Formation.

Tv

Forest Hill Formation (Oligocene)
Deltaic sands, silts, and clays. Sand is fine-grained, silty, and quartzose; clay is carbonaceous and laminated, with lignite seams and silicified wood common. Carbonized plant fossils occur along fissile partings in clay intervals. The Forest Hill Formation unconformably overlies and commonly incises into the Yazoo Formation and represents the lowermost member of the Vicksburg Group, distinguished from overlying units by its terrestrial to deltaic depositional setting. Total thickness is approximately 80 ft in the mapping area.

Tth

Jackson Group

Yazoo Formation (Eocene to Oligocene)
Outer neritic to bathyal marine clay. Clay is calcareous and montmorillonitic, blue-green when unweathered. Sparingly fossiliferous, with marine mollusk shell hash common along partings. Bentonite seams present. Limestone ledges occur in places. The Yazoo Formation is marked by the planktonic foraminifera *Hantkenina alabamensis*. The Yazoo Formation conformably overlies the Moodys Branch Formation. Total thickness is approximately 400 ft in mapping area.

Ty

Cross Section Units Not Exposed at the Surface

Moodys Branch Formation (Eocene)
The Moodys Branch Formation represents the basal member of a marine transgression towards the close of the Eocene epoch in the northern Gulf, situated unconformably above the deltaic to estuarine Cockfield Formation and conformably below the outer neritic to bathyal clays of the Yazoo Formation. It consists of sandy, fossiliferous marl containing abundant marine mollusk shells of the genera *Glycymeris* and *Venericardia*. The unit unconformably overlies the Cockfield Formation, reflecting the delta destructional phase and subsequent marine transgression, and it conformably grades upward into the Yazoo Formation. Total thickness is approximately 15 ft.

Tmb

Claiborne Group

Cockfield Formation (Eocene)
Deltaic to estuarine deposits dominated by clays in the upper portions of the formation and sands in the lower portion. Clays are gray to brown in color, silty to fine sandy, plastic, highly carbonaceous with thin beds of lignite common, slightly micaceous, and locally pyritic. Sands are quartzose, cross bedded to massive, locally lignitic, and can be silty to clayey. The unit conformably overlies the Cook Mountain Formation. Thickness is approximately 300 ft in mapping area.

Tco

Cook Mountain Formation (Eocene)
Marine clays, silts, and sands. Clay, chocolate brown in color. Silt, dark yellowish-brown, carbonaceous, clayey, glauconitic, micaceous, sandy. Sand, light-gray to grayish-brown, fine- to coarse-grained, quartzose, fossiliferous, silty, clayey, micaceous, carbonaceous; shaley in upper portions, cross bedded in lower portions. Unconformably overlies the Kosciusko Formation. Thickness is approximately 60 ft.

Tem

Kosciusko Formation (Eocene)
Sand, gray to light olive gray, massive to cross bedded, very fine- to very coarse-grained, quartzose, micaceous, locally exhibits scattered weak ledges of limonitic sandstone; interbedded to interlaminated with silt and clay, light olive gray to brownish gray, locally carbonaceous. Locally unconformable at base. Total thickness not represented in cross section. Constitutes the Sparta Aquifer.

Tk

Field Photographs

Clayey-silty alluvium with concretionary pedogenic iron and manganese mineral concentrations exposed along the north-eastern channel wall of Richland Creek in Section 12, Township 4 North, Range 2 East.

Silty clay alluvium in the floodplain deposits of Terrapin Skin Creek exposed in a slump escarpment beneath vegetation in Section 35, Township 5 North, Range 2 East.

Looking south across the grassy floodplain of a channelized portion of Terrapin Skin Creek in Section 35, Township 5 North, Range 2 East.

Slightly indurated, limonite and kaolin cemented coarse-grained quartz sands of the Magee Terrace exposed along a road cut in Section 15, Township 4 North, Range 2 East.

Massive, friable, medium to fine-grained quartz sand of the Magee Terrace with sparse limonitic staining exposed along a road cut in Section 15, Township 4 North, Range 2 East.

An outcrop of mineralized lutitic deposits with weathered iron sulfide nodules in an exposure of the Catahoula Formation in Section 15, Township 4 North, Range 2 East.

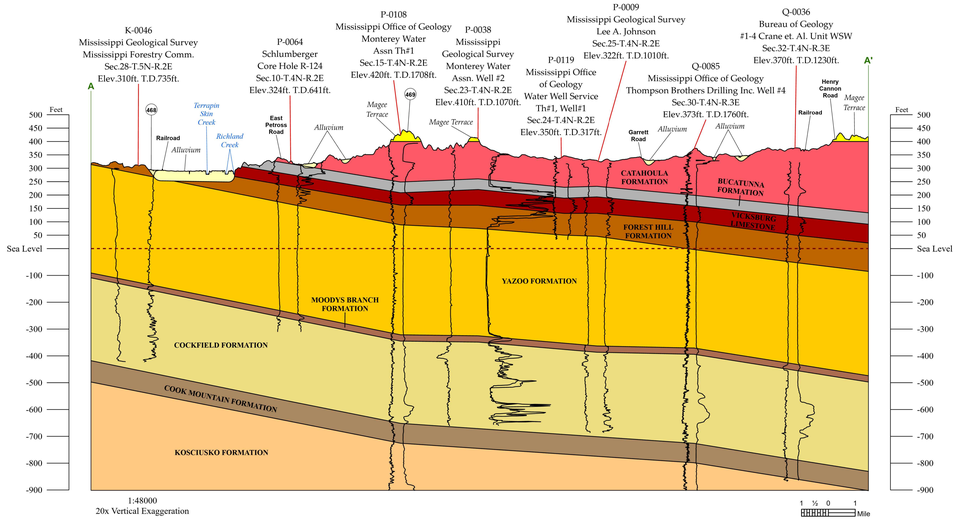
Indurated clayey siltstone of the Catahoula Formation exhibiting white opaline silica-filled vugs from near-surface diagenesis, leaching, and remineralization of the silica-rich lutitic deposit.

Indurated clayey siltstone formed from the near-surface diagenesis and leaching of silica-rich clay in the Catahoula Formation outcropping along a roadcut in Section 32, Township 4 North, Range 2 East.

Thin outcropping of the fossiliferous clayey-sandy marl of the Byram Formation exposed beneath stream alluvium along the active channel of Richland Creek in Section 12, Township 4 North, Range 2 East.

Closeup of marine mollusk fossils including the bivalve shells of *Scapharca* sp. and *Glycymeris* sp. exposed in the sandy clay marl of Byram Formation along Richland Creek in Section 12, Township 4 North, Range 2 East.

Heavily bioturbated estuarine carbonaceous clay lenses alternating between the fossiliferous sandy clay marl of the Byram Formation along Richland Creek in Section 12, Township 4 North, Range 2 East.

Fossiliferous sandy clay marl of Byram Formation outcropping along the southwestern bank of the active channel of Richland Creek in Section 12, Township 4 North, Range 2 East.

Structural Cross-Section of the Whitfield 7.5-Minute Geologic Quadrangle