United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with North Carolina Department of Environment and Natural Resources, North Carolina Agricultural Research Service, North Carolina Cooperative Extension Service, Rutherford Soil and Water Conservation District, and Rutherford County Board of Commissioners

Soil Survey of Rutherford County, North Carolina

How To Use This Soil Survey

General Soil Map

The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

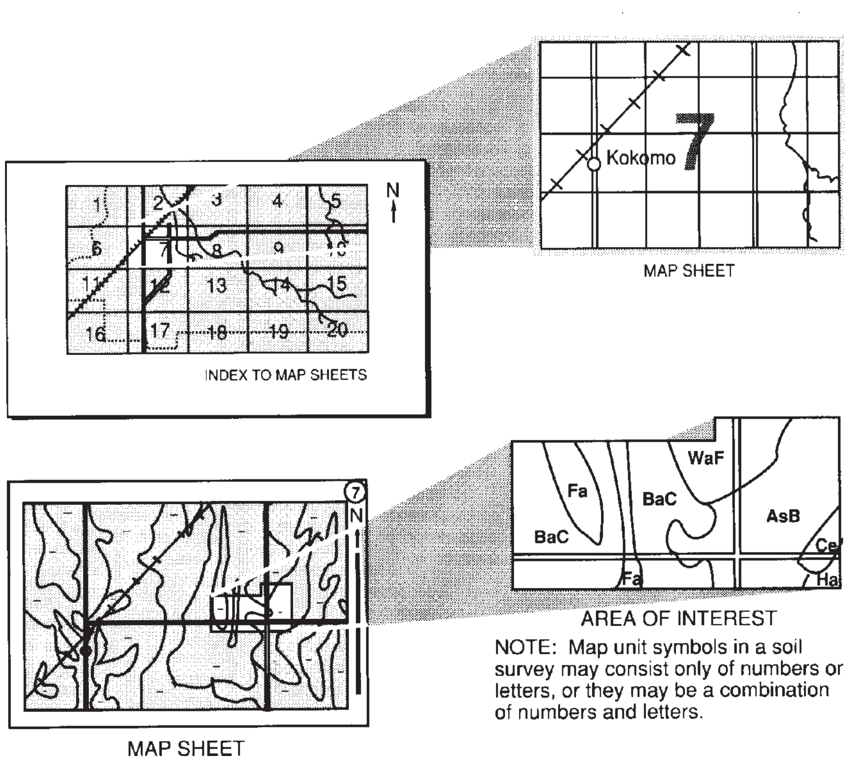
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the North Carolina Agricultural Research Service, and local agencies. The Natural Resources Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in May 1997. Soil names and descriptions were approved in October 1997. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1997. This soil survey was made cooperatively by the Natural Resources Conservation Service, the North Carolina Department of Environment and Natural Resources, the North Carolina Agricultural Research Service, the North Carolina Cooperative Extension Service, the Rutherford Soil and Water Conservation District, and the Rutherford County Board of Commissioners. The survey is part of the technical assistance furnished to the Rutherford Soil and Water Conservation District. The Rutherford County Board of Commissioners provided financial assistance for the survey.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: Hayland is a common use of Piedmont upland soils, such as Pacolet and Madison soils. Fannin and Cowee soils are the dominant soils in the forested, higher areas on mountains in the background.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

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Foreword

This soil survey contains information that can be used in land-planning programs in Rutherford County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

Mary K. Combs
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Rutherford County, North Carolina

By Scott C. Keenan, North Carolina Department of Environment and Natural Resources, and J. Craig Harris, Natural Resources Conservation Service

Soils surveyed by Scott C. Keenan, North Carolina Department of Environment and Natural Resources, and J. Craig Harris and L. Lee Mallard, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
North Carolina Department of Environment and Natural Resources, North Carolina Agricultural Research Service, North Carolina Cooperative Extension Service, Rutherford Soil and Water Conservation District, and Rutherford County Board of Commissioners

RUTHERFORD COUNTY is in the southwestern part of North Carolina (fig. 1). In 1990, the county had a population of 56,919 *(26)*. Rutherfordton, the county seat, had a population of 3,617. Forest City, the largest town in the county, had a population of 7,475. Rutherford County has a total area of 364,429 acres, or about 570 square miles.

This soil survey updates the survey of Rutherford County published in 1924 *(17)*. It provides more detailed maps on aerial photographs and contains more interpretive information.

General Nature of the County

This section gives general information about Rutherford County. It describes the history and economic development; physiography, relief, and drainage; and climate.

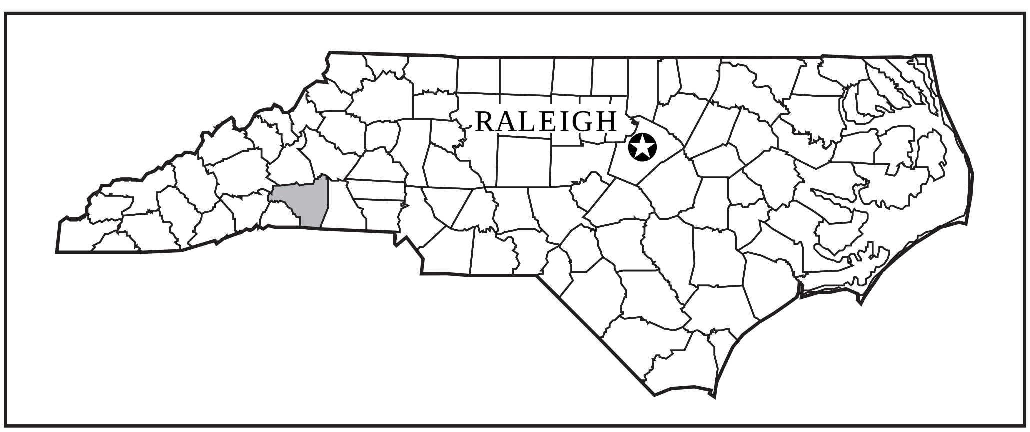

Figure 1.—Location of Rutherford County in North Carolina.

History and Economic Development

Rutherford County was established in 1779 from part of Tryon County. It was named in honor of General Griffith Rutherford, who gained fame in the Revolutionary War. Rutherford Town became the county seat in 1787, and its name was later changed to Rutherfordton *(10)*. By 1847, Buncombe, Cleveland, and Polk Counties were established from portions of the original area of Rutherford County.

The first permanent settlers, drawn to the area by land grants, began arriving in 1764 *(10)*. They were mainly of Scotch-Irish, English, and German descent. In 1768, a Presbyterian church, one of the first west of the Catawba River, was established in the Cane Creek area. Trading posts and forts were also constructed during this period and included Pott's Fort near Whitehouse and Fort McFadden near Rutherfordton. These forts were later used during the Revolutionary War.

According to a 1790 census of Rutherford County, corn and other grains, cattle, and hogs were the county's chief agricultural products *(10)*. During this time, most agricultural exports were transported by boat along the Broad River. Around the early 1800's, cotton production began to become increasingly important to the economy of the county. By 1810, the county had 28 cotton gins in operation and its population had grown to about 13,000 *(10)*.

In 1828, gold was discovered in the county. In 1831, Christopher and Augustus Betchler, father and son immigrants from Germany, started a mint near Rutherfordton. During the 1830's, Rutherford County was part of an area that produced an average of about 750,000 dollars worth of gold annually *(16)*. The major gold mining operations in the county, however, had ended by 1852 because of dwindling local finds and new gold discoveries in California. Between 1840 and 1850, the county experienced a decrease in growth and population *(10)*.

Sustained industrial development began in Rutherford County following the Civil War. During the Civil War, Rutherford County was spared major battlefield action with the exception of a lone raid by General George Stoneman's Union Calvary in 1865. Economically, the war brought significant hardship to most residents. By 1874, however, the economic situation had improved and textile plants began operating and manufacturing cotton yarn. Early textile plants were located in Caroleen, Henrietta, and Forest City. By 1900, the textile industry was a major employer in the county.

In 1887, the Carolina Central Railroad was completed, linking Rutherfordton to cities such as Charlotte and Wilmington *(10)*. Further railroad links to other towns and cities encouraged more industrial development, and communities began to develop along the railroads. Railroads remained the mainstay of the transportation system until the 1920's when road construction and road improvement accelerated. By the 1930's, both U.S. Highway 74 and U.S. Highway 221 had paved sections within the county. The present-day road system provides most areas of the county with easy access to major highways, including U.S. Highways 221, 64, and 74.

Today, Rutherford County has a diversity of industries, which manufacture goods such as food products, woven and knitted goods, apparel, wood products, and rubber *(7)*. Manufacturing and retail trade currently account for most of the employment opportunities within the county.

Rutherford County also has a diversity of agriculture. The major row crops include corn, small grain, soybeans, and cotton. Vegetables include tomatoes, squash, pumpkins, and cucumbers. Most of the cropland is in areas of flood plain soils and gently sloping or strongly sloping soils on divides in the Piedmont part of the county. On the steeper soils, pasture and hayland and managed pine plantations are becoming increasingly important to the local economy. Today, hardwood timber continues to provide employment to local residents as it did in the county's early history (fig. 2).

Figure 2.—The soils of Rutherford County support large acreages of hardwood timber. The timber industry provides employment to many residents.

The mountain scenery and mild climate of Rutherford County have encouraged tourism. The Lake Lure and Hickory Nut Gorge areas in the mountains are important tourist attractions. Rutherford County is also in a part of North Carolina that is becoming increasingly popular for retirement living.

Physiography, Relief, and Drainage

Rutherford County is located within the western Piedmont and eastern Blue Ridge Major Land Resource Areas. According to U.S. Geological Survey topographic maps, the county ranges in elevation from about 3,965 feet, on Sugar Loaf Mountain on the western edge of the county, to about 650 feet, in the eastern part of the county along the Broad River where the river enters Cleveland County. Rutherfordton, the county seat, is at an elevation of about 1,095 feet.

The county is drained by the Broad River and its numerous tributaries, including the First and Second Broad Rivers, Catheys Creek, and Mountain Creek. The overall drainage pattern is northwest to southeast.

About 24 percent of the landforms and soils in Rutherford County are in the mountains (fig. 3). The mountain soils have slopes ranging from strongly sloping to very steep. The dominant soils are loamy soils that range in depth from shallow to very deep. Stones or boulders are commonly scattered across the surface of most soils. The major mountain landform positions include long narrow summits, irregularly shaped side slopes, and bouldery colluvial fans. Most mountain landforms and soils are at elevations above 1,200 feet. In a few areas, however, colluvial fans and small mountain flood plains finger into the Piedmont at elevations as low as 950 feet. In the western part of the county, within Hickory Nut Gorge, numerous spectacular rocky mountain escarpments occur in association with the county's largest colluvial fans.

