U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science Directorate
Geologic Resources Division

Guilford Courthouse National Military Park

GRI Ancillary Map Information Document

Produced to accompany the Geologic Resources Inventory (GRI) Digital Geologic Data for Guilford Courthouse National Military Park

guco_geology.pdf

Version: 9/27/2021

Geologic Resources Inventory Map Document for Guilford Courthouse National Military Park

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Geologic Resources Inventory Map Document

Guilford Courthouse National Military Park, North Carolina

Document to Accompany Digital Geologic-GIS Data

guco_geology.pdf

Version: 9/27/2021

This document has been developed to accompany the digital geologic-GIS data developed by the Geologic Resources Inventory (GRI) program for Guilford Courthouse National Military Park, North Carolina (GUCO).

Attempts have been made to reproduce all aspects of the original source products, including the geologic units and their descriptions, geologic cross sections, the geologic report, references and all other pertinent images and information contained in the original publication.

This document contains the following information:

1) **About the NPS Geologic Resources Inventory Program** – A brief summary of the Geologic Resources Inventory (GRI) Program and its products. Included are web links to the GRI GIS data model, and to the GRI products page where digital geologic-GIS datasets, scoping reports and geology reports are available for download. In addition, web links to the NPS Data Store and GRI program home page, as well as contact information for the GRI coordinator, are also present.

2) **GRI Digital Map and Source Citation** – The GRI digital geologic-GIS map produced for this project along with the source used in its completion. In addition, a brief explanation of how the source map was used is provided.

3) **Map Unit List** – A listing of all geologic map units present on the map for this project, generally listed from youngest to oldest.

4) **Map Unit Descriptions** – Descriptions for all geologic map units.

5) **Ancillary Source Map Information** – Additional source map information.

6) **GRI Digital Data Credits** – GRI digital geologic-GIS data and ancillary map information document production credits.

For information about using GRI digital geologic-GIS data contact:

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About the NPS Geologic Resources Inventory Program

Background

The Geologic Resources Inventory (GRI) provides geologic map data and pertinent geologic information to support resource management and science-informed decision making in more than 270 natural resource parks throughout the National Park System. Geologic resources for management consideration include both the processes that act upon the Earth and the features formed as a result of these processes. Geologic processes include: erosion and sedimentation; seismic, volcanic, and geothermal activity; glaciation, rockfalls, landslides, and shoreline change. Geologic features include mountains, canyons, natural arches and bridges, minerals, rocks, fossils, cave and karst systems, beaches, dunes, glaciers, volcanoes, and faults.

The GRI is one of 12 inventories funded by the National Park Service (NPS) Inventory and Monitoring Program. The Geologic Resources Division of the NPS Natural Resource Stewardship and Science Directorate administers the GRI. The NPS Geologic Resources Division partners with the Colorado State University Department of Geosciences to produce GRI products. Many additional partners participate in the GRI process by contributing source maps or reviewing products.

The GRI team undertakes three tasks for each park in the Inventory and Monitoring program: (1) conduct a scoping meeting and provide a summary document, (2) provide digital geologic map data in a geographic information system (GIS) format, and (3) provide a GRI report. These products are designed and written for nongeoscientists.

Products

Scoping Meetings: These park-specific meetings bring together local geologic experts and park staff to inventory and review available geologic data and discuss geologic resource management issues. A summary document is prepared for each meeting that identifies a plan to provide digital map data for the park.

Digital Geologic Maps: Digital geologic maps reproduce all aspects of traditional paper maps, including notes, legend, and cross sections. Bedrock, surficial, and special purpose maps such as coastal or geologic hazard maps may be used by the GRI to create digital Geographic Information Systems (GIS) data and meet park needs. These digital GIS data allow geologic information to be easily viewed and analyzed in conjunction with a wide range of other resource management information data.

For detailed information regarding GIS parameters such as data attribute field definitions, attribute field codes, value definitions, and rules that govern relationships found in the data, refer to the NPS Geology-GIS Data Model document available at: https://www.nps.gov/articles/gri-geodatabase-model.htm

Geologic Reports: GRI reports synthesize discussions from the original scoping meeting, follow up conference call(s), and subsequent research. Chapters of each report discuss the geologic setting of the park, distinctive geologic features and processes within the park, highlight geologic issues facing resource managers, and describe the geologic history leading to the present-day landscape. Each report also includes a poster illustrating these GRI digital geologic-GIS data.

For a complete listing of GRI products visit the GRI publications webpage: https://go.nps.gov/gripubs. GRI digital geologic-GIS data is also available online at the NPS Data Store: https://irma.nps.gov/DataStore/Search/Quick. To find GRI data for a specific park or parks select the appropriate park(s), enter “GRI” as a Search Text term, and then select the Search button.

For more information about the Geologic Resources Inventory Program visit the GRI webpage: https://

www.nps.gov/subjects/geology/gri.htm. At the bottom of that webpage is a “Contact Us” link if you need additional information. You may also directly contact the program coordinator:

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The Geologic Resources Inventory (GRI) program is funded by the National Park Service (NPS) Inventory and Monitoring (I&M) Division. Learn more about I&M and the 12 baseline inventories at the I&M webpage: https://www.nps.gov/im/inventories.htm.

GRI Digital Map and Source Map Citation

The GRI digital geologic-GIS map for Guilford Courthouse National Military Park, North Carolina (GUCO):

Digital Geologic-GIS Map of Guilford Courthouse National Military Park and Vicinity, North Carolina (*GRI MapCode GUCO*)

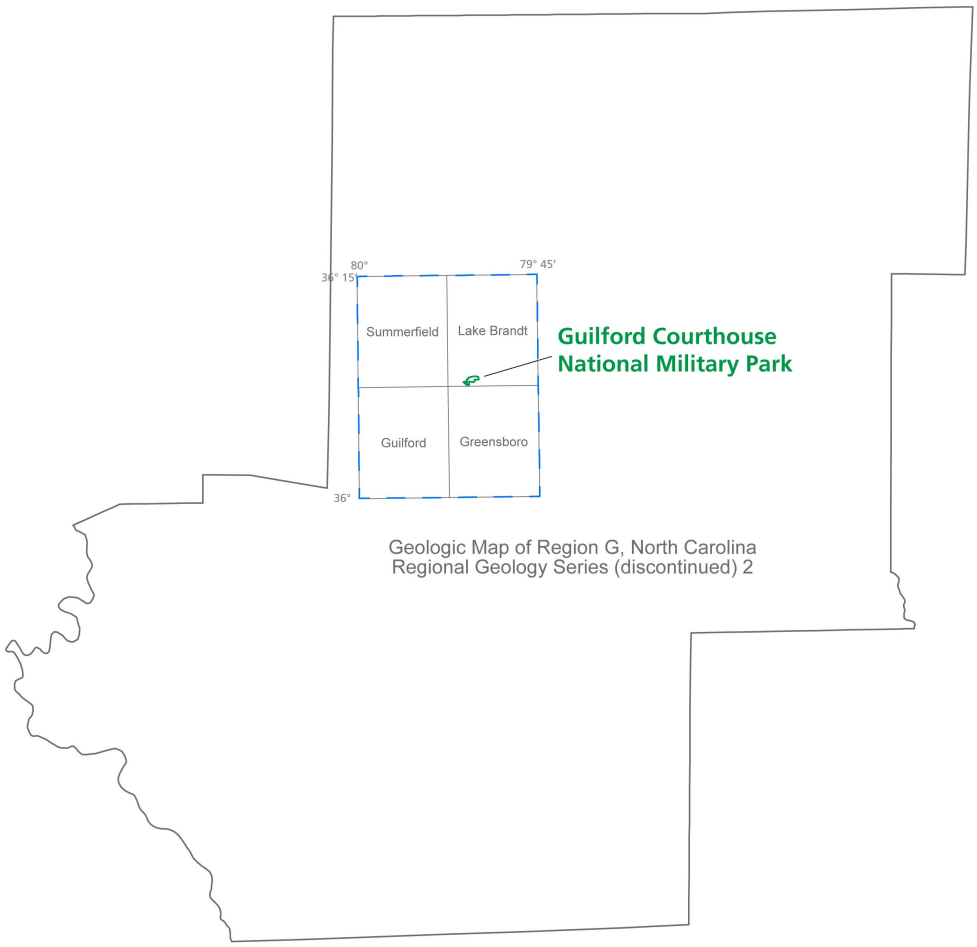
Only a portion of the source map listed below was used, but all geologic features within the extent used were captured.

