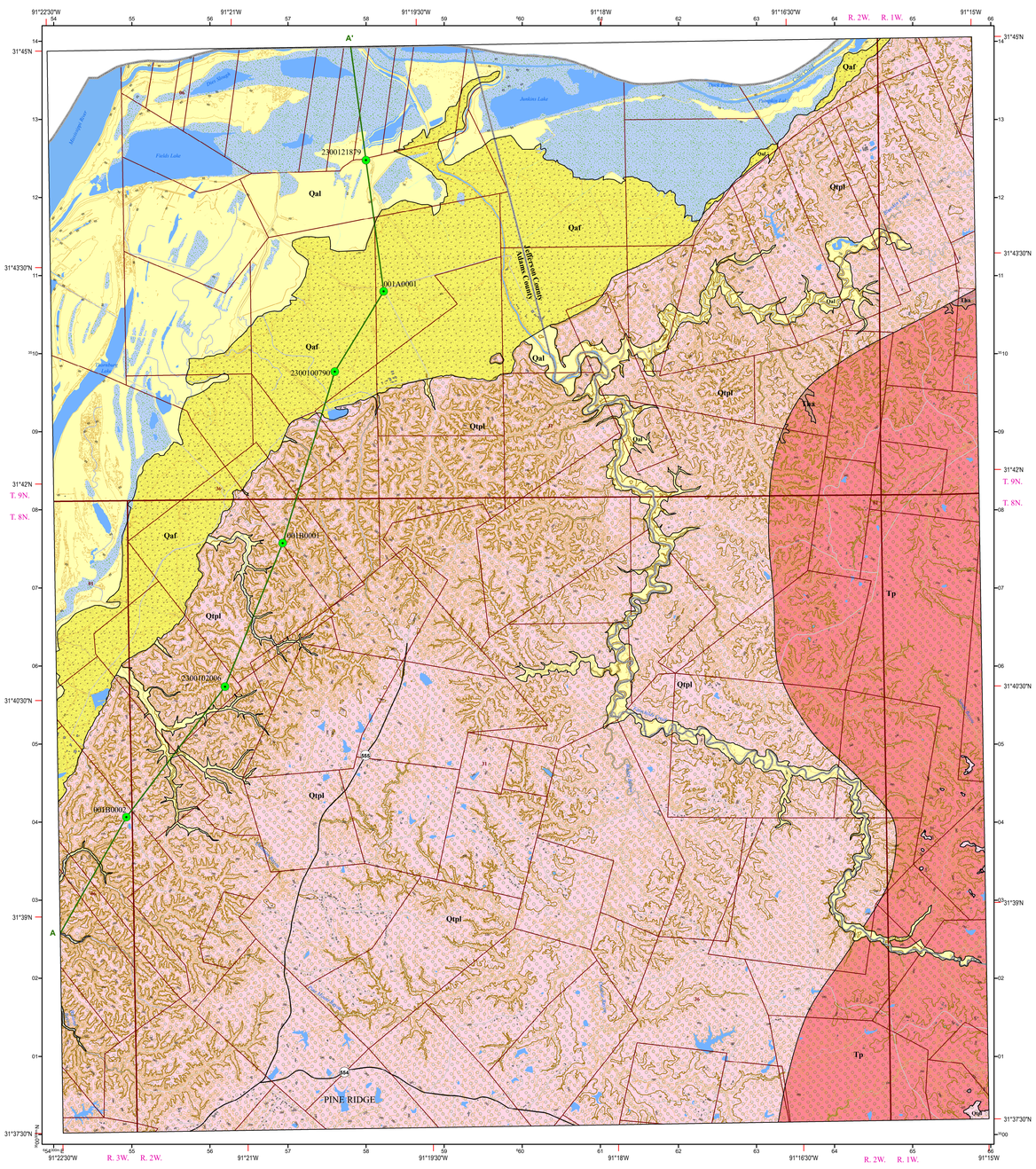
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF GEOLOGY SURFACE MAPPING DIVISION
MISSISSIPPI GEOLOGICAL SURVEY

Prepared in cooperation with
UNITED STATES NATIONAL PARK SERVICE
GEOLOGIC RESOURCES DIVISION

GEOLOGIC MAP OF THE 7.5-MINUTE PINE RIDGE QUADRANGLE OPEN-FILE REPORT 334



Base Map produced by the Mississippi Geological Survey
Coordinate System:NAD 1983 UTM Zone 15N
Projection: Transverse Mercator
Datum: North American 1983
Units: Meter
Declination: World Magnetic Model, January 1, 2023, estimated Magnetic North declination in 7.5-Minute PINE RIDGE quadrangle, (91°18'44"W, 31°41'14"N), center area is 0.61° west of True North ± 0.35°. Annual rate of declination change is approximately 0.10° west per year.
Basemap Data sourced from https://maris.mississippi.edu/.
Contours are derived from LIDAR data.
Borehole data from Mississippi Office of Geology and Mississippi Oil and Gas Board.

