

**SURFICIAL GEOLOGY OF THE FREEHOLD QUADRANGLE
MIDDLESEX AND MONMOUTH COUNTIES, NEW JERSEY**




by
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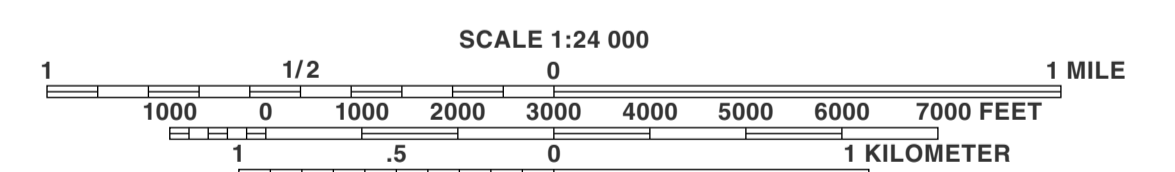
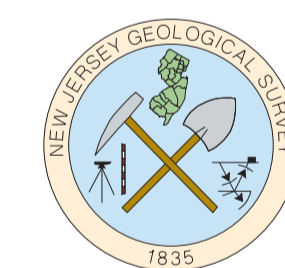
MAP UNITS

Age of unit indicated in parentheses. For units spanning more than one period, principal age is listed first.
Order of map units in list does not necessarily indicate chronological sequence.

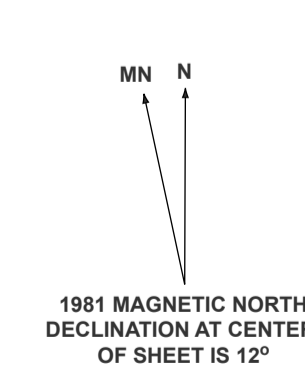
-  **ARTIFICIAL FILL**—Sand, silt, clay, gravel; brown, gray, yellowish brown; may include demolition debris (concrete, brick, asphalt, glass) and trash. As much as 20 feet thick. In road and railroad embankments and made land. Many small areas of fill in urban areas are not shown.
-  **Qal** **ALLUVIUM** (Holocene and late Pleistocene)—Sand, silt, clay, peat; yellowish brown, dark brown, gray; and pebble gravel. Abundant organic matter. Sand is chiefly quartz, with some glauconite and mica. Gravel is quartz and quartzite with minor ironstone. As much as 15 feet thick. Deposited in floodplains, channels, and ground-water seepage areas.
-  **Qcal** **COLLUVIUM AND ALLUVIUM** (Holocene and late Pleistocene)—Interbedded alluvium and colluvium in steep-sided headwater valleys. As much as 15 feet thick.
-  **Qe** **EOLIAN DEPOSITS** (late Pleistocene and Holocene)—Fine-to-medium sand, very pale brown to reddish yellow. Sand is chiefly quartz with minor glauconite and mica in places. As much as 20 feet thick. Forms dunes and sand sheets.
-  **Qtl** **LOWER TERRACE DEPOSITS** (late Pleistocene)—Sand and minor silt; yellow, yellowish brown, reddish yellow; and gravel. Sand is chiefly quartz with some glauconite and mica. Gravel is quartz and quartzite with minor ironstone. As much as 30 feet thick. Forms stream terraces with surfaces 5 to 20 feet above the modern floodplain.
-  **Qcl** **LOWER COLLUVIUM** (late Pleistocene)—Sand, silt, minor clay; yellow, yellowish brown, reddish yellow, light gray; some quartz and ironstone pebbles. As much as 10 feet thick. Forms aprons graded to lower terraces or the modern floodplain.
-  **Qtu** **UPPER TERRACE DEPOSITS** (middle Pleistocene)—Sand, minor silt; yellow, reddish yellow; and pebble gravel. Sand is chiefly quartz; glauconite and mica are generally less abundant than in the lower terrace deposits and alluvium. Gravel is quartz, quartzite, and minor ironstone. As much as 10 feet thick. Forms stream terraces with surfaces 20 to 50 feet above the modern floodplain.
-  **Qcu** **UPPER COLLUVIUM** (middle Pleistocene)—Sand, silt, minor clay; pale brown, yellow, reddish yellow; some quartz, quartzite and ironstone pebbles. As much as 10 feet thick. Forms aprons graded to upper terraces.
-  **Tg** **UPLAND GRAVEL** (Pliocene-early Pleistocene)—Sand and silt, yellow to reddish yellow, and pebble gravel; minor fine-cobble gravel. Sand is chiefly quartz, with glauconite in places; gravel is quartz, quartzite, and ironstone with minor weathered chert. Locally iron-cemented. As much as 20 feet thick. In erosional remnants on hillslopes and interfluves.
-  **Tpg** **PENSAUKEN FORMATION, GLAUCONITIC PHASE** (Pliocene)—Sand, minor silt and clay; reddish yellow to yellowish brown; and pebble gravel. Sand is chiefly quartz with some glauconite and mica and minor feldspar. Gravel is chiefly quartz and quartzite with some chert. As much as 20 feet thick. In an erosional remnant on the upland northeast of Englishtown. The Pensauken Formation is a fluvial deposit that fills a broad lowland to the north and west of the Freehold quadrangle. The glauconitic phase of the Pensauken Formation was deposited by tributaries flowing westerly from the Coastal Plain.
-  **Qwcp** **WEATHERED COASTAL PLAIN FORMATIONS**—Exposed sand and clay of Coastal Plain bedrock formations. May be overlain by thin, patchy alluvium and colluvium. Quartz and ironstone pebbles left from erosion of surficial deposits may be present on the surface and in the upper several feet of the formation.

MAP SYMBOLS

-  **Contact**—Contacts of alluvium are well-defined by landforms and are drawn from 1:12,000 scale aerial stereophotos. Contacts of other units are approximately located based on both landforms and field observation points.
-  **Material observed in hand-auger hole, exposure, or excavation.**
-  **Shallow topographic basin**—Of probable periglacial origin. Basins within eolian deposits may be of eolian origin.



CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



LOCATION IN
NEW JERSEY