> Carpenter, P.A., 1982, Geologic Map of Region G, North Carolina: North Carolina Geologic Survey, Regional Geology Series (discontinued), scale 1:125,000 (North Carolina (Region G)). (*GRI Source Map ID 1201*).

Additional information pertaining to the source map is also presented in the GRI Source Map Information (GUCOMAP) table included with the GRI digital geologic-GIS data.

Index Map

The following index map displays the extent of the GRI digital geologic-GIS map produced for Guilford Courthouse National Military Park (GUCO) with a dashed blue line. The boundary for Guilford Courthouse National Military Park (as of September 2021) is outlined in green and the extent of the source map is shown in gray. 7.5 minute quadrangles that define the extent of the GRI digital geologic-GIS map are also shown.



Index map by James Winter (Colorado State University).

Map Unit List

The geologic units present in the digital geologic-GIS data produced for Guilford Courthouse National Military Park, North Carolina (GUCO) are listed below. Units are listed with their assigned unit symbol and unit name (e.g., Qal - Alluvium). Units are listed from youngest to oldest. No description for water is provided. Information about each geologic unit is also presented in the GRI Geologic Unit Information (GUCOUNIT) table included with the GRI geologic-GIS data. Some source unit symbols and ages have been changed in this document and in the GRI digital geologic-GIS data. Unit symbols, names and/or ages in a unit descriptions, or on a correlation of map units or other source map figure were not edited. If a unit symbol, name or age was changed by the GRI the unit's source map symbol, name and age appears with the unit's source map description.

Cenozoic Era

Quaternary Period
Qal - Alluvium

Mesozoic Era

Jurassic and Triassic Periods
JTRd - Diabase dike

Paleozoic Era

PZpgr - Porphyritic granite

Paleozoic and Precambrian Eras

PZPCmgs - Mica gneiss and schist
PZPCicf - Felsic intrusive complex
PZPCdi - Intermediate intrusive rocks
PZPCms - Muscovite and biotite schists

Map Unit Descriptions

Descriptions of all geologic map units, generally listed from youngest to oldest, are presented below. All unit descriptions from: North Carolina (Region G)

Qal - Alluvium (Quaternary)

Dark-brown, gray to white unconsolidated sand, silt, and clay; occasionally containing subrounded to well-rounded pebbles and cobbles. Soil series include Chewacla, Congaree, and Wehadkee.

JTRd - Diabase dike (Jurassic and Triassic)

TRd - Diabase (Triassic and Jurassic)
Dark-gray to black, medium- to fine-grained diabase (dolerite), forming dikes that range in width from a few centimeters to more than 30 meters; composed chiefly of plagioclase, augite, micropegmatite, ± olivine, and accessory biotite, apatite, hornblende, and opaque minerals. Solid lines indicate where located in the field, dashed lines indicate where projected by aeromagnetic data (U.S. Geological Survey, 1971a, 1971b, 1971c, 1974, 1977a), dots indicate isolated boulders or outcrops.

PZpgr - Porphyritic granite (Upper Paleozoic)

Light-gray, medium- to coarse-grained porphyritic granite; composed of gray microcline phenocrysts up to 13 cm. in diameter in a matrix of quartz, oligoclase, and biotite; also contains minor nonporphyritic granite. This porphyritic granite is considered correlative with the Churchland pluton (Butler and Ragland, 1969, and Stromquist and Sundelius, 1975). The Churchland pluton has been given a Rb-Sr age date of 282 ± 6 m. y. by Fullagar and Butler (1979).

PZPCmgs - Mica gneiss and schist (Precambrian to Paleozoic)

mgs - Mica gneiss and schist (Precambrian to Paleozoic)
Heterogeneous unit of dark-colored, medium- to coarse-grained biotite gneiss and schist; locally interlayered with hornblende gneiss and schist and felsic gneiss; commonly with distinct layering and foliation; some portions are porphyroblastic; chiefly composed of biotite, quartz, feldspar, and sometimes muscovite and hornblende; intruded locally by pegmatite dikes. Dots indicate augen gneiss or porphyroblastic biotite gneiss; more extensive areas are shown as separate units. Soils are of the Madison series.

PZPCicf - Felsic intrusive complex (Precambrian to Paleozoic)

icf - Felsic intrusive complex (Precambrian to Paleozoic)
White to gray, fine- to coarse-grained, massive to foliated, metamorphosed bodies of varying assemblages of intimately associated felsic intrusive rock types; in some areas the complex includes mineralogic gradations within a single body while in other areas it includes separate intrusions; rock types include granite, granodiorite, quartz diorite, and quartz monzonite; primary minerals include quartz, plagioclase, ± potassium feldspar, muscovite, and biotite; metamorphic minerals include chlorite, epidote, and sericite. Local shearing is common in Guilford County. Narrow mafic dikes intrude the complex in many areas and are frequently so abundant that they are the predominant rock type. Soil series include Appling, Cecil, Durham, Enon, Helena, Lockhart, Pacolet, Sedgefield, Vance, Wedowee, and Wilkes.

PZPCdi - Intermediate intrusive rocks (Precambrian to Paleozoic)

di - Intermediate intrusive rocks (Precambrian to Paleozoic)
Gray to greenish-gray, medium- to coarse-grained, massive, well-jointed metamorphosed bodies, probably dioritic in composition; composed primarily of hornblende, plagioclase, biotite, epidote, chlorite, magnetite, and minor quartz; frequently form narrow dikes, primarily within felsic intrusive units. di- indicates diorite; di-gb indicates areas where diorite and gabbro are too closely associated to be mapped separately. Soil series include Coronaca, Davidson, Enon, Hiwassee, Iredell, Mecklenburg, Sedgefield, and Wilkes.

PZPCms - Muscovite and biotite schists (Precambrian to Paleozoic)

ms - Muscovite and biotite schists (Precambrian to Paleozoic)
Dark gray to black, fine- to coarse-grained, schistose rocks composed of muscovite or biotite or both with minor quartz, feldspar, and occasionally garnet; locally interlayered with biotite and hornblende gneisses and schists and intruded by pegmatite dikes; some areas of sheared rock in the Charlotte belt are primarily mica schist. Mica schist in northwestern Rockingham County is included in the Ashe Formation in the east-half of the Winston-Salem Quadrangle (Espenshade, 1975). Soils are of the Madison series.

Ancillary Source Map Information

The following sections present ancillary source map information associated with source used for this project.