Adjoining 7.5' Quadrangles

Scale 1:24000

1 ½ 0 1 Mile
1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet
1 0.5 0 1 Kilometers

Contour Interval 5 and 20 feet

North American Vertical Datum 1988 Geoid 12A

Mississippi Office of Geology
Open-File Report 334

This geologic map was funded by the United States National Park Service, Geologic Resources Division.

GEOLOGIC MAP of the PINE RIDGE 7.5-MINUTE QUADRANGLE
Adams and Jefferson County, Mississippi

2022

Geology by

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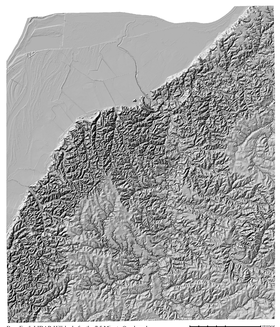
Surface Mine

B-0002 Drill-hole locality and identification number

Unconformable Contact

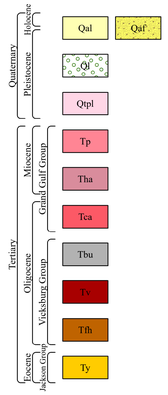
A A' Line of Section



Bare Earth LIDAR Hillshade for the 7.5 Minute Quadrangle. 1 ½ 0 1

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

Qal

Alluvium (Holocene to Pleistocene)
Mississippi River Alluvium: Sand, yellow- to brownish-white in color, fine- to coarse-grained, subrounded to rounded, predominately quartzose, a range of gravels with province as far north as Canada. Constitutes a major aquifer system, the Mississippi River Alluvial Aquifer. Pleistocene Vertebrates common. Mississippi River Alluvium thickness is approximately 160 feet.
Stream Alluvium: 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 and Miocene Subcrop, silty to clayey; humus lenses common; floodplain deposits are heavily loess-derived. Silicified wood common. Tributaries have narrow alluvial valleys and are deeply incised through the loess terrain. Stream Alluvium thickness is interpreted to be approximately 10 feet.

Qaf

Alluvial Fans (Holocene to Pleistocene)
Alternating silts, sands, and gravels deposited by streams entering the Mississippi River Alluvial Plain from the adjacent uplands. Coarsest at the apex of the fan, fining laterally (radially) from the apex of the fan. Alluvial fans interfinger with the Mississippi River Alluvium and are a significant source of recharge for the Mississippi River Alluvial Aquifer. Typically, the basal sand gravels of the Mississippi River alluvium beneath the alluvial fan can be recognized by the presence of numerous granite and metamorphic rock clasts as encountered in nearby test hole 063G0041 in Jefferson County.

Qf

Loess (Pleistocene)
Silt, buff to tan, pale yellow, red, gray to gray-green where in anoxic conditions, quartzose to feldspathic. Loess is considered an eolian deposit derived from glacial outwash. Loess is typically calcareous with dolomite and calcite; however, the upper portion of the loess can be deeply weathered, leached / noncalcareous, and has been commonly referred to as "brown loam." Loess deposits unconformably blanket the pre-loess topography with substantial local variations in thickness but generally thickening towards the west. In places, weathered loess contains secondary deposits of small calcareous concretions (caliche, loess dolls). Loess can be locally and sparingly fossiliferous, commonly containing tests or steinkerns of pulmonate gastropods and less commonly containing fossils of Pleistocene vertebrates.

Qtpl

Pre-loess Terrace Deposits (Pleistocene)
Pleistocene ancestral Mississippi River terraces deposited prior to Pleistocene loessification. Sand, yellow, orange, purple, red, pink, fine- to coarse-grained, predominantly quartzose, cross-bedded to massive; graveliferous, pea to large cobble size clasts, boulder size ice-rafted clasts of sandstone and chert. Economically significant gravels are predominantly chert with lesser amounts of vein quartz, metaquartzite, agate, sandstone, and rare rhyolite clasts; clay, pink to white, generally occurring as discontinuous lenses and as rip-up clasts up to boulder-size. Conglomeratic ironstone ledges are common in the graveliferous sands at the base of the deposits, which overlie the Pascagoula Formation unconformably. Completely preserved terrace beneath the loess with a base perched between 20-40 feet above MSL with a relic alluvial plain surface at approximately 135 feet above MSL represented as a clay bed. This ancestral Mississippi River, Pre-loess Terrace Deposit is a first order terrace of the Mississippi River and is the "Natchez Formation" of the previous literature. Preliminary radiometric dating places the abandonment of this alluvial terrace during the height of the last glacial maxima, approximately 20,000 years B.P. "Head-of-hollow", terrace-derived valley-fill deposits are common at lower elevations and are isolated to valley walls adjacent to the erosional remnants of the higher of the two terrace deposits. These deposits are of such limited extent as not to warrant representation on this map.