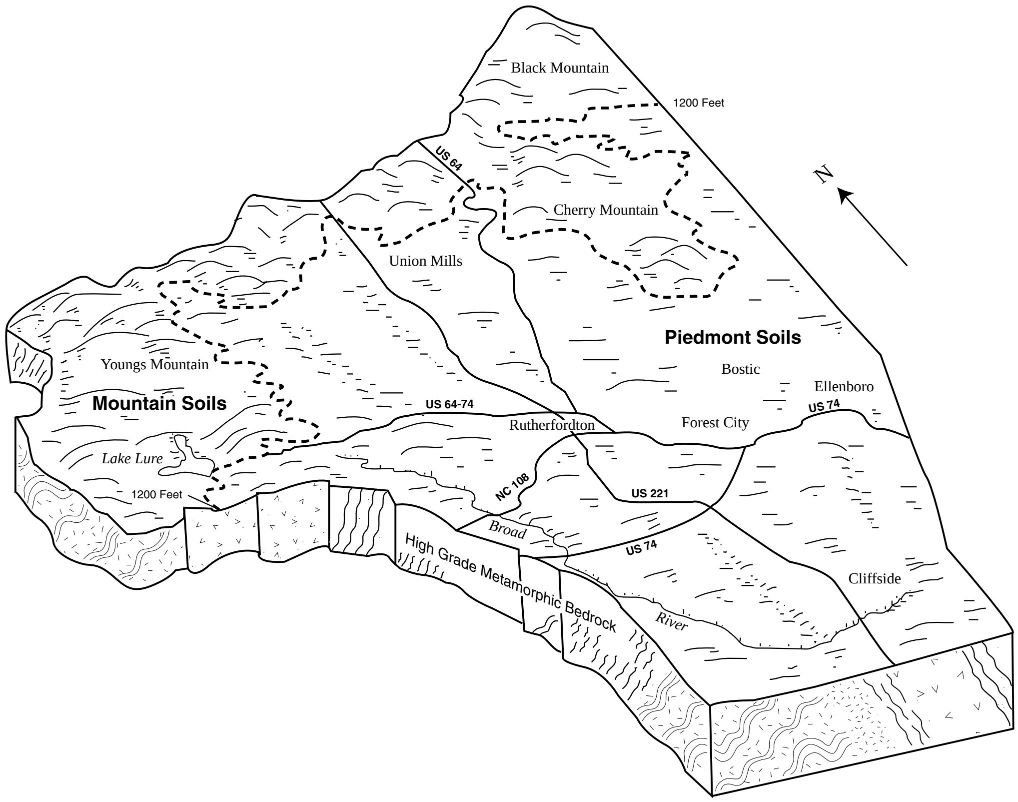

Figure 3.—A physiographic overview of Rutherford County showing the locations and relative proportions of mountain and Piedmont landforms.

About 76 percent of the landforms and soils in Rutherford County are in the Piedmont. Most Piedmont landforms and soils occur at elevations below 1,200 feet. On the divides, the soils are dominantly strongly sloping to steep and have a clayey subsoil. Depth to bedrock is very deep or moderately deep. Landform positions typically include summits that are wider than and side slopes that are shorter than their mountain counterparts. The widest summits occur in the southeastern part of the county. Soils on Piedmont landscapes are generally less stony than those in the mountains. Most of the flood plain and stream terrace landforms in the county occur in the Piedmont.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Forest City, North Carolina, in the period 1976 to 1996. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

The yearly average daily minimum temperature is 44.8 degrees F. The average daily minimum temperature ranges from a high of 64.2 degrees in July to a low of 25.2 degrees in January. The yearly average daily maximum temperature is 70.4 degrees. The average daily maximum temperature ranges from a high of 89.5 degrees in July to a low of 48.7 degrees in January. The lowest recorded temperature during the period of record is -8 degrees, and the highest is 106 degrees.

Growing degree days are shown in table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total average annual precipitation is about 51 inches. Of this, 27 inches, or about 53 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 16 inches. The heaviest 1-day rainfall during the period of record was 6.85 inches on August 18, 1986. Thunderstorms occur on about 45 days each year.

The average seasonal snowfall is about 6 inches. The greatest snow depth at any one time during the period of record was 16 inches. On the average, 4 days of the year have at least 1 inch of snow on the ground.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The sun shines 60 percent of the time possible in summer and 55 percent in winter. The prevailing wind is from the northwest. Average windspeed is highest, 10 miles per hour, in winter.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in Rutherford County. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They studied many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the material from which the soil formed.

Soils occur in an orderly pattern that results from the combined influence over time of climate, parent material, relief, and plants and animals. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils formed. This model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify the soils. After describing the soils and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. The data from these analyses and tests and from field-observed characteristics and soil properties are used to predict behavior of the soils under different uses. Interpretations are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a relatively high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in accurately locating boundaries.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Survey Procedures

The general procedures followed in making this survey are described in the "National Soil Survey Handbook" of the Natural Resources Conservation Service and in the "Soil Survey Manual" *(20, 24)*.

Before fieldwork began, preliminary boundaries of slopes and landforms were plotted stereoscopically on aerial photographs taken in 1984 at a scale of 1:24,000. United States Geological Survey topographic maps at a scale of 1:24,000 were also used. Map units were then designed according to the pattern of soils interpreted from photographs, maps, and field observations.

Traverses were made on foot. The soils were examined at intervals ranging from a few hundred feet to as much as 1/4 mile, depending on the landscape and soil pattern. Where soil profiles were readily observable, such as along recently constructed access roads and along logging roads, observations of the content of rock fragments, depth to bedrock, depth of rooting, the landform, and the underlying material were made without regard to spacing. Observations of special features, such as landforms, vegetation, and evidence of flooding, were also made continuously without regard to spacing. Soil boundaries were determined on the basis of soil examinations, observations, and photo interpretations and were plotted stereoscopically on the basis of parent material, landform, and relief. The soils were examined with the aid of a bucket auger or a spade to a depth of about 3 to 5 feet.

Samples for chemical and physical analyses were taken from the site of the typical pedon of the major soils in the survey area. Most of the analyses were made by the Soil Survey Laboratory, Lincoln, Nebraska; the Soil Mechanics Laboratory, Ft. Worth, Texas; and the North Carolina State University Soils Laboratory, Raleigh, North Carolina. Commonly used laboratory procedures were followed *(21)*.

After completion of the soil mapping on aerial photographs, map unit delineations were transferred by hand to orthophotographs at a scale of 1:24,000. Surface drainage and cultural features were transferred from 7.5-minute topographic maps of the United States Geological Survey.

General Soil Map Units

The general soil map shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils and some minor soils or miscellaneous areas. It is named for the major soils. The components of one map unit can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Dominantly Gently Sloping to Steep, Well Drained Soils on Piedmont Uplands

1. Cecil-Pacolet

Gently sloping to moderately steep, very deep, well drained soils that have a clayey subsoil; on divides

Setting

Location in the survey area: Piedmont uplands in the southern and eastern parts of the county, below an elevation of 1,200 feet
Landscape: Piedmont
Landform: Divides
Landform position: Cecil—summits; Pacolet—summits and side slopes (fig. 4)
Slope range: 2 to 25 percent; dominantly 2 to 15 percent

Extent and Composition

Percent of the survey area: 7.5
Cecil soils—40 percent
Pacolet soils—37 percent
Minor soils (including Appling, Chewacla, Helena, and Worsham soils)—23 percent

Soil Characteristics

Cecil
Surface layer: Reddish brown sandy clay loam
Subsoil: In sequence downward, red clay, red clay that has strong brown mottles, red clay loam that has yellowish red mottles, and red clay loam that has pockets of reddish yellow sandy clay loam saprolite
Depth class: Very deep

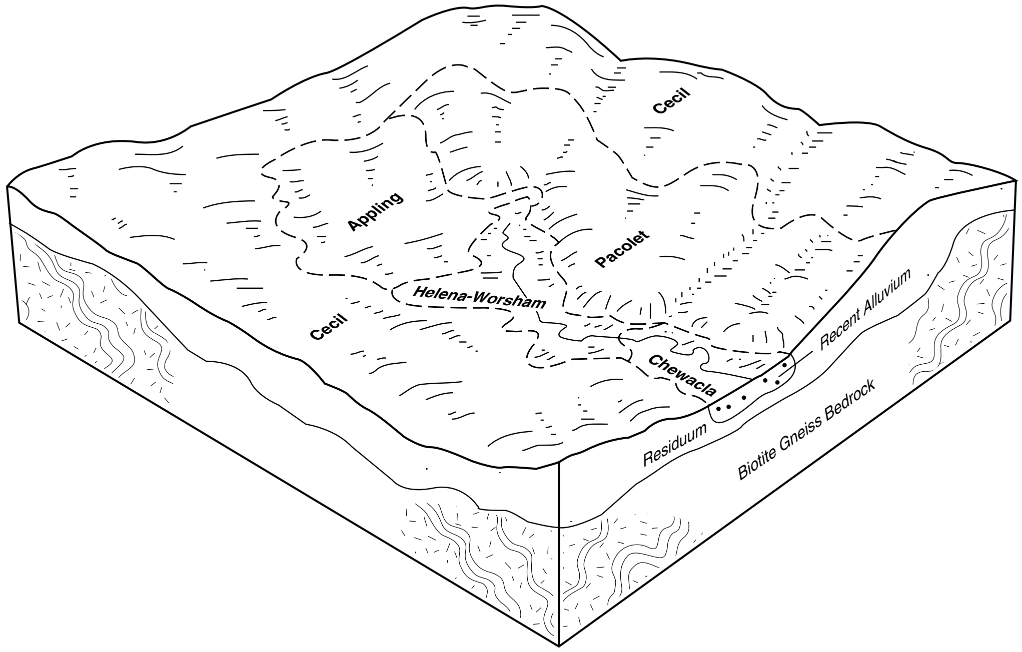

Figure 4.—Typical relationship of soils, landform position, and parent material in the Cecil-Pacolet general soil map unit.

Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 2 to 8 percent
Parent material: Residuum weathered from high-grade metamorphic rock, such as biotite gneiss

Pacolet
Surface layer: Dark reddish brown sandy clay loam
Subsoil: Upper part—red clay; lower part—red sandy clay loam
Underlying material: Upper part—red sandy loam saprolite; lower part—yellowish red sandy loam saprolite
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 8 to 15 percent
Parent material: Residuum weathered from high-grade metamorphic rock, such as biotite gneiss

Minor soils
- The well drained Appling soils, which have a yellow subsoil
- The somewhat poorly drained Chewacla soils on flood plains
- Random areas of the loamy Rion soils on steep slopes near drainageways
- The somewhat poorly drained Helena soils at the head of drainageways
- The poorly drained Worsham soils at the head of drainageways

Use and Management

Major Uses: Cropland, pasture and hayland, woodland, and urban development

Agricultural Development

Cropland
Management concerns: Erodibility, tilth, and soil fertility

Pasture and hayland
Management concerns: Cecil—erodibility; Pacolet—erodibility and equipment use

Woodland
Management concerns: Equipment use and seedling survival rates

Urban Development

Dwellings
Management concerns: Cecil—no significant limitations; Pacolet—slope

Septic tank absorption fields
Management concerns: Cecil—restricted permeability; Pacolet—restricted permeability and slope

Local roads and streets
Management concerns: Cecil—low strength; Pacolet—low strength and slope

Recreational Development

Camp areas
Management concerns: Slope

Picnic areas
Management concerns: Slope

Playgrounds
Management concerns: Slope

Paths and trails
Management concerns: Slope

2. Pacolet-Saw

Gently sloping to moderately steep, very deep and moderately deep, well drained soils that have a clayey subsoil; on uplands

Setting

Location in the survey area: Piedmont uplands in the southern and eastern parts of the county, below an elevation of 1,200 feet
Landscape: Piedmont
Landform: Divides
Landform position: Summits and side slopes
Slope range: 2 to 25 percent

Extent and Composition

Percent of the survey area: 5.5
Pacolet soils—51 percent
Saw soils—32 percent
Minor soils (including Chewacla, Rion, Cecil, and Cliffside soils)—17 percent

Soil Characteristics

Pacolet
Surface layer: Dark reddish brown sandy clay loam

Subsoil: Upper part—red clay; lower part—red sandy clay loam
Underlying material: Upper part—red sandy loam saprolite; lower part—yellowish red sandy loam saprolite
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 2 to 25 percent
Parent material: Residuum weathered from slightly metamorphosed granite

Saw
Surface layer: Strong brown sandy loam
Subsoil: Upper part—yellowish red sandy clay; lower part—strong brown sandy clay that has yellowish red mottles
Underlying material: Multicolored gravelly sandy loam saprolite
Bedrock: Hard granitic gneiss bedrock
Depth class: Moderately deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 2 to 25 percent
Parent material: Residuum weathered from slightly metamorphosed granite