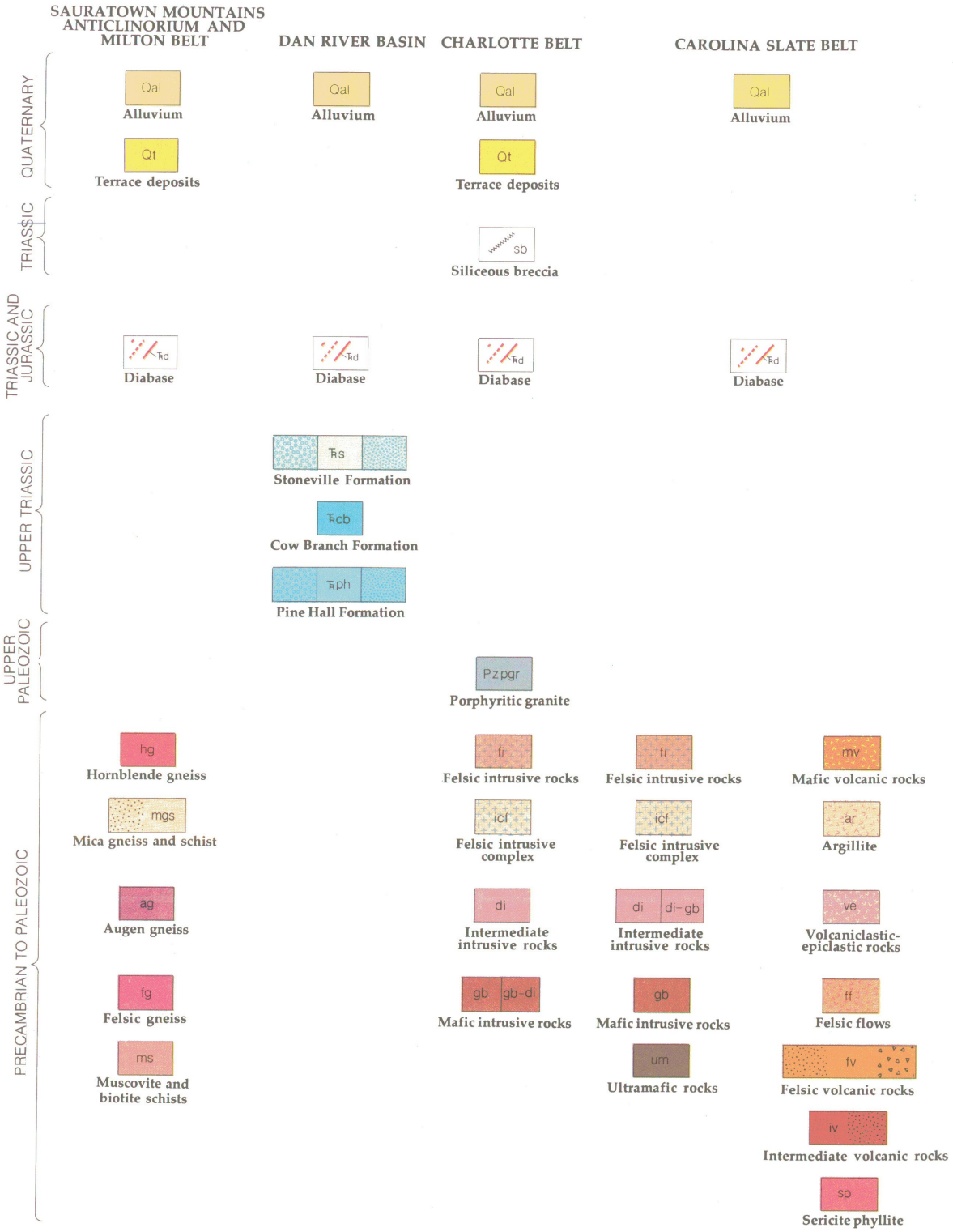
North Carolina (Region G)

The formal citation for this source.

> Carpenter, P.A., 1982, Geologic Map of Region G, North Carolina: North Carolina Geologic Survey, Regional Geology Series (discontinued), scale 1:125,000 (*GRI Source Map ID 1201*).

Prominent graphics and text associated with this source.

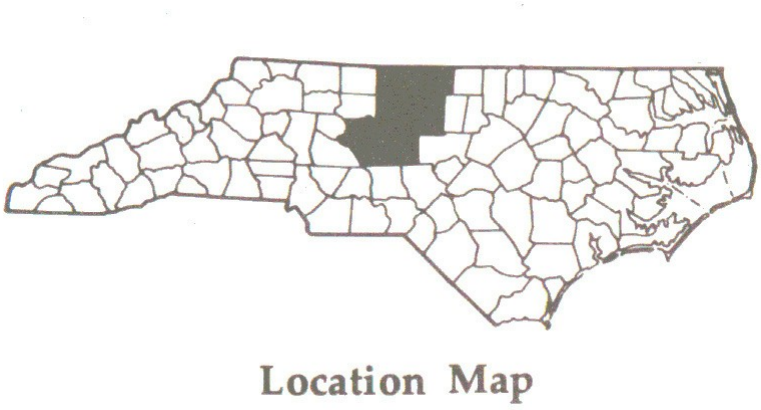
Correlation of Map Units



Graphic from source map: North Carolina (Region G). Of note, not all units presented in the above correlation of map units figure are present within the extent of the GRI digital geologic-GIS data as

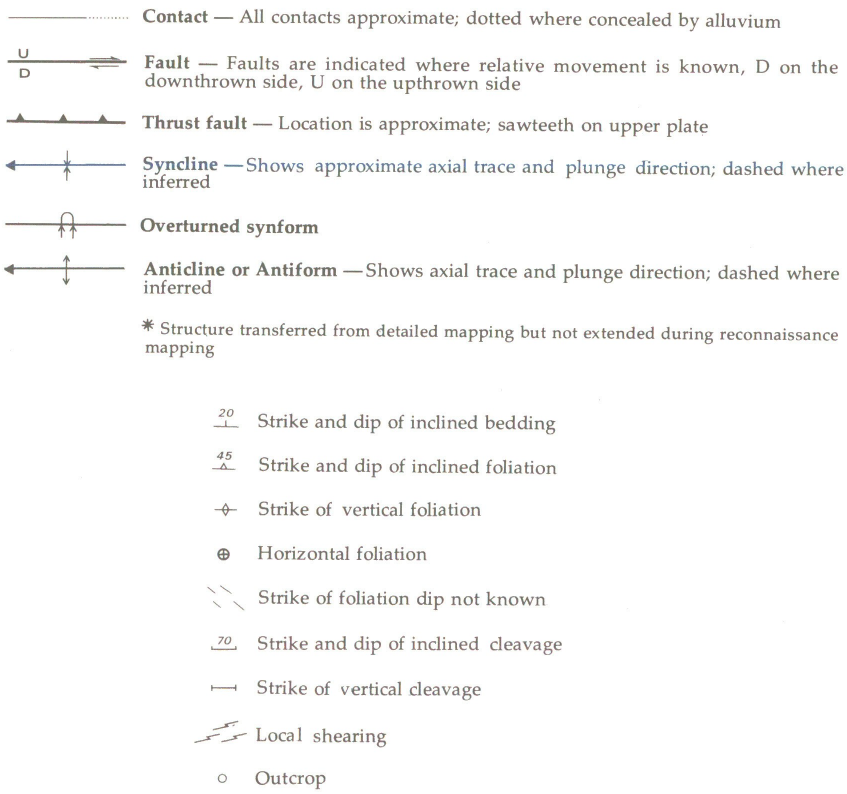
this extent is only a limited extent within the full source map extent.

Location Map



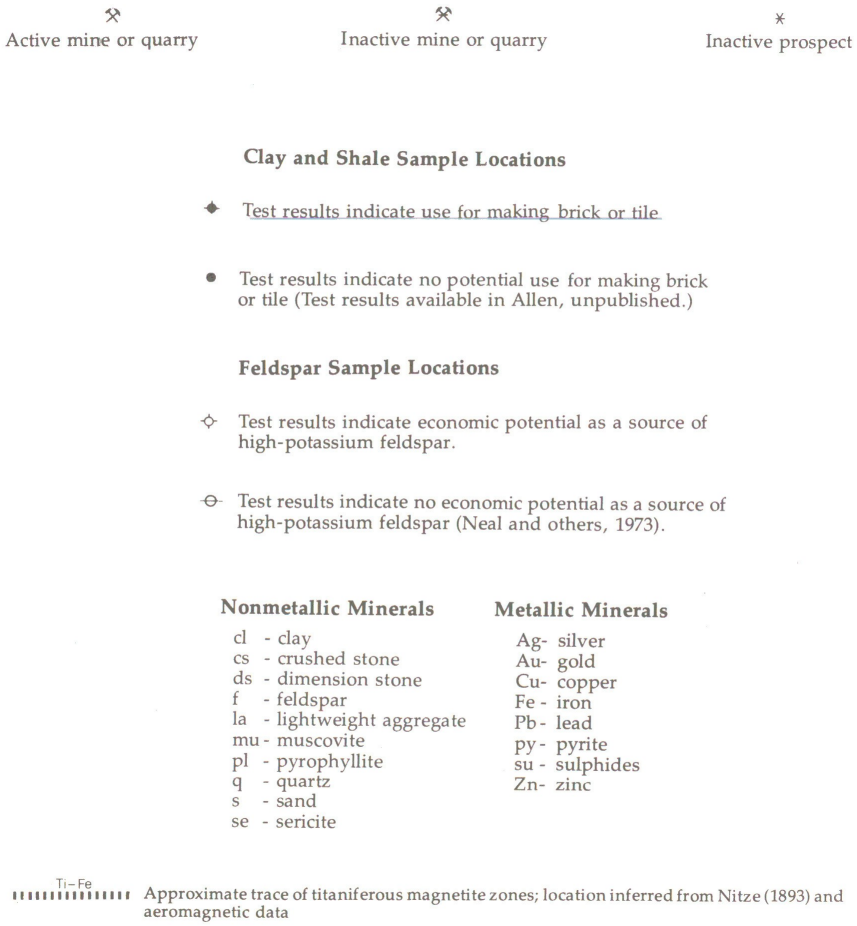
Graphic from source map: North Carolina (Region G)