Grand Gulf Group

Tp

Pascagoula Formation (Miocene)
Deltaic sands, silts, and clays; Clay, blue-green, gray, brown, weathers pink to off-white, silty to sandy, locally lignitic; sand, gray, pale yellow to white, fine-to coarse-grained ,cross-bedded to massive with bedded pea gravels (gravels consist of black, grey, brown chert, and milky quartz, are highly polished, sub-angular to well rounded), often indurated to sandstones and siltstones at surface, predominantly quartzose with lesser amounts of chert, metaquartzite, mica, and heavy minerals, slightly glauconitic in places, silicified and coalified wood common. The Pascagoula Formation conformably overlies the Hattiesburg Formation. Total thickness is not encountered in this quadrangle but is estimated to be approximately 1,320 feet.

Tha

Hattiesburg Formation (Miocene)
Deltaic sands, silts, and clays; Clay, green, gray, brown, weathers white to brown, silty to sandy, locally lignitic; sand, gray, pale yellow to white, fine- to coarse-grained, cross-bedded to massive with rare thinly-bedded pea gravels (gravels consist of black chert and milky quartz, are highly polished, sub-angular to well rounded), often indurated to sandstones and siltstones at surface, predominantly quartzose with lesser amounts of chert, metaquartzite, mica, and heavy minerals, slightly glauconitic in places, silicified and coalified wood common. The base of the Hattiesburg Formation is designated at the base of a sand unit of regional extent that occurs above the last occurrence of *Heterostegina* at the approximate horizon of the base of the Fleming Formation in Louisiana and the Amos Sand in Alabama. The Hattiesburg Formation conformably overlies the Pascagoula Formation. Total thickness is approximately 540 feet.

Cross Section Units Not Exposed at the Surface

Tca

Catahoula Formation (Oligocene)
Deltaic sands, silts, and clays; Sand, gray, pale yellow to white, fine- to coarse-grained, cross-bedded to massive, predominantly quartzose with lesser amounts of chert, metaquartzite, mica, and heavy minerals, slightly glauconitic in places with rare thinly-bedded pea gravels, Gravels, black chert and milky quartz, highly polished, immature, subangular to well rounded; Clay, green, gray, brown, kaolinitic, weathers white to brown exhibiting a "popcorn" appearance, silty to sandy, lignite common in basal clays. Often indurates to opaline-cemented sandstones and rarer orthoquartzites where exposed, silicified wood and fossil palm common. Ironstone common where sands overlie clays. The Catahoula Formation unconformably overlies the Bucatunna Formation. Total thickness is approximately 560 feet.

Vicksburg Group

Tbu

Bucatunna Formation (Oligocene)
Clay, dark brown to dark gray, weathers light brown to light gray, carbonaceous, silty to sandy, micaceous, laminated to massive, sparingly fossiliferous. The Bucatunna Formation conformably overlies the Byram Formation. Thickness is approximately 40 feet except where Catahoula Formation channels have incised.

Tv

Vicksburg Limestone Undifferentiated (Oligocene)
Includes the Byram Formation, Glendon Limestone, Marianna Limestone, and Mint Spring Formation. The Glendon Limestone is white to gray, commonly indurated to semi-crystalline bioclastic limestone, either massive or with alternating ledges separated by thinly-bedded glauconitic marl. The Glendon Limestone commonly contains solution cavities at or near outcrop. Larger cavities usually form at the contact with the underlying Marianna Limestone. The Marianna Limestone is white to pale-yellow, soft to indurated, glauconitic marl, containing an admixture of fine-grained sands and clays in places. There is an abundance of the large Foraminifera *Lepidocyclina mantelli* in the Marianna Limestone and *Lepidocyclina supera* in the Glendon Limestone and the echinoid *Chyepastor rogersi*. The Vicksburg Limestone unconformably overlies the Forest Hill Formation. Thickness is approximately 70 feet.