Minor soils
- The somewhat poorly drained Chewacla soils on flood plains
- Random areas of the loamy Rion soils on steep slopes near drainageways
- Small areas of the very deep Cecil soils on broad, gently sloping ridges
- The moderately deep, loamy Cliffside soils on steep slopes near drainageways

Use and Management

Major Uses: Woodland, pasture and hayland, and dwellings

Agricultural Development

Cropland
Management concerns: Pacolet—erodibility, tilth, and soil fertility; Saw—erodibility, tilth, soil fertility, and equipment use

Pasture and hayland
Management concerns: Erodibility and equipment use

Woodland
Management concerns: Pacolet—equipment use and seedling survival rates; Saw—equipment use, windthrow hazard, and seedling survival rates

Urban Development

Dwellings
Management concerns: Pacolet—slope; Saw—slope and depth to bedrock

Septic tank absorption fields
Management concerns: Pacolet—restricted permeability and slope; Saw—restricted permeability, slope, and depth to bedrock

Local roads and streets
Management concerns: Low strength and slope

Recreational Development

Camp areas
Management concerns: Slope

Picnic areas
Management concerns: Slope

Playgrounds
Management concerns: Slope

Paths and trails
Management concerns: Slope

3. Pacolet-Bethlehem

Gently sloping to moderately steep, very deep and moderately deep, well drained soils that have a clayey subsoil; on divides

Setting

Location in the survey area: Piedmont uplands in the southern and eastern parts of the county, below an elevation of 1,200 feet
Landscape: Piedmont
Landform: Divides
Landform position: Summits and side slopes
Slope range: 2 to 25 percent

Extent and Composition

Percent of the survey area: 17
Pacolet soils—51 percent
Bethlehem soils—32 percent
Minor soils (including Chewacla, Rion, Cliffside, and Cecil soils)—17 percent

Soil Characteristics

Pacolet
Surface layer: Dark reddish brown sandy clay loam
Subsoil: Upper part—red clay; lower part—red sandy clay loam
Underlying material: Upper part—red sandy loam saprolite; lower part—yellowish red sandy loam saprolite
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 2 to 25 percent
Parent material: Residuum weathered from felsic, high-grade metamorphic rock, such as sillimanite schist and mica schist

Bethlehem
Surface layer: Brown gravelly sandy clay loam
Subsoil: Upper part—red clay; lower part—yellowish red gravelly sandy clay loam
Bedrock: Soft, weathered sillimanite schist and mica schist
Depth class: Moderately deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 2 to 25 percent
Parent material: Residuum weathered from felsic, high-grade metamorphic rock, such as sillimanite schist and mica schist

Minor soils
- The somewhat poorly drained Chewacla soils on flood plains

- Random areas of the loamy Rion and Cliffside soils on steep slopes near drainageways
- Small areas of the very deep Cecil soils on broad, gently sloping ridges

Use and Management

Major Uses: Woodland, pasture and hayland, and cropland

Agricultural Development

Cropland
Management concerns: Erodibility, tilth, and soil fertility

Pasture and hayland
Management concerns: Erodibility and equipment use

Woodland
Management concerns: Pacolet—equipment use and seedling survival rates; Bethlehem—equipment use, windthrow hazard, and seedling survival rates

Urban Development

Dwellings
Management concerns: Pacolet—slope; Bethlehem—slope and depth to bedrock

Septic tank absorption fields
Management concerns: Pacolet—restricted permeability and slope; Bethlehem—restricted permeability, slope, and depth to bedrock

Local roads and streets
Management concerns: Low strength and slope

Recreational Development

Camp areas
Management concerns: Slope

Picnic areas
Management concerns: Slope

Playgrounds
Management concerns: Slope

Paths and trails
Management concerns: Slope

4. Pacolet-Cecil

Gently sloping to moderately steep, very deep, well drained soils that have a clayey subsoil; on divides

Setting

Location in the survey area: Piedmont uplands in the west-central, central, and south-central parts of the county, below an elevation of 1,200 feet
Landscape: Piedmont
Landform: Divides
Landform position: Pacolet—summits and side slopes; Cecil—summits
Slope range: 2 to 25 percent, dominantly 8 to 25 percent

Extent and Composition

Percent of the survey area: 22
Pacolet soils—69 percent
Cecil soils—17 percent
Minor soils (including Rion, Chewacla, Appling, and Ashlar soils)—14 percent

Soil Characteristics

Pacolet
Surface layer: Dark reddish brown sandy clay loam
Subsoil: Upper part—red clay; lower part—red sandy clay loam
Underlying material: Upper part—red sandy loam saprolite; lower part—yellowish red sandy loam saprolite
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 8 to 25 percent
Parent material: Residuum weathered from high-grade metamorphic rock, such as biotite gneiss

Cecil
Surface layer: Reddish brown sandy clay loam
Subsoil: In sequence downward, red clay, red clay that has strong brown mottles, red clay loam that has yellowish red mottles, and red clay loam that has pockets of reddish yellow sandy clay loam saprolite
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 2 to 8 percent
Parent material: Residuum weathered from high-grade metamorphic rock, such as biotite gneiss

Minor soils
- The well drained Appling soils, which have a yellow subsoil
- The somewhat poorly drained Chewacla soils on flood plains
- Random areas of the loamy Rion soils on steep slopes near drainageways
- The moderately deep Ashlar soils, which have a loamy subsoil

Use and Management

Major Uses: Pasture and hayland, woodland, cropland, and urban development

Agricultural Development

Cropland
Management concerns: Erodibility, tilth, and soil fertility

Pasture and hayland
Management concerns: Pacolet—erodibility and equipment use; Cecil—erodibility

Woodland
Management concerns: Equipment use and seedling survival rates

Urban Development

Dwellings
Management concerns: Pacolet—slope; Cecil—no significant limitations

Septic tank absorption fields
Management concerns: Pacolet—restricted permeability and slope; Cecil—restricted permeability

Local roads and streets
Management concerns: Pacolet—low strength and slope; Cecil—low strength

Recreational Development

Camp areas
Management concerns: Slope

Picnic areas
Management concerns: Slope

Playgrounds
Management concerns: Slope

Paths and trails
Management concerns: Slope

5. Pacolet-Rion

Strongly sloping to very steep, very deep, well drained soils that have a clayey or loamy subsoil; on divides

Setting

Location in the survey area: Piedmont uplands in the west-central part of the county, dominantly below an elevation of 1,200 feet
Landscape: Piedmont
Landform: Divides
Landform position: Pacolet—summits and side slopes; Rion—side slopes
Slope range: 8 to 70 percent

Extent and Composition

Percent of the survey area: 6.5
Pacolet soils—59 percent
Rion soils—29 percent
Minor soils (including Ashlar, Chewacla, and Buncombe soils)—12 percent

Soil Characteristics

Pacolet
Surface layer: Dark reddish brown sandy clay loam
Subsoil: Upper part—red clay; lower part—red sandy clay loam
Underlying material: Upper part—red sandy loam saprolite; lower part—yellowish red sandy loam saprolite
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 8 to 15 percent
Parent material: Residuum weathered from high-grade metamorphic rock, such as biotite gneiss

Rion
Surface layer: Dark yellowish brown sandy loam
Subsoil: Upper part—strong brown sandy clay loam; middle part—yellowish red clay loam; lower part—yellowish red and red sandy clay loam that has pockets of sandy loam saprolite
Underlying material: Yellowish red sandy loam saprolite
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 25 to 45 percent
Parent material: Residuum weathered from high-grade metamorphic rock, such as biotite gneiss

Minor soils
- The somewhat poorly drained Chewacla soils on flood plains
- The excessively drained, sandy Buncombe soils on flood plains
- The moderately deep Ashlar soils, which have a loamy subsoil and are on steep side slopes

Use and Management

Major Uses: Woodland, pasture and hayland, and dwellings

Agricultural Development

Cropland
Management concerns: Erodibility and equipment use

Pasture and hayland
Management concerns: Erodibility and equipment use

Woodland
Management concerns: Equipment use and erodibility

Urban Development

Dwellings
Management concerns: Slope

Septic tank absorption fields
Management concerns: Pacolet—restricted permeability and slope; Rion—slope

Local roads and streets
Management concerns: Slope

Recreational Development

Camp areas
Management concerns: Slope

Picnic areas
Management concerns: Slope

Playgrounds
Management concerns: Slope

Paths and trails
Management concerns: Slope

6. Madison-Pacolet-Grover

Strongly sloping to steep, very deep, well drained soils that have a clayey or loamy subsoil; on divides

Setting

Location in the survey area: Piedmont uplands in the north-central and west-central parts of the county, below an elevation of 1,200 feet
Landscape: Piedmont
Landform: Divides
Landform position: Madison and Pacolet—summits and shoulder slopes; Grover—side slopes (fig. 5)
Slope range: 8 to 45 percent

Extent and Composition

Percent of the survey area: 15
Madison soils—54 percent
Pacolet soils—21 percent
Grover soils—10 percent
Minor soils (including Cecil, Chewacla, and Hiwassee soils)—15 percent

Soil Characteristics

Madison
Surface layer: Yellowish red clay loam
Subsoil: Upper part—red clay; middle part—red clay loam; lower part—yellowish red loam
Underlying material: Yellowish red and reddish brown loam saprolite that has a high content of mica

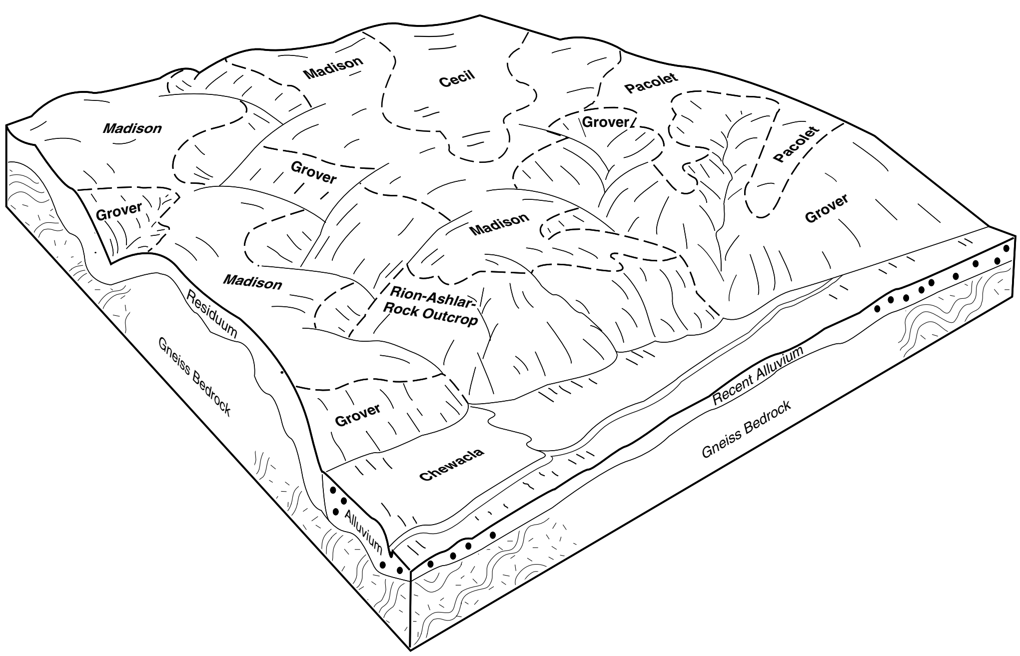

Figure 5.—Typical relationship of soils, landform position, and parent material in the Madison-Pacolet-Grover general soil map unit.

Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 8 to 25 percent
Parent material: Residuum weathered from metamorphic rock having a high content of mica, such as migmatitic gneiss

Pacolet
Surface layer: Dark reddish brown sandy clay loam
Subsoil: Upper part—red clay; lower part—red sandy clay loam
Underlying material: Upper part—red sandy loam saprolite; lower part—yellowish red sandy loam saprolite
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 8 to 25 percent
Parent material: Residuum weathered from high-grade metamorphic rock, such as biotite gneiss

Grover
Surface layer: Brown loam
Subsoil: Upper part—strong brown sandy clay loam; lower part—strong brown loam
Underlying material: Strong brown sandy loam saprolite that has a high content of mica and dark brown streaks
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 25 to 45 percent
Parent material: Residuum weathered from metamorphic rock having a high content of mica, such as migmatitic gneiss

Minor soils
- The well drained Cecil soils
- The somewhat poorly drained Chewacla soils on flood plains
- The well drained Hiwassee soils, which are dark red

Use and Management

Major Uses: Cropland, pasture and hayland, woodland, and urban development

Agricultural Development

Cropland
Management concerns: Madison and Pacolet—erodibility, equipment use, tilth, and soil fertility; Grover—erodibility and equipment use

Pasture and hayland
Management concerns: Erodibility and equipment use

Woodland
Management concerns: Madison and Pacolet—equipment use, erodibility, and seedling survival rates; Grover—erodibility and equipment use

Urban Development

Dwellings
Management concerns: Slope

Septic tank absorption fields
Management concerns: Madison and Pacolet—restricted permeability and slope; Grover—slope

Local roads and streets
Management concerns: Madison and Pacolet—low strength and slope; Grover—slope

Recreational Development

Camp areas
Management concerns: Slope

Picnic areas
Management concerns: Slope

Playgrounds
Management concerns: Slope

Paths and trails
Management concerns: Slope and highly erosive subsoil

Nearly Level and Gently Sloping, Excessively Drained to Somewhat Poorly Drained Soils on Flood Plains

7. Chewacla-Toccoa-Buncombe

Very deep, well drained to somewhat poorly drained soils that have a loamy subsoil or predominantly sandy underlying material; on flood plains

Setting

Location in the survey area: Flood plains of the Broad and Second Broad Rivers and their major tributaries
Landscape: Piedmont
Landform: Flood plains
Landform position: Chewacla—planar to slightly concave slopes; Toccoa—planar slopes; Buncombe—planar to slightly convex slopes (fig. 6)
Slope range: 0 to 5 percent

Extent and Composition

Percent of the survey area: 3
Chewacla soils—54 percent
Toccoa soils—19 percent
Buncombe soils—14 percent
Minor soils (including Skyuka, Hiwassee, Dogue, and Wehadkee soils)—13 percent

Soil Characteristics

Chewacla
Surface layer: Brown loam
Subsoil: In sequence downward, strong brown loam that has brown mottles, brown clay loam that has brown mottles and thin lenses of yellowish red sandy loam,

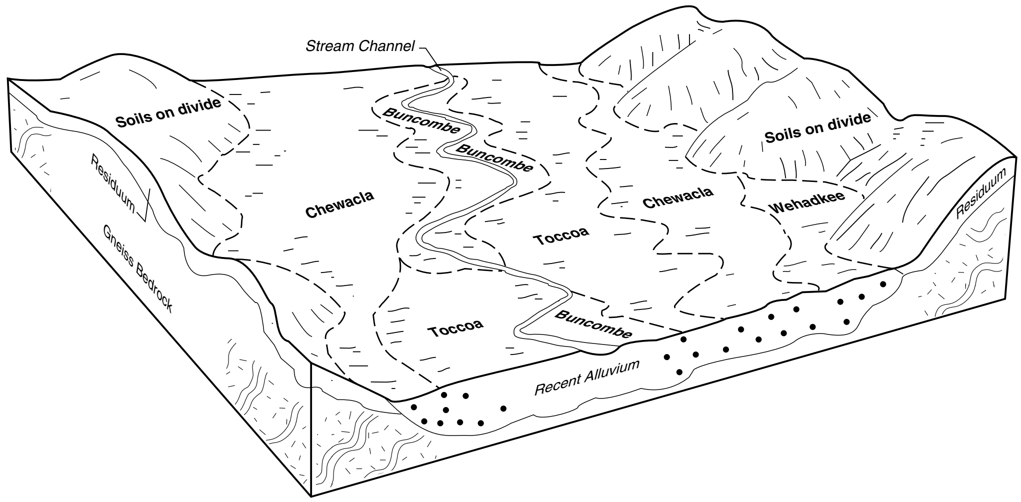

Figure 6.—Typical relationship of soils, landform position, and parent material in the Chewacla-Toccoa-Buncombe general soil map unit.

strong brown clay loam that has grayish brown iron depletions, and brown loam that has grayish brown iron depletions and yellowish red iron concentrations
Underlying material: Gray loam that has strong brown masses of iron accumulation
Depth class: Very deep
Drainage class: Somewhat poorly drained
Depth to high water table: 0.5 foot to 1.5 feet from November to April
Slope range: 0 to 2 percent
Parent material: Alluvium derived mainly from felsic, high-grade metamorphic or igneous rock

Toccoa
Surface layer: Dark yellowish brown sandy loam
Underlying material: In sequence downward, dark yellowish brown loam, yellowish brown loam, dark yellowish brown loam, and dark yellowish brown loamy sand
Depth class: Very deep
Drainage class: Well drained or moderately well drained
Depth to high water table: 2.5 to 5.0 feet from December to April
Slope range: 0 to 3 percent
Parent material: Alluvium derived mainly from felsic, high-grade metamorphic or igneous rock

Buncombe
Surface layer: Dark yellowish brown loamy sand
Underlying material: Upper part—yellowish brown sand; middle part—light yellowish brown and yellowish brown sand; lower part—dark yellowish brown sandy loam
Depth class: Very deep
Drainage class: Excessively drained
Depth to high water table: More than 6.0 feet
Slope range: 0 to 5 percent
Parent material: Alluvium derived mainly from felsic, high-grade metamorphic or igneous rock

Minor soils
- The well drained, clayey Skyuka soils on stream terraces
- The well drained, clayey Hiwassee soils, which are dark red and on stream terraces
- The clayey, moderately well drained Dogue soils on stream terraces
- The poorly drained Wehadkee soils in backwater areas on flood plains

Use and Management

Major Uses: Cropland, pasture and hayland, and woodland

Agricultural Development

Cropland
Management concerns: Chewacla—flooding and wetness; Toccoa—flooding; Buncombe—flooding, droughtiness, and leaching of nutrients

Pasture and hayland
Management concerns: Chewacla—flooding and wetness; Toccoa—flooding; Buncombe—flooding, droughtiness, and leaching of nutrients

Orchard and Ornamental Crops
Management concerns: Chewacla—flooding and wetness; Toccoa—flooding; Buncombe—flooding, droughtiness, and leaching of nutrients

Woodland
Management concerns: Chewacla—equipment use and competition from undesirable plants; Toccoa—equipment use; Buncombe—equipment use and seedling survival rates

Urban Development

Dwellings
Management concerns: Chewacla—flooding and wetness; Toccoa and Buncombe—flooding

Septic tank absorption fields
Management concerns: Chewacla—flooding and wetness; Toccoa—flooding; Buncombe—flooding and poor filtering capacity

Local roads and streets
Management concerns: Chewacla—flooding and wetness; Toccoa and Buncombe—flooding

Recreational Development

Camp areas
Management concerns: Chewacla—flooding and wetness; Toccoa—flooding; Buncombe—flooding and a high content of sand

Picnic areas
Management concerns: Chewacla—flooding and wetness; Toccoa—flooding; Buncombe—flooding and a high content of sand

Playgrounds
Management concerns: Chewacla—flooding and wetness; Toccoa—flooding; Buncombe—flooding and a high content of sand

Paths and trails
Management concerns: Chewacla—flooding and wetness; Toccoa—flooding; Buncombe—flooding and a high content of sand

Moderately Steep to Very Steep, Well Drained and Somewhat Excessively Drained Soils on Mountain Uplands

8. Evard-Cowee-Fannin

Well drained soils that are very deep and moderately deep and have a predominantly stony surface layer and a loamy subsoil

Setting

Location in the survey area: Northeastern, northern, and northwestern edges of the county
Landscape: Low mountains
Landform: Mountains
Landform position: Summits and side slopes
Slope range: 15 to 85 percent

Extent and Composition

Percent of the survey area: 18
Evard soils—58 percent
Cowee soils—17 percent
Fannin soils—10 percent
Minor soils (including Greenlee, Tate, Bandana, and Ostin soils)—15 percent

Soil Characteristics

Evard
Surface layer: Brown sandy loam
Subsurface layer: Dark yellowish brown sandy loam
Subsoil: Upper part—strong brown sandy clay loam; middle part—yellowish red clay loam; lower part—strong brown sandy clay loam
Underlying material: Upper part—brownish yellow fine sandy loam saprolite; lower part—light yellowish brown sandy loam saprolite
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 15 to 85 percent
Parent material: Residuum and soil creep weathered from felsic, high-grade metamorphic or igneous rock

Cowee
Surface layer: Dark yellowish brown gravelly sandy loam
Subsurface layer: Brown gravelly sandy loam
Subsoil: Upper part—brown gravelly sandy clay loam; lower part—yellowish red gravelly clay loam that has red and yellowish red mottles
Bedrock: Upper part—soft, weathered gneiss, sillimanite schist, or mica schist bedrock; lower part—hard gneiss, sillimanite schist, or mica schist bedrock
Depth class: Moderately deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 15 to 85 percent

Parent material: Residuum and soil creep weathered from felsic, high-grade metamorphic or igneous rock

Fannin
Surface layer: Dark yellowish brown fine sandy loam
Subsoil: Upper part—strong brown sandy clay loam; middle part—yellowish red clay loam; lower part—yellowish red sandy clay loam
Underlying material: Upper part—strong brown loam saprolite that has a high content of mica; lower part—loam saprolite that is multicolored in shades of brown, yellow, and black and has a high content of mica
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 15 to 85 percent
Parent material: Residuum and soil creep weathered from metamorphic rock having a high content of mica, such as migmatitic gneiss

Minor soils
- Greenlee soils that formed in colluvium and have more rock fragments in the subsoil than the major soils
- Tate soils that formed in colluvium and have a brown subsoil
- Bandana soils that are on nearly level flood plains and are somewhat poorly drained
- Ostin soils that are on nearly level flood plains and are well drained or moderately well drained

Use and Management

Major Uses: Woodland, dwellings, and pasture

Agricultural Development

Cropland
Management concerns: Evard and Fannin—erodibility and equipment use; Cowee—rooting depth, droughtiness, erodibility, and equipment use

Pasture and hayland
Management concerns: Evard and Fannin—erodibility and equipment use; Cowee—rooting depth, droughtiness, erodibility, and equipment use

Orchard and Ornamental Crops
Management concerns: Evard and Fannin—erodibility and equipment use; Cowee—rooting depth, droughtiness, erodibility, and equipment use

Woodland
Management concerns: Evard and Fannin—equipment use and erodibility; Cowee—equipment use, erodibility, and windthrow hazard

Urban Development

Dwellings
Management concerns: Evard—slope; Cowee—depth to bedrock and slope; Fannin—slope and erodibility

Septic tank absorption fields
Management concerns: Evard and Fannin—slope and restricted permeability; Cowee—slope, depth to bedrock, and restricted permeability

Local roads and streets
Management concerns: Evard and Cowee—slope and frost action; Fannin—slope, frost action, and erodibility

Recreational Development

Camp areas
Management concerns: Slope

Picnic areas
Management concerns: Slope

Playgrounds
Management concerns: Evard and Fannin—slope; Cowee—slope and depth to bedrock

Paths and trails
Management concerns: Slope

9. Cliffield-Evard-Cowee-Pigeonroost

Very deep and moderately deep, well drained soils that have a predominantly stony surface layer and a loamy subsoil

Setting

Location in the survey area: Northeastern corner and east-central area of the county
Landscape: Low mountains
Landform: Mountain slopes
Landform position: Summits and side slopes
Slope range: 15 to 95 percent