Map Legend - Structural Symbols



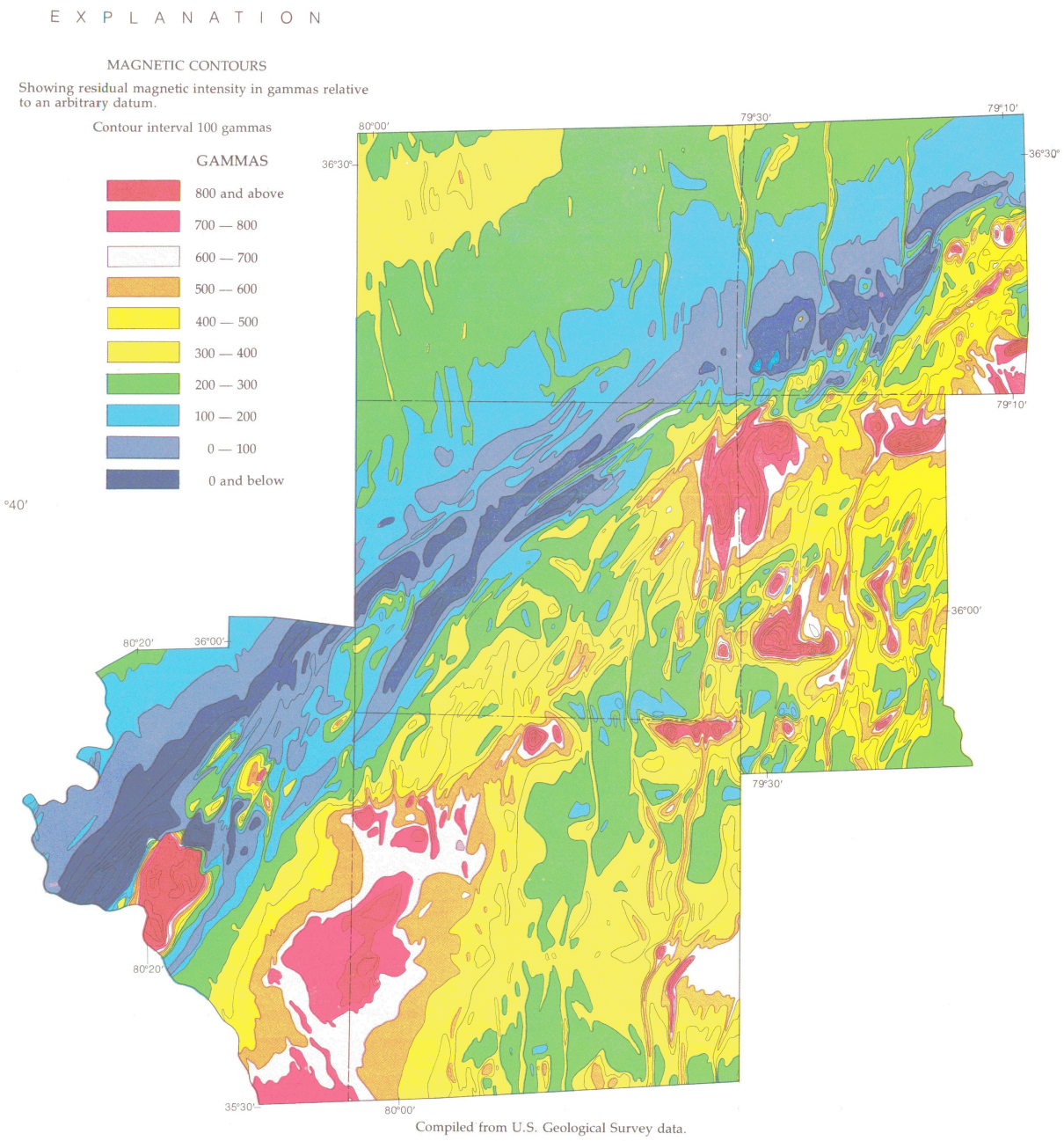
Graphic from source map: North Carolina (Region G). Of note, not all features presented in the above legend are present within the extent of the GRI digital geologic-GIS data as this extent is only a limited extent within the full source map extent.

Map Legend - Mineral Resources



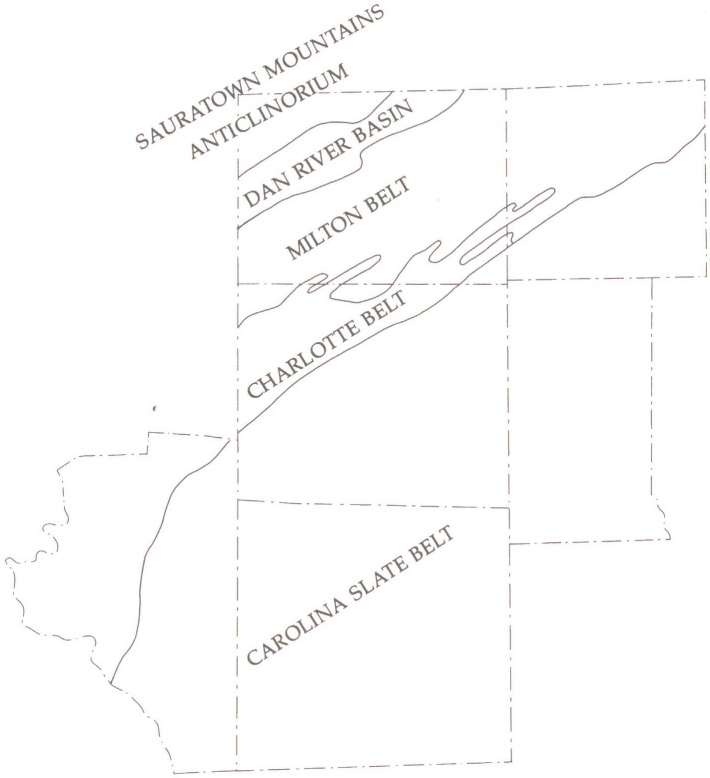
Graphic from source map: North Carolina (Region G). Of note, not all features presented in the above legend are present within the extent of the GRI digital geologic-GIS data as this extent is only a limited extent within the full source map extent.