Tfh

Forest Hill Formation
Deltaic sands, silts, and clays. Sand, fine-grained, silty, quartzose; Clay, carbonaceous, laminated, lignite and silicified wood common. Lignitic plant fossils common along fissile partings in clays. The Forest Hill Formation unconformably overlies the Yazoo Formation. Total thickness is approximately 50 feet.

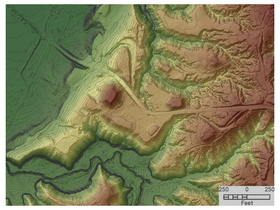
Jackson Group

Ty

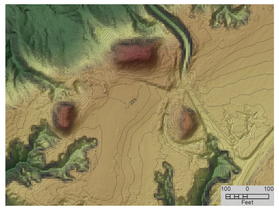
Yazoo Formation (Eocene)
Locally referred to as the Yazoo Clay. Clay, bluish-green to bluish gray, weathers yellowish brown to tan, montmorillonitic, calcareous, silty, locally fossiliferous, locally contains, framboidal pyrite. The Yazoo Formation conformably overlies the Moodys Branch Formation. Total thickness is approximately 390 feet.

Field Photographs

Stream alluvium along the valley floor of Fairchilds Creek consisting of a bedload of reworked loess silt and Pre-loess Terrace sand and gravel. Section 22, Township 8N., Range 2W.



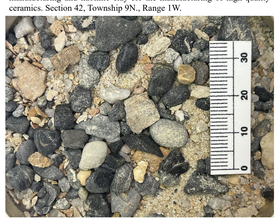
The Anna Mounds site (22 AD 500) is a Plaquemine culture archeological site on the National Register of Historic Places (NRHP 93001606). This import Native American cultural large earthworks complex was inhabited during the Mississippian cultural period around A.D. 1200 to 1500 and is the type site for the Anna Phase. The color-ramped lidar map of the site with 1-foot contours, depicts the sites association with the natural environment. The mound group is situated on the vantage of the expressed surface of the flat-lying ancestral Mississippi River Pre-loess Terrace, now heavily dissected by severe erosion. It overlooks Coles-Creek along the edge of the alluvial Plain of the Mississippi River. Coles Creek is an excellent source of fresh water and is choked with an exquisite resource of Pre-loess Terrace gravel for lithic tool manufacturing and kaolinic clay for the manufacturing of high-quality ceramics. Section 42, Township 9N., Range 1W.



The Feltus Mounds site (22 JE 500) is also known as the Ferguson or the Truly Mounds. This import Native American cultural earthworks site was inhabited during the Woodland cultural period (Early Coles Creek phase) around A.D. 700 to 1000 The color-ramped lidar map of the site with 1-foot contours, depicts the sites association with the natural environment. The mound group is situated on the vantage of the expressed surface of the flat-lying ancestral Mississippi River Pre-loess Terrace, now heavily dissected by severe erosion. It overlooks Coles-Creek along the edge of the alluvial Plain of the Mississippi River. Coles Creek is an excellent source of fresh water and is choked with an exquisite resource of Pre-loess Terrace gravel for lithic tool manufacturing and kaolinic clay for the manufacturing of high-quality ceramics. Section 42, Township 9N., Range 1W.

Stream alluvium along the valley floor of Fairchilds Creek consisting of a bedload of reworked loess silt and Pre-loess Terrace sand and gravel. Section 22, Township 8N., Range 2W.

Typical character of sand and gravel of Pre-loess Terrace Deposits from drill cuttings of the test hole ID MGS EG4-5, from a depth of 130-140 measured from ground level. Section 5, Township 8N., Range 3W.



Typical character of sand and gravel of Pascagoula Formation from drill cuttings of the test hole MGS EG4-5 from a depth of 280-290 measured from ground level. Section 5, Township 8N., Range 3W.

Relic floodplain clay from the upper portion of the ancestral Mississippi River Pre-loess Terrace Deposits and stream alluvium outcropping along Fairchilds Creek. This kaolinitic clay resource was vital to the ceramics industry of the Woodland and Mississippian cultural periods. Section 22, Township 8N., Range 2W.

Relic floodplain clay from the upper portion of the ancestral Mississippi River Pre-loess Terrace Deposits and stream alluvium outcropping along Fairchilds Creek. This kaolinitic clay resources was vital to ceramics industry of the Woodland Mississippian period Natchez Indians. Section 22, Township 8N., Range 2W.

Structural Cross-Section of the Pine Ridge 7.5-Minute Geologic Quadrangle