Extent and Composition

Percent of the survey area: 2
- Cliffield soils—33 percent
- Evard soils—28 percent
- Cowee soils—13 percent
- Pigeonroost soils—13 percent
- Minor inclusions—13 percent (including Rock outcrop and Greenlee and Tate soils)

Soil Characteristics

Cliffield
Surface layer: Dark yellowish brown very cobbly sandy loam
Subsoil: Brown very cobbly sandy clay loam
Bedrock: Hard sillimanite schist or mica schist
Depth class: Moderately deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 15 to 95 percent
Parent material: Residuum and soil creep weathered from felsic, high-grade metamorphic or igneous rock

Evard
Surface layer: Brown sandy loam
Subsurface layer: Dark yellowish brown sandy loam
Subsoil: Upper part—strong brown sandy clay loam; middle part—yellowish red clay loam; lower part—strong brown sandy clay loam
Underlying material: Upper part—brownish yellow fine sandy loam saprolite; lower part—light yellowish brown sandy loam saprolite

Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 15 to 85 percent
Parent material: Residuum and soil creep weathered from felsic, high-grade metamorphic or igneous rock

Cowee
Surface layer: Dark yellowish brown gravelly sandy loam
Subsurface layer: Brown gravelly sandy loam
Subsoil: Upper part—brown gravelly sandy clay loam; lower part—yellowish red gravelly clay loam that has red and yellowish red mottles
Bedrock: Upper part—soft, weathered gneiss, sillimanite schist, or mica schist bedrock; lower part—hard gneiss, sillimanite schist, or mica schist bedrock
Depth class: Moderately deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 15 to 85 percent
Parent material: Residuum and soil creep weathered from felsic, high-grade metamorphic or igneous rock

Pigeonroost
Surface layer: Brown gravelly sandy loam
Subsoil: Upper part—dark yellowish brown gravelly sandy clay loam; lower part—strong brown gravelly sandy clay loam
Bedrock: Soft, weathered sillimanite-mica schist
Depth class: Moderately deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 15 to 50 percent
Parent material: Residuum and soil creep weathered from felsic, high-grade metamorphic or igneous rock

Minor inclusions
- The moderately deep Cowee soils that have a subsoil that is redder than that of the major soils
- Areas of Rock outcrop having little or no soil material
- Greenlee soils that formed in colluvium and have more rock fragments in the subsoil than the major soils
- Tate soils that formed in colluvium and have a brown subsoil

Use and Management

Major Uses: Woodland

Agricultural Development

Cropland
Management concerns: Cliffield—equipment use, tilth, and droughtiness; Evard—equipment use and erodibility; Cowee and Pigeonroost—equipment use, droughtiness, and erodibility

Pasture and hayland
Management concerns: Cliffield—equipment use, droughtiness, and tilth; Evard—equipment use and erodibility; Cowee and Pigeonroost—equipment use and droughtiness

Orchard and Ornamental Crops

Management concerns: Cliffield, Cowee, and Pigeonroost—equipment use, erodibility, and droughtiness; Evard—equipment use and erodibility

Woodland

Management concerns: Cliffield—erodibility, equipment use, seedling survival rates, and windthrow hazard; Evard—equipment use and erodibility; Cowee and Pigeonroost—erodibility, equipment use, and windthrow hazard

Urban Development

Dwellings

Management concerns: Cliffield, Cowee, and Pigeonroost—slope and depth to bedrock; Evard—slope

Septic tank absorption fields

Management concerns: Cliffield, Cowee, and Pigeonroost—depth to bedrock and slope; Evard—slope

Local roads and streets

Management concerns: Cliffield, Cowee, and Pigeonroost—depth to bedrock, slope, and frost action; Evard—slope and frost action

Recreational Development

Camp areas

Management concerns: Cliffield—slope and content of rock fragments; Evard, Cowee, and Pigeonroost—slope

Picnic areas

Management concerns: Cliffield—slope, content of rock fragments, and erodibility; Evard, Cowee, and Pigeonroost—slope and erodibility

Playgrounds

Management concerns: Cliffield—slope, content of rock fragments, and erodibility; Evard, Cowee, and Pigeonroost—slope and erodibility

Paths and trails

Management concerns: Cliffield—slope, content of rock fragments, and erodibility; Evard, Cowee, and Pigeonroost—slope and erodibility

10. Ashe-Edneyville-Rock outcrop-Cleveland

Rock outcrop and moderately steep to very steep, shallow to very deep soils that have a predominantly loamy subsoil and formed in residuum affected by soil creep and weathered mainly from high-grade metamorphic rock, such as Henderson gneiss

Setting

Location in the survey area: Northwestern edge of the county
Landscape: Low and intermediate mountains
Landform: Mountains
Landform position: Summits and side slopes
Slope range: 15 to 95 percent

Extent and Composition

Percent of the survey area: 2.5
Ashe and similar soils—28 percent
Edneyville soils—24 percent

Rock outcrop—16 percent
Cleveland soils—13 percent
Minor soils (including Chestnut, Greenlee, and Tate soils)—19 percent

Soil Characteristics

Ashe
Surface layer: Dark brown gravelly sandy loam
Subsoil: Dark yellowish brown gravelly coarse sandy loam
Underlying material: Brown gravelly loamy coarse sand saprolite
Bedrock: Hard Henderson gneiss bedrock
Depth class: Moderately deep
Drainage class: Somewhat excessively drained
Depth to high water table: More than 6.0 feet
Slope range: 15 to 95 percent
Parent material: Residuum and soil creep weathered from felsic, high-grade metamorphic or igneous rock

Edneyville
Surface layer: Very dark grayish brown sandy loam
Subsurface layer: Dark brown sandy loam
Subsoil: Yellowish brown sandy loam
Underlying material: Upper part—gravelly sandy loam saprolite that is multicolored in shades of brown, yellow, and gray; lower part—sandy loam saprolite that is multicolored in shades of gray, brown, and white
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 15 to 50 percent
Parent material: Residuum and soil creep weathered from felsic, high-grade metamorphic or igneous rock

Rock outcrop
Rock outcrop consists of areas where bedrock extends above the surface of the soil.

Cleveland
Surface layer: Very dark grayish brown gravelly sandy loam
Subsoil: Dark yellowish brown gravelly sandy loam
Bedrock: Hard Henderson gneiss bedrock
Depth class: Shallow
Drainage class: Somewhat excessively drained
Depth to high water table: More than 6.0 feet
Slope range: 15 to 95 percent
Parent material: Residuum and soil creep weathered from felsic, high-grade metamorphic or igneous rock

Minor soils
- Cleveland soils that are shallow to bedrock and near areas of Rock outcrop
- The moderately deep, coarse-loamy Chestnut soils
- The extremely bouldery Greenlee soils in colluvial areas
- The fine-loamy, extremely stony Tate soils in colluvial areas

Use and Management

Major Uses: Woodland

Agricultural Development

Cropland
Management concerns: Equipment use and erodibility

Pasture and hayland
Management concerns: Equipment use and erodibility

Orchard and Ornamental Crops
Management concerns: Equipment use, erodibility, and rooting depth

Woodland
Management concerns: Equipment use, windthrow hazard, and rooting depth

Urban Development

Dwellings
Management concerns: Slope, depth to bedrock, and large stones

Septic tank absorption fields
Management concerns: Depth to bedrock and slope

Local roads and streets
Management concerns: Slope, depth to bedrock, and large stones

Recreational Development

Camp areas
Management concerns: Slope and depth to bedrock

Picnic areas
Management concerns: Slope and depth to bedrock

Playgrounds
Management concerns: Slope and depth to bedrock

Paths and trails
Management concerns: Slope

Strongly Sloping to Steep, Well Drained Soils in Mountain Coves and on Foot Slopes

11. Greenlee-Tate

Strongly sloping to steep, very deep soils that have a predominantly extremely bouldery surface and a loamy subsoil and that formed in colluvium from mixed geologic sources; in coves and on foot slopes

Setting

Location in the survey area: Northeastern and northwestern corners of the county
Landscape: Low mountains
Landform: Colluvial fans
Landform position: Toe slopes
Slope range: 6 to 70 percent

Extent and Composition

Percent of the survey area: 1
Greenlee soils—43 percent
Tate soils—25 percent
Minor soils (including Ostin soils)—32 percent

Soil Characteristics

Greenlee
Surface layer: Dark brown very cobbly sandy loam
Subsoil: Dark yellowish brown very cobbly sandy loam
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 6 to 70 percent
Parent material: Colluvium derived from felsic, high-grade metamorphic or igneous rock

Tate
Surface layer: Dark brown cobbly sandy loam
Subsurface layer: Dark yellowish brown cobbly sandy loam
Subsoil: Upper part—yellowish brown sandy clay loam; middle part—strong brown sandy clay loam; lower part—strong brown sandy loam that has yellowish red and red mottles
Depth class: Very deep
Drainage class: Well drained
Depth to high water table: More than 6.0 feet
Slope range: 6 to 70 percent
Parent material: Colluvium derived from felsic, high-grade metamorphic or igneous rock

Minor soils
- Ostin soils that are sandy and have many rock fragments; adjacent to drainageways
- Soils that are similar to the Tate and Greenlee soils but have a redder subsoil
- Soils that are similar to the Greenlee and Tate soils but have a dark surface layer that contains more organic matter

Use and Management

Major Uses: Woodland and dwellings

Agricultural Development

Cropland
Management concerns: Erodibility, equipment use, and tilth

Pasture and hayland
Management concerns: Equipment use, tilth, and erodibility

Orchard and Ornamental Crops
Management concerns: Erodibility, equipment use, and tilth

Woodland
Management concerns: Greenlee—equipment use, seedling survival rates, and erodibility; Tate—erodibility and equipment use

Urban Development

Dwellings
Management concerns: Greenlee—slope, large stones, and instability of soil when disturbed; Tate—slope

Septic tank absorption fields
Management concerns: Greenlee—slope and large stones; Tate—restricted permeability and slope

Local roads and streets
Management concerns: Greenlee—slope, large stones, frost action, and instability of soil when disturbed; Tate—slope and frost action

Recreational Development

Camp areas
Management concerns: Large stones and slope

Picnic areas
Management concerns: Large stones and slope

Playgrounds
Management concerns: Large stones and slope

Paths and trails
Management concerns: Large stones and slope

Detailed Soil Map Units

The map units delineated on the detailed maps represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading “Use and Management of the Soils.”

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some “included” areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. For example, the map unit Cecil sandy clay loam, 2 to 8 percent slopes, eroded, would be expected to have small areas with slopes of less than 2 percent or more than 8 percent.

Some included soils and miscellaneous areas have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Pacolet sandy clay loam, 8 to 15 percent slopes, eroded, is a phase of the Pacolet series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes. A *soil complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. The number of observations in these map units is sometimes fewer than in other map units because of very steep slopes or inaccessibility. However, the detail is adequate for the expected use of these soils. Greenlee-Tate complex, 30 to 70 percent slopes, rubbly, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, quarry, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see “Contents”) give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

ApB—Appling sandy loam, 1 to 6 percent slopes

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Summits and foot slopes
Shape of areas: Irregular
Size of areas: 10 to 50 acres

Composition

Appling soil and similar soils: 90 percent
Dissimilar soils: 10 percent

Typical Profile

Surface layer:
0 to 10 inches—brown sandy loam

Subsoil:
10 to 35 inches—yellowish brown clay
35 to 48 inches—yellowish brown clay that has yellowish red and red mottles
48 to 65 inches—yellowish red, yellowish brown, and red clay loam that has pockets of sandy clay loam saprolite

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)

Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Nearly level or gently sloping
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Strongly acid or very strongly acid except where surface layers have been limed
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- The moderately well drained Helena soils in low spots or near drainageways
- Saw soils that have hard bedrock at a depth of less than 40 inches; in stony or rocky spots

Similar:
- Appling soils that have an eroded surface layer of sandy clay loam or clay loam
- Soils that are similar to the Appling soil but have a red subsoil
- Soils that are similar to the Appling soil but have a thinner subsoil

Land Use

Dominant Uses: Cropland and pasture and hayland
Other Uses: Orchards and woodland

Agricultural Development

Cropland
Suitability: Well suited
Commonly grown crops: Cotton, corn, small grain, and soybeans
Management concerns: Erodibility and soil fertility
Management measures and considerations:
- Resource management systems that include terraces and diversions, stripcropping, contour tillage, no-till farming, and crop residue management help to minimize erosion, control surface runoff, and maximize the infiltration of water (fig. 7).
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.