Generalized Aeromagnetic Map



Graphic from source map: [North Carolina (Region G)]

Major Geologic Subdivisions



Graphic from source map: North Carolina (Region G)

Mines and Quarries

Map Number	Name and Commodity	Operator	Status
	ALAMANCE COUNTY		
1	Alamance County Sand Pit(s)	Thompson-Arthur Paving Company	Active
2	Burlington Quarry(cs)	Martin Marietta Aggregates	Active
3	Burlington Mine (cl)	Hanford Brick Company	Active
4	Mebane Oaks Mine(cl)	Hanford Brick Company	Active
5	Woods Mine(se)	Glendon Pyrophyllite, Inc.	Active
6	Rainey Pit(s)	John W. Long & Sons	Inactive
7	Scott Quarry(cs)		Inactive
8	Swepsonville Quarry(cs)	Department of Transportation	Inactive
9	Long Borrow Pit(s)		Inactive
10	Faust Mine(Cu)		Inactive
11	Robeson Mine(Au)		Inactive
12	Copper Prospect(Cu)		Inactive
13	Snow Camp Mine(pl)	Boren and Harvey	Inactive
14	Major Hill Prospects(pl)		Inactive
	CASWELL COUNTY		
1	Shelton Quarry(cs)	Vulcan Materials Company	Active
2*	Angle Prospect(mu)		Inactive
3*	O.W. Barker Prospect(mu)		Inactive
4*	J.G. Slaughter Prospects(mu)		Inactive
5*	Yarboro #1 Mine (Old Milton Mine)(mu)		Inactive
6*	Yarboro #2 Mine(mu)		Inactive
7*	Harris and Satterfield Prospects(mu)		Inactive
8*	Ivy Bluff Quarry(cs)		Inactive
	DAVIDSON COUNTY		
1	Lexington Quarry(cs)	Martin Marietta Aggregates	Active
2	I-85 Gravel Pit(s)	Sink and White	Active
3	Pilot Quarry(cs)	Cecile Crushed Stone	Active
4	Myers Quarry(cs)	Martin Marietta Aggregates	Active
5	Davidson Mine(cl)	Cunningham Brick Company	Active
6	Davidson #2 Mine(cl)	Cunningham Brick Company	Active
7	Davidson Mine(ds)	Jacobs Creek Stone Company	Active
8	Hedgecock Pit(s)		Inactive
9	Ira Pope #3 Pit(s)		Inactive
10	Conrad Hill-Dodge Hill Mines(Cu-Au)		Inactive
11	Hepler and Claude Hepler Mines(Au)		Inactive
12	Silver Valley Mine(Au, Ag, Pb, Zn)		Inactive
13	Sechrist Mine(Au)		Inactive
14	Ida Mine(Au)		Inactive
15	Cid Mine(Cu, Au)		Inactive
16	Silver Hill Mine(Ag, Au, Pb, Cu, Zn)		Inactive
17	Emmons Mine(Cu, Pb, Au, Zn)		Inactive
18	Peters Mine(Cu, Au)		Inactive
19	Hunt Mine(Au)		Inactive
20	Cross Mine(Au)		Inactive
	GUILFORD COUNTY		
1	Guilford County Mine(s)	Thompson-Arthur Paving Co.	Active
2	Plants #1 & #2(cl)	Boren Clay Products Co.	Active
3	Plant #3(cl)	Boren Clay Products Co.	Active
4	Jamestown Quarry(cs)	Martin Marietta Aggregates	Active
5	Pomona Quarry(cs)	Martin Marietta Aggregates	Active
6	Hicone Quarry(cs)	Martin Marietta Aggregates	Active
7	Buchanan Quarry(cs)	Central Rock Company	Active
8	Stokesdale Quarry(cs)	Vulcan Materials Company	Active
9	Groome Sand Rock Pit(s)	Mr. Fred M. Groome	Active
10	Nunn Gravel Pit(s)	Mr. J.T. Nunn	Active
11	Pearman Quarry(cs)	Department of Transportation	Inactive
12	Tuscarora Mine(Fe)		Inactive
13	McCleansville Quarry(cs)	Martin Marietta Aggregates	Inactive
14	Whitsett Quarry(cs)		Inactive
15	Pine Hill Mine(Au)		Inactive
16	Hodges Hill Mine(Au)		Inactive
17	Fentress Mine(Au, Cu)		Inactive
18	Fisher Hill Mine(Au)		Inactive
19	Millis Hill Mine(Cu, Au)		Inactive
20	Pucket Mine(Cu, Au)		Inactive
21	Beard Mine(Au, Cu)		Inactive
22	Gardner Hill Mine(Au, Cu)		Inactive
23	Jacks Hill Mine(Au, Cu)		Inactive
24	North State Mine(Au, Cu)		Inactive
25	Lindsay Mine(Au, Cu)		Inactive
26	Deep River Mine(Au, Cu)		Inactive

Map Number	Name and Commodity	Operator	Status
	RANDOLPH COUNTY		
1	Staley Plant(q)	Southern Stone Industries	Active
2	Asheboro Quarry(cs)	Martin Marietta Aggregates	Active
3	High Point Quarry(cs)	Martin Marietta Aggregates	Inactive
4	Crushed Stone Quarry(cs)	Department of Transportation	Inactive
5	Cagle Brothers Mine #1(q)	Cagle Brothers Aggregate Supply	Inactive
6	Copple, Spencer, and Ruth Mines(Au)		Inactive
7	Jones and Laughlin Mines(Au)		Inactive
8	Merrill Mine(Au)		Inactive
9	New Sawyer Mine(Au)		Inactive
10	Sawyer Complex(Au)		Inactive
11	Hoover Hill Mine(Au)		Inactive
12	Jones-Keystone Mine(Au)		Inactive
13	Kindley Mine(Au)		Inactive
14	Parish Mine(Au)		Inactive
15	Southern Homestake Mine(Au)		Inactive
16	Delft Mine(Au)		Inactive
17	Scarlett Mine(Au, Cu)		Inactive
18	Gray Mine(Au)		Inactive
19	McAllister Mine(Au)		Inactive
20	Newby Mine(Au)		Inactive
21	Pritchard Mine(Au)		Inactive
22	Redding Mine(Au)		Inactive
23	Allred Mine(Au)		Inactive
24	Melancton Quarry(cs)	Department of Transportation	Inactive
25	Staley Mine(pl)		Inactive
26	Crushed Stone Quarry(cs)	Department of Transportation	Inactive
27	Parks Crossroads Quarry(cs)	Department of Transportation	Inactive
28	Spoon Mine(Au)		Inactive
29	Pilot Mountain #1 Mine(Au)		Inactive
30	Pilot Mountain #2 Mine(Au)		Inactive
31	Pilot Mountain pyrophyllite prospect(pl)		Inactive
32	Smith Mine(Au)		Inactive
33	Goliham & Smith Mine(Au)		Inactive
34	Branson Mine(Au)		Inactive
35	Dowd Mine(Au)		Inactive
36	Rush Mine(Au)		Inactive
37	Gluyas Mine(Au)		Inactive
38	Farmer Quarry(cs)	Martin Marietta Aggregates	Inactive
39	New Hope Quarry(cs)	Department of Transportation	Inactive
40	Uharie Mine(Au)		Inactive
41	Talbert and Hill Mine(Au)		Inactive
42	Griffin Mine(Au)		Inactive
43	Stafford Mine(Au)		Inactive
44	Southern Aggregates Mine #47(cs)	Southern Aggregates, Inc.	Inactive
45	Cagle Brothers Mine #2(q)	Cagle Brothers Aggregate Supply	Inactive
46	Miller Quarry(cs)		Inactive
	ROCKINGHAM COUNTY		
1	220-N Pit(s)	Thompson-Arthur Paving Co.	Active
2	Rockingham County Pit(s)	Thompson-Arthur Paving Co.	Active
3	Madison Pomona Mine(cl)	Pine Hall Brick & Pipe Company	Active
4	Young-Webb Mine(cl)	Pine Hall Brick & Pipe Company	Active
5	Chilton-Webster Mine(cl)	Pine Hall Brick & Pipe Company	Active
6	Reidsville Quarry(cs)	Martin Marietta Aggregates	Active
7	East Quarry(la)	Virginia Solite Corporation	Active
8	Settle Bridge Sand Pit(s)	Vulcan Materials Company	Active
9	Stoneville Quarry(cs)	Vulcan Materials Company	Active
10	Sand Pit(s)	Fred D. Mitchell & Sons	Active
11	Eden Plant(cl)	Webster Brick Company	Active
12	Madison Sand Plant(s)	Doyle Ready-Mix Concrete	Active
13	Wade Williamson Mine(cl)	Pine Hall Brick & Pipe Company	Active
14	Chilton Van Noppen Mine(cl)	Pine Hall Brick & Pipe Company	Active
15	Sand Pit(s)	Rockingham Sand Co., Inc.	Active
16	Dan River Sand Co. Mine(s)	Dan River Sand Company	Active
17	Dr. Martin Mine(cl)	Pine Hall Brick & Pipe Co., Inc.	Active
18	Leakesville Quarry(cs)	Department of Transportation	Inactive
19	Clay Pits(cl)	Pine Hall Brick & Pipe Company	Inactive
20	Press Byrd Mine(cl)	Pine Hall Brick & Pipe Company	Inactive
21	Mayodan Mine(cl)	Pine Hall Brick & Pipe Company	Inactive
22	Sam Galloway Mine(cl)	Pine Hall Brick & Pipe Company	Inactive
23	Wolf Island Quarry(cs)	Vulcan Materials Co.	Inactive
24	King Slate Quarry(cs)		Inactive
25	Stacey Quarry(cs)		Inactive
26*	Harry Knight Mine(mu)		Inactive
27*	Short Tom Smith Mine(mu)		Inactive
28*	Cox Prospects(mu)		Inactive
29*	Rosa Evans Mine(mu)		Inactive
30*	Long Tom Smith Mine(mu)		Inactive
31*	Earnest Smith Prospect #1(mu)		Inactive
32*	Earnest Smith Prospect #2(mu)		Inactive
33*	Watkins Prospect(mu)		Inactive
34*	Clifton Mine(mu-f)		Inactive
35*	Tyler Holland Mine(mu)		Inactive
36*	Byrd Holland Mine(mu)		Inactive