Pasture and hayland
Suitability: Well suited
Commonly grown crops: Tall fescue, clover, and alfalfa
Management concerns: No significant limitations
Management measures and considerations:
- Using a rotational grazing system and implementing a well-planned clipping and harvesting schedule help to maintain pastures and increase productivity.

Woodland
Suitability: Well suited
Management concerns: No significant limitations
Management measures and considerations:
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

Figure 7.—Crop residue left on the surface in a field of soybeans on Appling sandy loam, 1 to 6 percent slopes. The crop residue helps to minimize runoff and control erosion.

Urban Development

Dwellings
Suitability: Well suited
Management concerns: No significant limitations
Management measures and considerations:
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Suited
Management concerns: Restricted permeability
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soil is not wet helps to prevent smearing and sealing of trench walls.

Local roads and streets
Suitability: Suited
Management concerns: Low strength
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.

Interpretive Groups

Land capability classification: 2e
Woodland ordination symbol: 8A, based on loblolly pine as the indicator species

ApC—Appling sandy loam, 6 to 12 percent slopes

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Foot slopes and side slopes
Shape of areas: Irregular
Size of areas: 10 to 50 acres

Composition

Appling soil and similar soils: 90 percent
Dissimilar soils: 10 percent

Typical Profile

Surface layer:
0 to 10 inches—brown sandy loam

Subsoil:
10 to 35 inches—yellowish brown clay
35 to 48 inches—yellowish brown clay that has yellowish red and red mottles
48 to 65 inches—yellowish red, yellowish brown, and red clay loam that has pockets of sandy clay loam saprolite

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Strongly sloping
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Strongly acid or very strongly acid except where surface layers have been limed
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- The moderately well drained Helena soils in the low, less sloping spots or near drainageways
- Saw soils that have hard bedrock at a depth of less than 40 inches; in stony or rocky spots

Similar:
- Appling soils that have an eroded surface layer of sandy clay loam or clay loam
- Soils that are similar to the Appling soil but have a red subsoil
- Soils that are similar to the Appling soil but have a thinner subsoil

Land Use

Dominant Uses: Pasture and hayland
Other Uses: Woodland and urban development

Agricultural Development

Cropland
Suitability: Suited
Management concerns: Erodibility and soil fertility
Management measures and considerations:
- Resource management systems that include terraces and diversions, stripcropping, contour tillage, no-till farming, and crop residue management help to minimize erosion, control surface runoff, and maximize the infiltration of rainfall.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.

Pasture and hayland
Suitability: Well suited
Commonly grown crops: Tall fescue, clover, and alfalfa
Management concerns: No significant limitations
Management measures and considerations:
- Using a rotational grazing system and implementing a well-planned clipping and harvesting schedule help to maintain pastures and increase productivity.

Woodland
Suitability: Well suited
Management concerns: No significant limitations
Management measures and considerations:
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

Urban Development

Dwellings
Suitability: Suited
Management concerns: Slope
Management measures and considerations:
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Grading or land shaping can divert upslope surface water away from foundations.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Suited
Management concerns: Restricted permeability and slope
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soil is not wet helps to prevent smearing and sealing of trench walls.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

Local roads and streets
Suitability: Suited
Management concerns: Low strength and slope

Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soil and prevent excessive erosion.

Interpretive Groups

Land capability classification: 3e
Woodland ordination symbol: 8A, based on loblolly pine as the indicator species

ArD—Ashe-Cleveland-Rock outcrop complex, 15 to 30 percent slopes

Setting

Landscape: Mountains
Landform: Rocky escarpments
Landform position: Ashe—summits in areas away from Rock outcrop; Cleveland—summits in areas adjacent to Rock outcrop; Rock outcrop—randomly scattered areas
Shape of areas: Irregular or long and narrow
Size of areas: 10 to 200 acres

Composition

Ashe soil and similar soils: 50 percent
Cleveland soil and similar soils: 23 percent
Rock outcrop: 13 percent
Dissimilar soils: 14 percent

Typical Profile

Ashe
Surface layer:
0 to 5 inches—very dark grayish brown gravelly sandy loam

Subsoil:
5 to 22 inches—dark yellowish brown gravelly coarse sandy loam

Underlying material:
22 to 28 inches—brown gravelly loamy coarse sand saprolite

Bedrock:
28 to 60 inches—hard gneiss bedrock

Cleveland
Surface layer:
0 to 3 inches—very dark grayish brown gravelly sandy loam

Subsoil:
3 to 13 inches—dark yellowish brown gravelly sandy loam

Bedrock:
13 to 60 inches—hard gneiss bedrock

Rock outcrop
Rock outcrop consists of areas where bedrock extends above the surface of the soil.

Properties and Qualities of the Ashe and Cleveland Soils

Depth class: Ashe—moderately deep; Cleveland—shallow
Drainage class: Somewhat excessively drained
General texture class: Loamy
Permeability: Moderately rapid (2 to 6 inches per hour)
Available water capacity: Low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.1 to 15 percent surface coverage
Extent of rock outcrops: 10 percent surface coverage
Potential frost action: Moderate
Soil reaction: Moderately acid to very strongly acid
Depth to bedrock: Ashe—20 to 40 inches to hard bedrock; Cleveland—10 to 20 inches to hard bedrock

Minor Components

Dissimilar:
- Edneyville soils that have bedrock at a depth of more than 60 inches; in the less stony areas and away from areas of Rock outcrop
- Randomly scattered areas of Chestnut soils that have soft bedrock at a depth of less than 40 inches

Similar:
- Soils that are similar to the Ashe and Cleveland soils but have more clay in the subsoil

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability for pasture: Ashe—suited; Cleveland—poorly suited
Suitability for hayland: Ashe—poorly suited; Cleveland—unsuited
Management concerns: Erodibility, equipment use, droughtiness, and rockiness
Management measures and considerations:
- Removing stones or limiting equipment use to the less stony or rocky areas helps to increase the productivity of these soils.
- Special equipment or planning may be needed to maintain forages safely on these soils.
- Planting drought-tolerant species helps to increase productivity.

Woodland
Suitability: Suited

Management concerns: Equipment use, erodibility, and windthrow hazard
Management measures and considerations:
- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of these soils.

Urban Development

Dwellings
Suitability for dwellings without basements: Poorly suited
Suitability for dwellings with basements: Ashe—poorly suited; Cleveland—unsuited
Management concerns: Slope, depth to bedrock, and rockiness
Management measures and considerations:
- Sites should be selected in areas where the slope and rockiness are least restrictive to construction and equipment use.
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Special excavation equipment may be needed because of the limited depth of these soils.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Ashe—poorly suited; Cleveland—unsuited
Management concerns: Slope and depth to bedrock
Management measures and considerations:
- Onsite waste disposal systems in areas of this map unit may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Ashe—slope and frost action; Cleveland—slope, depth to bedrock, and frost action
Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soils and prevent excessive erosion.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.
- Blasting or special grading equipment may be needed to construct roads on these soils.

Interpretive Groups

Land capability classification: Ashe—6s; Cleveland—7e; Rock outcrop—8s
Woodland ordination symbol: Based on chestnut oak as the indicator species, 4R in areas of the Ashe soil and 3D in areas of the Cleveland soil; Rock outcrop—none assigned

ArF—Ashe-Cleveland-Rock outcrop complex, 50 to 95 percent slopes

Setting

Landscape: Mountains
Landform: Rocky escarpments
Landform position: Ashe—side slopes in areas away from Rock outcrop; Cleveland—side slopes in areas adjacent to Rock outcrop; Rock outcrop—randomly scattered areas
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Ashe soil and similar soils: 50 percent
Cleveland soil and similar soils: 20 percent
Rock outcrop: 20 percent
Dissimilar soils: 10 percent

Areas of the Ashe and Cleveland soils and Rock outcrop are too small in size and too intricately mixed to be mapped separately. The number of observations in this map unit was less than in others because of the very steep slopes, inaccessibility, and hazardous footing (fig. 8). The detail of mapping, however, is adequate for the expected use of the map unit.

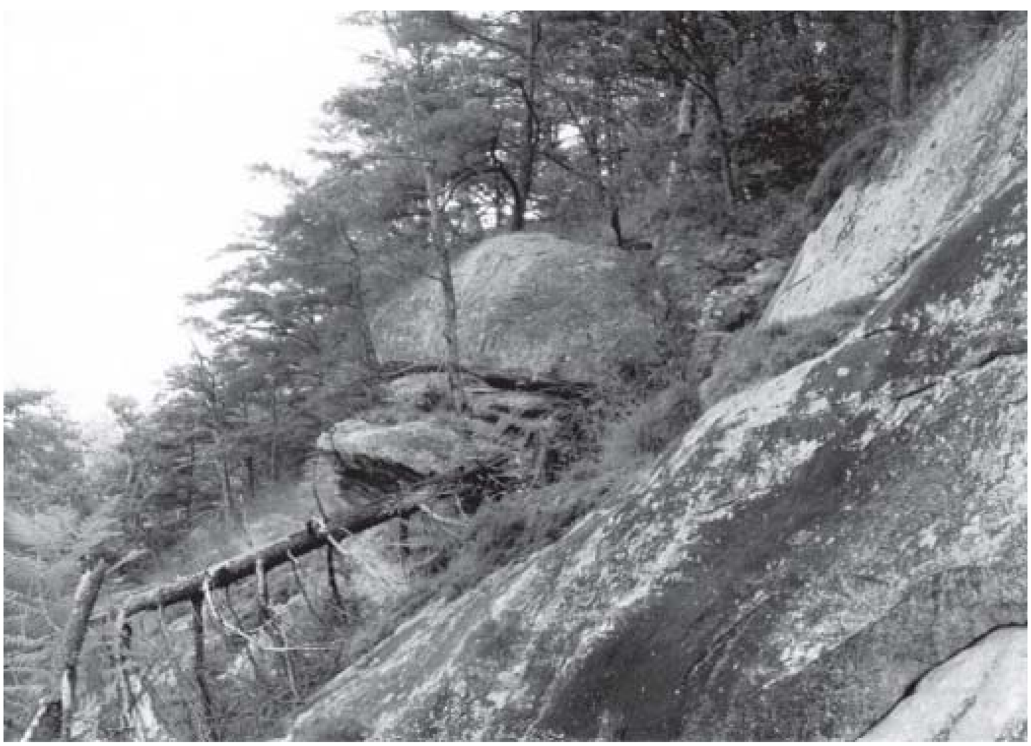

Figure 8.—An area of Ashe-Cleveland-Rock outcrop complex, 50 to 95 percent slopes. In this map unit, hazardous footing and very steep slopes limit accessibility and land use potential.

Typical Profile

Ashe
Surface layer:
0 to 5 inches—dark brown gravelly sandy loam

Subsoil:
5 to 22 inches—dark yellowish brown gravelly coarse sandy loam

Underlying material:
22 to 28 inches—brown gravelly loamy coarse sand saprolite

Bedrock:
28 to 60 inches—hard gneiss bedrock

Cleveland
Surface layer:
0 to 3 inches—very dark grayish brown gravelly sandy loam

Subsoil:
3 to 13 inches—dark yellowish brown gravelly sandy loam

Bedrock:
13 to 60 inches—hard gneiss bedrock

Rock outcrop
Rock outcrop consists of areas where bedrock extends above the surface of the soil.