* Location approximate

Graphic from source map: North Carolina (Region G). Of note, not all mine features presented in the above listing are present within the extent of the GRI digital geologic-GIS data as this extent is only a limited extent within the full source map extent.

Map Units, Topographic Features and Mineral Resource Uses

MAP UNITS CORRELATED WITH TOPOGRAPHIC FEATURES AND MINERAL RESOURCE USES

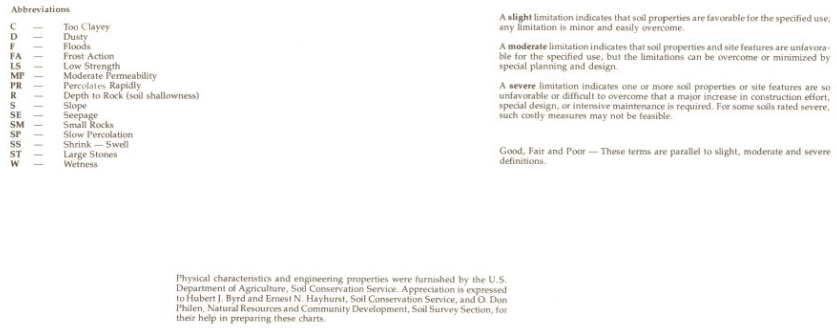
Geologic Unit	Description	Topography	Mineral Resource Uses: Past	Present	Potential
Alluvium	Unconsolidated sand, silt, and clay	Broad to narrow lowlands adjacent to streams (floodplains)	Sand	Sand	Sand
Terrace Deposits	Unconsolidated alluvial sand, silt, and clay; in places containing pebbles and cobbles of quartz	Flat to moderately sloping divides and benches adjacent to floodplains			Sand and Gravel
Triassic Sediments	Interbedded conglomerate, sandstone, siltstone, mudrocks, coal, and mudstone	Gently rolling northeast-sloping lowland; low relief except between Madison and Stoneville	Lightweight Aggregate Crushed Stone Coal	Lightweight Aggregate	Lightweight Aggregate Crushed Stone
Diabase	Dark-gray to black, fine-grained, dense dike rocks	Most have no topographic expression; In places forms narrow, elongated, gently to steeply sloping hills and ridges; In places controls stream channels	Brick and Tile Clay	Brick and Tile Clay	Brick and Tile Clay Uranium Crushed Stone
Porphyritic Granite Felsic Intrusives Felsic Intrusive Complex	White to light-gray, massive, coarse-grained granitic rocks	Rolling dissected hills; slight to moderate slopes	Sand and Gravel Metallic Minerals Crushed Stone	Sand and Gravel Crushed Stone	Sand and Gravel High-potassium Feldspar (porphyritic granite) Metallic Minerals Crushed Stone
Intermediate Intrusives	Dark-gray to greenish-gray, massive, coarse-grained dioritic rocks	Rolling dissected hills; slight to moderate slopes	Crushed Stone	Crushed Stone	Crushed Stone Brick and Tile Clay
Mafic Intrusives	Black to greenish-black, massive, coarse-grained gabbroic rocks	Rolling dissected hills; small rounded hills; slight to steep slopes	Crushed Stone	Crushed Stone	Crushed Stone Brick and Tile Clay
Ultramafics	Black to greenish-black, massive, coarse-grained rocks	Small rounded hills; slightly to steeply sloping			
Argillite	Light-gray, brown, and bluish-gray, fine-grained, thinly laminated, metasedimentary rock	Rolling hills and lowlands	Brick and Tile Clay Flagstone Metallic Minerals	Brick and Tile Clay Flagstone	Brick and Tile Clay Flagstone Metallic Minerals
Volcaniclastic-Epiclastic Rocks	Coarse-grained, metamorphosed sediments such as arkose, graywackes, and conglomerates	Rolling hills and lowlands	Crushed Stone	Crushed Stone	Crushed Stone
Felsic Flows Felsic Volcanics	Dense, medium- to light-gray, metamorphosed volcanic rocks	Gently rolling hills and steeply sloping elongate hills	Metallic Minerals Pyrophyllite Brick and Tile Clay	Brick and Tile Clay	Metallic Minerals Pyrophyllite Brick and Tile Clay Crushed Stone
Intermediate Volcanics	Medium- to dark grayish-green, dense, fine-grained metamorphosed volcanic rocks; well developed cleavage	Steeply sloping hills and elongate ridges			Brick and Tile Clay
Mafic Volcanics	Fine- to medium-grained, medium grayish-green to dark-green to black, metamorphosed volcanic rocks	Gently rolling hills and steeply sloping elongate ridges	Crushed Stone Brick and Tile Clay	Crushed Stone Brick and Tile Clay	Crushed Stone Brick and Tile Clay
Sericite Phyllite	Fine-grained, medium- to light-gray to greenish-gray to white, schistose rocks	Most are not of large enough extent to control topography	Blended with Pyrophyllite	Blended with Pyrophyllite	Blended with Pyrophyllite
Hornblende Gneiss	Medium- to coarse-grained, dark, massive to foliated metamorphic rocks	Moderately to steeply sloping hills			
Mica Gneiss	Dark-colored, medium- to coarse-grained, foliated metamorphic rocks	Rolling, dissected hills	Mica (pegmatites) Crushed Stone	Crushed Stone	High-potassium Feldspar (pegmatites) Crushed Stone
Felsic Gneiss	Light-colored, fine- to medium-grained metamorphic rocks with indistinct layering and foliation	Rolling, dissected hills	Crushed Stone Mica (pegmatites)	Crushed Stone	Crushed Stone High-potassium Feldspar (pegmatites)
Muscovite and Biotite Schist	Fine- to coarse-grained, schistose metamorphic rocks	Rolling, dissected hills	Mica (pegmatities)		High-potassium Feldspar (pegmatites)
Quartz Veins (not shown individually on geologic map)	Light-colored, dense, siliceous veins	Steeply sloping ridges where veins are extensive enough	Crushed Stone for building facings Metallic Minerals	Crushed Stone for building facings	Crushed Stone for building facings Metallic Minerals
Siliceous Breccia	Light-colored, fragmental rock containing cavities lined with quartz and tiny veinlets of quartz	Low ridges			

Graphic from source map: North Carolina (Region G). Of note, not all map units presented in the above listing are present within the extent of the GRI digital geologic-GIS data as this extent is only a limited extent within the full source map extent.