Properties and Qualities of the Ashe and Cleveland Soils

Depth class: Ashe—moderately deep; Cleveland—shallow
Drainage class: Somewhat excessively drained
General texture class: Loamy
Permeability: Moderately rapid (2 to 6 inches per hour)
Available water capacity: Low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Very steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.1 to 15 percent surface coverage
Extent of rock outcrops: 10 percent surface coverage
Potential frost action: Moderate
Soil reaction: Moderately acid to very strongly acid
Depth to bedrock: Ashe—20 to 40 inches to hard bedrock; Cleveland—10 to 20 inches to hard bedrock

Minor Components

Dissimilar:
- Evard and Edneyville soils that have hard bedrock at a depth of more than 60 inches; away from areas of Rock outcrop

Similar:
- Soils that are similar to the Ashe and Cleveland soils but have more clay in the subsoil
- Soils that are similar to the Ashe and Cleveland soils but have a sandy subsoil

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability: Unsuited
Management concerns:
- The slope, depth to bedrock, and rockiness are severe limitations affecting the production of pasture and hay crops. A site should be selected on better suited soils.

Woodland
Suitability: Ashe—suited; Cleveland—poorly suited
Management concerns: Ashe—erodibility, equipment use, and windthrow hazard; Cleveland—erodibility, equipment use, seedling survival, and windthrow hazard
Management measures and considerations:
- Using cable logging methods helps to overcome limited road and trail construction resulting from the slope and the large amount of rock outcrops.
- Roads and skid trails should be on constructed on the contour and, where possible, around rock outcrops.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of these soils.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- The slope, depth to bedrock, and rockiness are severe limitations affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The slope, depth to bedrock, and rockiness are severe limitations affecting septic tank absorption fields.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Unsuited
Management concerns:
- The slope, depth to bedrock, and rockiness are severe limitations affecting roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: Ashe—7s; Cleveland—7e; Rock outcrop—8s
Woodland ordination symbol: Based on chestnut oak as the indicator species, 4R in areas of the Ashe soil and 3R in areas of the Cleveland soil; Rock outcrop—none assigned

BoA—Bandana-Ostin complex, 0 to 3 percent slopes, occasionally flooded

Setting

Landscape: Mountains
Landform: Narrow flood plains along streams that flow from mountain coves
Landform position: Bandana—planar to slightly concave slopes away from the stream channel; Ostin—planar to slightly convex, cobbly slopes adjacent to the stream channel
Shape of areas: Long and narrow
Size of areas: 4 to 75 acres

Composition

Bandana soil and similar soils: 40 percent
Ostin soil and similar soils: 35 percent
Dissimilar soils: 25 percent

Typical Profile

Bandana
Surface layer:
0 to 6 inches—brown sandy loam

Underlying material:
6 to 9 inches—brown sandy loam that has brown iron concentrations
9 to 17 inches—light olive brown sandy loam that has brown iron concentrations
17 to 24 inches—olive gray loamy sand that has yellowish brown and brown iron concentrations
24 to 60 inches—very gravelly coarse sand that is multicolored in shades of brown, olive, yellow, and gray

Ostin
Surface layer:
0 to 4 inches—dark brown cobbly sandy loam

Underlying material:
4 to 20 inches—yellowish brown very cobbly coarse sand
20 to 29 inches—brown extremely gravelly coarse sand
29 to 41 inches—dark yellowish brown gravelly loamy sand
41 to 48 inches—very dark gray loamy sand
48 to 63 inches—dark gray extremely gravelly coarse sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Bandana—somewhat poorly drained; Ostin—moderately well drained or well drained
General texture class: Bandana—loamy; Ostin—sandy with many rock fragments
Permeability: Bandana—moderately rapid or rapid (2.0 to more than 20 inches per hour); Ostin—rapid or very rapid (6.0 to more than 20 inches per hour)
Available water capacity: Bandana—moderate or high (6 to 12 inches within a 60-inch profile); Ostin—very low (less than 3 inches within a 60-inch profile)
Depth to high water table: Bandana—1.0 to 2.0 feet from November to May; Ostin—2.0 to 3.5 feet from November to April
Shrink-swell potential: Low

Slope class: Nearly level
Flooding: Bandana—occasional flooding from October to April for periods of 2 to 7 days; Ostin—occasional flooding from December to April for periods of 2 to 7 days
Potential frost action: None
Soil reaction: Bandana—strongly acid to slightly acid; Ostin—very strongly acid to neutral
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- The loamy Tate soils in the higher, stony areas
- Greenlee soils that are loamy and have many rock fragments; in the higher, extremely stony or bouldery areas
- Soils that are loamy and well drained; in landform positions similar to those of the Bandana and Ostin soils
- Poorly drained soils in landform positions similar to those of the Bandana and Ostin soils

Similar:
- Soils that are similar to the Bandana soil but have a sandy subsoil
- Soils that are similar to the Bandana soil but have fewer rock fragments in the lower part of the underlying material
- Soils that are similar to the Ostin soil but have fewer rock fragments

Land Use

Dominant Uses: Woodland
Other Uses: Pasture in a few areas

Agricultural Development

Cropland
Suitability: Bandana—suited; Ostin—poorly suited
Management concerns: Bandana—flooding, wetness, and limited size of areas; Ostin—flooding, droughtiness, and limited size of areas
Management measures and considerations:
- Harvesting row crops as early as possible helps to reduce the risk of damage caused by flooding.
- Installing an artificial drainage system helps to reduce the wetness limitation and improve productivity in areas of the Bandana soil.
- This map unit is difficult to manage for crop production because of the small size of areas.
- Areas of the better suited Bandana soil may be too intermingled with areas of the Ostin soil to manage separately.

Pasture and hayland
Suitability for pasture: Bandana—well suited; Ostin—suited
Suitability for hayland: Suited
Management concerns: Bandana—flooding, wetness, and limited size of areas; Ostin—flooding, droughtiness, and limited size of areas
Management measures and considerations:
- Harvesting hay crops as early as possible helps to reduce the risk of damage caused by flooding.
- Livestock should be provided escape routes to higher areas during periods of flooding.

- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.
- This map unit is difficult to manage for the production of pasture and hay crops because of the small size of areas.

Woodland
Suitability: Well suited
Management concerns: Bandana—limited size of areas; Ostin—seedling survival rates and limited size of areas
Management measures and considerations:
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.
- This map unit is difficult to manage for timber production because of the small size of areas.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The flooding, wetness, and poor filtering capacity are severe limitations affecting septic tank absorption fields. A site should be selected on better suited soils.

Local roads and streets
Suitability: Unsuited
Management concerns:
- The flooding is a severe limitation affecting roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: Bandana—3w; Ostin—4s
Woodland ordination symbol: Based on yellow-poplar as the indicator species, 9W in areas of the Bandana soil and 8F in areas of the Ostin soil

BuB—Buncombe loamy sand, 0 to 5 percent slopes, occasionally flooded

Setting

Landscape: Piedmont
Landform: Flood plains
Landform position: Planar to slightly convex slopes
Shape of areas: Elongated or irregular
Size of areas: 4 to 100 acres

Composition

Buncombe soil and similar soils: 90 percent
Dissimilar soils: 10 percent

Typical Profile

Surface layer:
0 to 9 inches—dark yellowish brown loamy sand

Underlying material:
9 to 15 inches—yellowish brown sand
15 to 46 inches—light yellowish brown and yellowish brown sand
46 to 62 inches—dark yellowish brown sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Excessively drained
General texture class: Sandy
Permeability: Rapid or very rapid (6.0 to 20 inches per hour)
Available water capacity: Very low or low (3 to 6 inches or less within a 60-inch profile)
Depth to high water table: More than 6.0 feet
Shrink-swell potential: Low
Slope class: Nearly level or undulating
Flooding: Occasional from February to June for periods of less than 2 days
Potential frost action: None
Soil reaction: Very strongly acid to slightly acid except where surface layers have been limed
Depth to bedrock: More than 120 inches

Minor Components

Dissimilar:
- The loamy, moderately well drained or well drained Toccoa soils in wide areas of the flood plain
- The loamy, somewhat poorly drained Chewacla soils in depressions adjacent to the uplands

Similar:
- Buncombe soils that have a loamy surface layer

Land Use

Dominant Uses: Cropland and woodland
Other Uses: Pasture and hayland

Agricultural Development

Cropland
Suitability: Suited
Commonly grown crops: Pumpkins, squash (fig. 9), watermelons, and small grain
Management concerns: Flooding, droughtiness, and leaching of nutrients
Management measures and considerations:
- Harvesting row crops as early as possible helps to reduce the risk of damage caused by flooding.
- Incorporating crop residue or organic matter from outside sources into the soil helps to improve the available water capacity.
- Using supplemental irrigation and crop varieties adapted to droughty conditions helps to increase crop production.

Figure 9.—Summer squash in an area of Buncombe loamy sand, 0 to 5 percent slopes, occasionally flooded. Summer squash is better suited to droughtiness than other vegetable varieties.

- Using frequent and light applications of irrigation water helps to prevent the leaching of plant nutrients and pesticides below the plant roots.

Pasture and hayland
Suitability: Suited
Commonly grown crops: Tall fescue, clover, and bermudagrass
Management concerns: Flooding, droughtiness, and leaching of nutrients
Management measures and considerations:
- Harvesting hay crops as early as possible helps to reduce the risk of damage caused by flooding.
- Livestock should be provided escape routes to higher areas during periods of flooding.
- Using supplemental irrigation and crop varieties adapted to droughty conditions helps to increase crop production.
- Using split applications of fertilizer and herbicides helps to increase their effectiveness.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Well suited
Management concerns: Equipment use and seedling survival rates
Management measures and considerations:
- Using tracked or low-pressure ground equipment helps to prevent rutting and root compaction during harvesting.

- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- The flooding is a severe limitation affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The flooding and poor filtering capacity are severe limitations affecting septic tank absorption fields. A site should be selected on better suited soils.

Local roads and streets
Suitability: Unsuited
Management concerns:
- The flooding is a severe limitation affecting roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: 4w
Woodland ordination symbol: 8S, based on yellow-poplar as the indicator species

CaB2—Cecil sandy clay loam, 2 to 8 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Summits
Shape of areas: Irregular
Size of areas: 10 to 1,000 acres

Composition

Cecil soil and similar soils: 90 percent
Dissimilar soils: 10 percent

Typical Profile

Surface layer:
0 to 8 inches—reddish brown sandy clay loam

Subsoil:
8 to 18 inches—red clay
18 to 39 inches—red clay that has strong brown mottles
39 to 52 inches—red clay loam that has yellowish red mottles
52 to 68 inches—red clay loam that has pockets of reddish yellow sandy clay loam saprolite

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Gently sloping
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Strongly acid or very strongly acid except where surface layers have been limed
Depth to bedrock: More than 78 inches

Minor Components

Dissimilar:
- Bethlehem soils that have soft, weathered bedrock at a depth of less than 40 inches; in convex, gravelly areas

Similar:
- Cecil soils that have a slightly eroded surface layer of sandy loam
- Soils that are similar to the Cecil soil but have a thinner subsoil
- Soils that are similar to the Cecil soil but have a browner subsoil

Land Use

Dominant Uses: Cropland, pasture and hayland, and urban development
Other Uses: Orchards and woodland

Agricultural Development

Cropland
Suitability: Well suited
Commonly grown crops: Cotton, corn, small grain, and soybeans
Management concerns: Erodibility, tilth, and soil fertility
Management measures and considerations:
- Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to prevent further erosion by stabilizing the soil, controlling surface runoff, and maximizing the infiltration of water.
- Incorporating crop residue into the soil or leaving residue on the soil surface helps to minimize clodding and crusting and maximize the infiltration of water.
- Restricting tillage to periods when the soil is not wet helps to reduce clodding and crusting and increases the infiltration of water.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.