Engineering Interpretations of Soils

ENGINEERING INTERPRETATIONS OF SOILS

Soil Series	Sewerage Systems (Lagoons)	Septic Tank Absorption Fields	Sanitary Landfills	Small Commercial Buildings	Local roads and Streets	Shallow Excavations	Camp Sites	Picnic Areas	Play-Grounds	General Agriculture	Woods
Appling	Moderate to Severe SC,S	Moderate SP,S	Slight to Moderate S	Slight to Severe S	Slight to Moderate S	Moderate C,S	Slight to Moderate S	Slight to Moderate S	Slight to Severe	Good	Good
Badin	Severe R,S	Severe R,S	Severe R,S	Moderate to Severe SS,S	Severe LS,S	Moderate to Severe R,C,S	Moderate to Severe SM,S	Moderate to Severe SM,S	Severe SM,S	Good	Good
Cecil	Moderate to Severe PS,S	Moderate SP	Slight to Moderate S	Moderate to Severe LS,SS,S	Moderate to Severe LS,SS,S	Moderate to Severe C,S	Slight to Severe S,SM	Slight to Severe S,C	Slight to Severe S,C	Good	Good
Chewacla	Severe W,F	Severe W,F	Severe W,F	Severe W,F	Severe W,F	Severe W,F	Severe W,F	Severe F	Severe W,F	Good	Good
Congaree	Severe F	Severe F	Severe F	Severe F	Severe F	Severe F	Severe F	Moderate F	Severe F	Good	Good
Coronaca	Moderate to Severe SE,S	Moderate SP,S	Slight to Moderate S	Slight to severe S	Severe LS	Moderate C,S	Slight to Moderate S	Slight to Moderate S	Moderate to Severe S	Good	Good
Davidson	Moderate to Severe S	Moderate to Severe SP,S	Slight to Severe S	Slight to Severe S	Moderate to Severe LS,S	Moderate to Severe C,S	Slight to Severe C,S	Slight to Severe C,S	Moderate to Severe C,S	Good	Good
Durham		Moderate SP			Slight		Slight to Moderate S	Slight	Moderate S	Good	Good
Enon	Moderate to Severe S	Severe SP,S	Slight to Severe S	Severe SS,LS,S	Severe SS,LS,S	Severe C,S	Moderate to Severe SP,S,C	Slight to Severe C,S	Moderate to Severe SP,S	Good	Good
Georgeville	Moderate to Severe SP,S	Moderate to Severe SP,S	Slight to Severe S	Slight to Severe S	Severe LS,S	Moderate to Severe C,S	Slight to Severe S,SM	Slight to Severe S,SM	Moderate to Severe S,SM	Good	Good
Goldston	Severe R	Severe R	Severe SE	Moderate to Severe R,S	Moderate to Severe R,S	Severe R	Moderate to Severe SM,S	Moderate to Severe SM,S	Moderate to Severe R,S	Fair	Good
Hanceville	Moderate to Severe SE,S	Slight to Severe S	Slight to Severe S	Moderate to Severe SS,S	Severe LS,S	Moderate to Severe C,S	Slight to Severe S	Slight to Severe S	Slight to Severe S	Good	Good
Helena	Slight to Severe S	Severe SP,W	Slight to Moderate S	Severe SS,S,W	Severe SS,LS	Severe C	Moderate SP,W,C	Moderate W,S,C	Moderate SP,W,C	Good	Good
Herndon	Moderate to Severe SE,S	Moderate SP,S S	Slight to Moderate S	Slight to Severe	Severe LS	Moderate C,S	Slight to Moderate S	Slight to Moderate S	Moderate to Severe ST,S	Good	Good
Hiwassee	Moderate to Severe S	Moderate to Severe SP,S	Slight to Severe L	Moderate to Severe LS,S	Moderate to Severe LS,S	Moderate to Severe C,S	Slight to Severe C,S	Slight to Severe C,S	Moderate to Severe S	Good	Good
Iredell	Severe W,S	Severe SP,W	Severe W	Severe W,SS,S	Severe LS,SS	Severe W	Severe W	Moderate W,SM	Severe W,S,SM	Good	Good
Leaksville	Severe R,W	Severe SP,W,R	Severe W	Severe W,SS,LS	Severe LS,SS,W	Severe R,W,C	Severe W	Severe W	Severe W	Poor	Poor
Lignum	Severe W,S	Severe SP,W	Severe W	Severe W,S	Severe LS	Severe W	Severe W	Moderate W,SM,S	Severe W,SM,S	Poor	Good
Lockhart	Moderate to Severe S,SM	Slight to Severe S	Slight to Severe S	Moderate to Severe S	Slight to Severe S	Moderate to Severe SM,S	Moderate to Severe S,SM	Moderate to Severe S,SM	Severe S,SM	Poor	Good
Madison	Moderate to Severe S,SE	Moderate to Severe SP,S	Slight to Severe S	Slight to Severe S	Moderate to Severe LS,S	Moderate to Severe C,S	Slight to Severe C,S	Slight to Severe C,S	Moderate to Severe C,S,SM	Good	Good
Mayodan	Moderate to Severe SE,S	Moderate to Severe SP,S	Slight to Severe S	Moderate to Severe LS,S	Moderate to Severe S,LS	Moderate to Severe C,S	Slight to Severe S	Slight to Severe S	Slight to Severe S	Good	Good
Mecklenburg	Moderate to Severe R,S	Severe SP,S	Slight to Severe S	Severe LS,S	Severe LS,S	Severe C,S	Slight to Severe S,SM	Slight to Severe S,SM	Moderate to Severe S,SM	Good	Good
Nason	Moderate to Severe R,SE,S	Moderate to Severe R,SP,S	Moderate to Severe R,S	Moderate to Severe SS,S	Severe LS,S	Moderate to Severe C,S	Slight to Severe S	Slight to Severe S	Moderate to Severe SM,S	Good	Good
Orange	Severe W,S	Severe SP,W	Severe W	Severe W,SS,S	Severe LS,SS	Severe W	Severe W	Moderate W,SP,S	Severe W,S	Fair	Good
Pacolet	Moderate to Severe SE,S	Moderate to Severe SP,S	Slight to Severe S	Slight to Severe S	Severe L,S	Moderate to Severe C,S	Slight to Severe S,SM	Slight to Severe S,SM	Moderate to Severe S,SM	Fair	Good
Pinkston	Severe R,S	Severe R,S	Severe SE,S	Moderate to Severe R,S	Moderate to Severe R,S	Severe R,S	Slight to Moderate S,SM	Slight to Moderate S,SM	Slight to Severe S,R,SM	Fair	Good
Roanoke	Slight	Severe F,SP,W	Severe F,W	Severe F,LS,W	Severe F,LS,W	Severe F,W,C	Severe F,W,SP	Severe W	Severe F,W,SP	Poor	Fair
Sedgefield	Slight to Severe S	Severe SP,W	Moderate W	Severe SS	Severe SS	Severe C,W	Moderate SP	Moderate W	Moderate SP,W	Good	Good
Spray	Moderate SE,S	Moderate SP	Slight	Moderate LS,S	Moderate LS	Moderate C	Slight to Moderate C,D	Slight to Moderate C,D	Slight to Moderate S,C,D	Fair	Good
Tatum	Moderate to Severe SE,R	Moderate to Severe R,SP,S	Moderate to Severe R,S	Moderate to Severe SS,S	Severe LS,S	Moderate to Severe C,S	Slight to Severe SM,S	Slight to Severe SM,S	Moderate to Severe S,SM	Fair	Good
Vance	Moderate to Severe SP,S	Severe SP,S	Slight to Severe S	Severe LS,S	Severe LS,S	Severe C,S	Moderate to Severe SP,S	Slight to Severe S	Moderate to Severe SP,S	Good	Good
Wadesboro	Moderate to Severe R,SE,S	Moderate to Severe R,SP,S	Moderate to Severe R,S,C	Moderate to Severe SS,S	Severe LS,S	Moderate to Severe C,S	Slight to Severe S	Slight to Severe S	Moderate to Severe S	Good	Good
Wedowee	Moderate to Severe S	Moderate to Severe SP,S	Slight to Severe S	Moderate to Severe LS,SS,S	Moderate to Severe LS,SS,S	Moderate to Severe C,S	Slight to Severe C,S	Slight to Severe C,S	Moderate to Severe S,C	Good	Good
Wehadkee	Severe W,F	Severe W	Severe SE,W,F	Severe W,F	Severe W,F	Severe F,W	Severe W,F	Severe W	Severe W,F	Poor	Poor
Wilkes	Moderate to Severe S,R	Severe R,S	Severe SE,S	Moderate to Severe S,SS	Slight to Severe S	Moderate to Severe R,S	Moderate to Severe SP,S	Slight to Severe S	Moderate to Severe S,SP	Fair	Good



Abbreviations

C — Too Clayey
D — Dusty
F — Floods
FA — Frost Action
LS — Low Strength
MP — Moderate Permeability
PR — Percolates Rapidly
R — Depth to Rock (soil shallowness)
S — Slope
SE — Seepage
SM — Small Rocks
SP — Slow Percolation
SS — Shrink — Swell
ST — Large Stones
W — Wetness

A **slight** limitation indicates that soil properties are favorable for the specified use; any limitation is minor and easily overcome.

A **moderate** limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design.

A **severe** limitation indicates one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Good, Fair and Poor — These terms are parallel to slight, moderate and severe definitions.

Physical characteristics and engineering properties were furnished by the U.S. Department of Agriculture, Soil Conservation Service. Appreciation is expressed to Hubert J. Byrd and Ernest N. Hayhurst, Soil Conservation Service, and O. Don Philen, Natural Resources and Community Development, Soil Survey Section, for their help in preparing these charts.

Graphic from source map: North Carolina (Region G). Of note, not all soils presented in the above figure are present within the extent of the GRI digital geologic-GIS data as this extent is only a limited extent within the full source map extent.

Physical Characteristics of Soils

PHYSICAL CHARACTERISTICS OF SOILS

Rock Type	Soil Series	Natural Drainage	Susceptibility to Erosion	Permeability	Shrink-Swell Characteristics	Thickness of Soil Solum (inches)	Depth to Bedrock (feet)	Slopes (percent)
Felsic intrusives, felsic intrusive complexes	Appling	Good	Slight to Moderate	Moderate	Low	40–60	6–15	0–15
Argillite	Badin	Good	Slight to Moderate	Moderate	Low	20–40	2–4	2–45
Felsic intrusives	Cecil	Good	Moderate to Severe	Moderate	Low	40–60	6–40	0–25
Alluvium	Chewacla	Poor	Slight	Moderate	Low	36–>72	5–>10	0–2
Alluvium	Congaree	Good	Slight	Moderate	Low		8–20	0–4
Mafic to intermediate intrusives, mafic volcanics	Coronaca	Good	Slight to Moderate	Moderate	Low	60–>100	>10	2–15
Mafic and intermediate intrusives, mafic volcanics	Davidson	Good	Moderate to Severe	Moderate	Low	60–>100	6–25	2–25
Felsic intrusives	Durham	Good	Slight to Moderate	Moderate	Low		6–15	2–10
Intermediate intrusives, felsic intrusives mixed with mafic dikes, volcaniclastic-epiclastics	Enon	Good	Moderate to Severe	Slow	Moderate to High	20–44	3–8	2–25
Felsic, intermediate and mafic volcanics, argillite	Georgeville	Good	Severe	Moderate	Low	40–70	10	2–25
Felsic volcanics	Goldston	Good	Moderate to Severe	Moderately Rapid	Low	20	1.5–3.5	2–45
Triassic sandstone, siltstone, and shales	Hanceville	Good	Moderate to Severe	Moderate	Low to Moderate	40–72	5–9	0–40
Felsic intrusives mixed with mafic dikes	Helena	Fair	Moderate to Severe	Slow	Moderate	46	4	0–15
Felsic volcanics	Herndon	Good	Moderate to Severe	Moderate	Low	>30	4–8	2–15
Mafic and intermediate intrusives or mixed felsic and mafic intrusives	Hiwassee	Good	Slight to Moderate	Moderate	Low	40–>60	>5	2–25
Mafic volcanics, intermediate and mafic intrusives, and diabase	Iredell	Fair	Moderate to Severe	Slow	High	20–40	2–8	0–15
Triassic sediments	Leaksville	Poor	Slight	Slow	Moderate to High	20–40	2–5	0–4
Sheared felsic volcanics, volcaniclastic-epiclastics	Lignum	Poor	Moderate	Moderately Slow to Slow	Moderate	20–40	>3.5	0–15
Porphyritic granite	Lockhart	Good	Moderate	Moderately Rapid	Low	30–72	6–15	6–40
Mica gneisses and schists	Madison	Good	Moderate to Severe	Moderate	Low	20–40	>5	2–35
Triassic sediments	Mayodan	Good	Moderate to Severe	Moderate	Low	40–60	>5 up to 10	1–25
Intermediate and mafic intrusives and mafic volcanics	Mecklenburg	Good	Moderate to Severe	Slow	Moderate	20–40	4–15	2–20
Felsic volcanics, phyllite, argillite, volcaniclastic-epiclastics	Nason	Good	Moderate to Severe	Moderate	Moderate	25–50	3.5–5	0–25
Felsic volcanics	Orange	Fair		Slow	High	20–40	3.5–5.5	0–15
Felsic intrusives, felsic gneisses	Pacolet	Good	Severe	Moderate	Low	18–30	>5	2–40
Triassic sediments	Pinkston	Good	Severe	Moderately Rapid	Low	12–35	1.5–3.5	0–45
Terrace deposits	Roanoke	Poor	Slight	Slow	Moderate	40–60	>10	0–2
Mixed felsic and mafic intrusives	Sedgefield	Fair	Slight to Moderate	Slow	High	20–40	>4	0–10
Triassic sediments	Spray	Good	Slight	Moderate	Low to Moderate	10–20	>5	0–5
Argillite, phyllite	Tatum	Good	Moderate to Severe	Moderate	Low	25–50	3.5–5	2–30
Felsic intrusives	Vance	Good	Moderate to Severe	Slow	Moderate	24–40	6–>10	2–25
Triassic sediments	Wadesboro	Good	Moderate to Severe	Moderate	Low	15–40	3.5–5	2–40
Felsic intrusives	Wedowee	Good	Moderate to Severe	Moderate	Moderate	20–40	>4	5–60
Alluvium	Wehadkee	Poor	Slight	Moderate	Low	30–60	8–20	0–2
Felsic intrusives with mafic dikes, intermediate intrusives, hornblende gneiss	Wilkes	Good	Moderate to Severe	Moderate	Low	10–20	3.5–7	4–60

SHRINK-SWELL POTENTIAL

Shrink-swell behavior is that quality of the soil that determines its volume change with respect to moisture content. Building foundations, roads and other structures may be severely damaged by the shrinking and swelling of soils. The volume change of soils is influenced by the amount of moisture change and the amount and kind of clay present in the soil.

The methods used in determining the shrink-swell potential of soils are (1) the Coefficient of Linear Extensibility (COLE) used by soil scientists; (2) the Shrinkage Index used by soil engineers; and (3) the Potential Volume Change (PVC) used by the Federal Housing Administration.

Three classes are used to help interpret soil maps for shrink-swell behavior — low, moderate, and high. In rare instances, a rating of very high may be justified.

Shrink-Swell Potential:

	Low	Moderate	High
COLE	.03	.03 to .06	.06
Shrinkage Index	15	15 to 30	30
PVC	2	2 to 4	4

Good, Fair and Poor — These terms are parallel to slight, moderate and severe definitions.

PERMEABILITY

Permeability relates only to movement of water downward through undisturbed materials. These values should be expressed in terms of inches per hour.

The following classes are used to rate the soil permeability:

Permeability Class	Grouping for Report
Very slow	Less than 0.06
Slow	0.06 to 0.2
Moderately slow	0.2 to 0.6
Moderate	0.6 to 2.0
Moderately rapid	2.0 to 6.0
Rapid	6.0 to 20
Very rapid	Over 20

Graphic from source map: North Carolina (Region G). Of note, not all soils presented in the above legend are present within the extent of the GRI digital geologic-GIS data as this extent is only a limited extent within the full source map extent.

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