Pasture and hayland
Suitability: Well suited
Commonly grown crops: Tall fescue, clover, and alfalfa
Management concerns: Erodibility

Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Using a rotational grazing system and implementing a well-planned clipping and harvesting schedule help to maintain pastures and increase productivity.

Woodland
Suitability: Well suited
Management concerns: Equipment use and seedling survival rates
Management measures and considerations:
- Unsurfaced roads may be impassible during wet periods because of the high clay content in this soil.
- Restricting logging operations to periods when the soil is not wet helps to prevent rutting and root damage resulting from compaction.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.

Urban Development

Dwellings
Suitability: Well suited
Management concerns: No significant limitations
Management measures and considerations:
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Suited
Management concerns: Restricted permeability
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soil is not wet helps to reduce smearing and sealing of trench walls.

Local roads and streets
Suitability: Suited
Management concerns: Low strength
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.

Interpretive Groups

Land capability classification: 2e
Woodland ordination symbol: 8C, based on loblolly pine as the indicator species

CeB2—Cecil-Urban land complex, 2 to 8 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Summits
Shape of areas: Irregular
Size of areas: 5 to 300 acres

Composition

Cecil soil and similar soils: 65 percent
Urban land: 25 percent
Dissimilar soils: 10 percent

Areas of the Cecil soil and Urban land are too small in size and too intricately mixed to be mapped separately. The number of observations in this map unit was less than in others because of urbanization. The detail of mapping, however, is adequate for the expected use of the map unit.

Typical Profile

Cecil
Surface layer:
0 to 8 inches—reddish brown sandy clay loam

Subsoil:
8 to 18 inches—red clay
18 to 39 inches—red clay loam that has strong brown mottles
39 to 52 inches—red clay that has yellowish red mottles
52 to 68 inches—red clay loam that has pockets of reddish yellow sandy clay loam saprolite

Urban land
Urban land consists of areas that are mostly covered by streets, parking lots, buildings, and other impervious surfaces.

Properties and Qualities of the Cecil Soil

Depth class: Very deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Gently sloping
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Strongly acid or very strongly acid except where surface layers have been limed
Depth to bedrock: More than 78 inches

Minor Components

Dissimilar:
- Bethlehem soils that have soft, weathered bedrock at a depth of less than 40 inches; in convex, gravelly areas

Similar:
- Soils that are similar to the Cecil soil but have a thinner subsoil

Land Use

Dominant Uses: Urban development

Agricultural Development

Cropland
Suitability: Poorly suited
Management concerns: Urbanization, which limits equipment use, potential management acreage, and management practices
Management measures and considerations:
- Onsite investigation is needed before planning cropland use in small areas.

Pasture and hayland
Suitability: Poorly suited
Management concerns: Urbanization, which limits equipment use, potential management acreage, and management practices
Management measures and considerations:
- Onsite investigation is needed before planning pasture and hayland uses in small areas.

Woodland
Suitability: Poorly suited
Management concerns: Urbanization, which limits equipment use, potential management acreage, and management practices
Management measures and considerations:
- Onsite investigation is needed before planning woodland use in small areas.

Urban Development

Dwellings
Suitability: Well suited
Management concerns: Excessive runoff from adjacent Urban land, which may cause damage to structures in low-lying areas
Management measures and considerations:
- Building structures on the highest part of the landscape helps to reduce the risk of damage caused by runoff.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Suited
Management concerns: Restricted permeability
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soil is not wet helps to reduce smearing and sealing of trench walls.

Local roads and streets
Suitability: Suited
Management concerns: Low strength
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.

Interpretive Groups

Land capability classification: Cecil—2e; Urban land—none assigned
Woodland ordination symbol: Cecil—8C, based on loblolly pine as the indicator species; Urban land—none assigned

ChA—Chewacla loam, 0 to 2 percent slopes, occasionally flooded

Setting

Landscape: Piedmont
Landform: Flood plains
Landform position: Planar to slightly concave slopes
Shape of areas: Elongated or irregular
Size of areas: 4 to 300 acres

Composition

Chewacla soil and similar soils: 70 percent
Dissimilar soils: 30 percent

Typical Profile

Surface layer:
0 to 8 inches—brown loam

Subsoil:
8 to 16 inches—strong brown loam that has brown mottles
16 to 21 inches—brown clay loam that has brown mottles and thin lenses of yellowish red sandy loam
21 to 34 inches—strong brown clay loam that has grayish brown iron depletions
34 to 48 inches—brown loam that has grayish brown iron depletions and yellowish red iron concentrations

Underlying material:
48 to 61 inches—gray loam that has strong brown iron concentrations

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
General texture class: Loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate or high (6 to 12 inches within a 60-inch profile)
Depth to high water table: 0.5 foot to 1.5 feet from November to April
Shrink-swell potential: Low
Slope class: Nearly level
Rock fragments on the surface: Less than 0.01 percent surface coverage
Flooding: Occasional from November to April for periods of 2 to 7 days
Potential frost action: None
Soil reaction: Slightly acid to very strongly acid to a depth of 40 inches; very strongly acid to mildly alkaline below a depth of 40 inches
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- The well drained and moderately well drained Toccoa soils in landform positions similar to those of the Chewacla soil
- The excessively drained, sandy Buncombe soils in areas nearer the stream channel
- The poorly drained Wehadkee soils in frequently flooded depressions
- Soils in the higher areas that are rarely flooded

Similar:
- Soils that are similar to the Chewacla soil but have less clay in the subsoil
- Soils that are similar to the Chewacla soil but have more rock fragments in the underlying material

Land Use

Dominant Uses: Woodland, cropland, and pasture and hayland
Other Uses: Gardens

Agricultural Development

Cropland
Suitability: Suited
Commonly grown crops: Corn, soybeans, small grain, and vegetable crops
Management concerns: Flooding and wetness
Management measures and considerations:
- Harvesting row crops as early as possible helps to reduce the risk of damage caused by possible flooding.
- Installing an artificial drainage system helps to reduce the wetness limitation and improve soil productivity.
- Planting wetness-tolerant species in undrained areas helps to improve productivity.

Pasture and hayland
Suitability for pasture: Well suited
Suitability for hayland: Suited
Commonly grown crops: Tall fescue and clover
Management concerns: Flooding and wetness
Management measures and considerations:
- Harvesting hay crops as early as possible helps to reduce the risk of damage caused by flooding.
- Livestock should be provided escape routes to higher areas during periods of flooding.
- Preventing overgrazing or preventing grazing when the soil is too wet helps to prevent soil compaction, decreased productivity, and a rough soil surface.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Well suited
Management concerns: Equipment use and plant competition
Management measures and considerations:
- Restricting the use of standard wheeled and tracked equipment to dry periods helps to prevent rutting and soil compaction that occurs when the soil is saturated.
- Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:

- The flooding and wetness are severe limitations affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting septic tank absorption fields. A site should be selected on better suited soils.

Local roads and streets
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: 3w
Woodland ordination symbol: 7W, based on yellow-poplar as the indicator species

CoD—Cliffield-Cowee complex, 15 to 30 percent slopes, very stony

Setting

Landscape: Mountains
Landform: Divides
Landform position: Cliffield—the more stony, convex areas on side slopes; Cowee—the less stony, concave areas on side slopes
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Cliffield soil and similar soils: 57 percent
Cowee soil and similar soils: 23 percent
Dissimilar soils: 20 percent

Typical Profile

Cliffield
Surface layer:
0 to 3 inches—dark yellowish brown very cobbly sandy loam

Subsoil:
3 to 25 inches—brown very cobbly sandy clay loam

Bedrock:
25 inches—hard schist bedrock

Cowee
Surface layer:
0 to 5 inches—dark yellowish brown gravelly sandy loam
5 to 10 inches—brown gravelly sandy loam

Subsoil:
10 to 21 inches—brown gravelly sandy clay loam
21 to 34 inches—yellowish red gravelly clay loam

Bedrock:
34 to 42 inches—soft schist bedrock
42 inches—hard schist bedrock

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
General texture class: Cliffield—loamy with many rock fragments; Cowee—loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.1 to 3.0 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Moderate
Soil reaction: Moderately acid to extremely acid
Depth to bedrock: Cliffield—20 to 40 inches to hard bedrock; Cowee—20 to 40 inches to soft, weathered bedrock and typically 40 to 60 inches to hard bedrock

Minor Components

Dissimilar:
- Evard soils that have bedrock at a depth of more than 60 inches; in the concave, less stony areas
- Randomly scattered soils that have bedrock at a depth of less than 20 inches

Similar:
- Soils that are similar to the Cowee soil but have a clayey subsoil
- Soils that are similar to the Cowee soil but have a browner subsoil

Land Use

Dominant Uses: Woodland
Other Uses: Dwellings

Agricultural Development

Cropland
Suitability: Cliffield—unsuited; Cowee—poorly suited
Management concerns: Erodibility, equipment use, and droughtiness
Management measures and considerations:
- All surface stones that are large enough to interfere with cropland management should be removed.
- Special equipment or planning may be needed to plant and harvest crops safely on these soils.

Pasture and hayland
Suitability for pasture: Cliffield—poorly suited; Cowee—suited
Suitability for hayland: Cliffield—unsuited; Cowee—poorly suited
Management concerns: Erodibility, equipment use, and droughtiness
Management measures and considerations:
- The slope limits equipment use in the steeper areas.

- All surface stones that are large enough to interfere with the management of forage and livestock should be removed.
- Persistent drought-resistant forages are recommended for management.

Woodland

Suitability: Suited

Management concerns: Cliffield—erodibility, equipment use, seedling survival rates, and windthrow hazard; Cowee—erodibility, equipment use, and windthrow hazard

Management measures and considerations:

- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of these soils.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings

Suitability: Poorly suited

Management concerns: Cliffield—depth to bedrock, large stones, and slope; Cowee—depth to bedrock and slope

Management measures and considerations:

- Drilling and blasting of rock or special earthmoving equipment is needed because of the limited depth of these soils.

Septic tank absorption fields

Suitability: Poorly suited

Management concerns: Depth to bedrock and slope

Management measures and considerations:

- Onsite waste disposal systems in areas of this map unit may require special design, or the deeper included soils may need to be located for use.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets

Suitability: Poorly suited

Management concerns: Cliffield—depth to bedrock, slope, and frost action; Cowee—slope and frost action

Management measures and considerations:

- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.
- Blasting or special grading equipment may be needed to construct roads on these soils.

Interpretive Groups

Land capability classification: Cliffield—6s; Cowee—6e

Woodland ordination symbol: Based on chestnut oak as the indicator species, 2R in areas of the Cliffield soil and 3R in areas of the Cowee soil

CpD—Cliffield-Pigeonroost complex, 15 to 30 percent slopes, very stony

Setting

Landscape: Mountains
Landform: Divides
Landform position: Cliffield—the more stony, convex areas on side slopes; Pigeonroost—the less stony, concave areas on side slopes
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Cliffield soil and similar soils: 55 percent
Pigeonroost soil and similar soils: 30 percent
Dissimilar soils: 15 percent

Typical Profile

Cliffield
Surface layer:
0 to 3 inches—dark yellowish brown very cobbly sandy loam

Subsoil:
3 to 25 inches—brown very cobbly sandy clay loam

Underlying material:
25 inches—hard schist bedrock

Pigeonroost
Surface layer:
0 to 3 inches—brown gravelly sandy loam

Subsoil:
3 to 12 inches—dark yellowish brown gravelly sandy clay loam
12 to 26 inches—strong brown gravelly sandy clay loam

Underlying material:
26 to 61 inches—soft, weathered schist bedrock

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
General texture class: Cliffield—loamy with many rock fragments; Pigeonroost—loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.1 to 3.0 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Moderate
Soil reaction: Cliffield—strongly acid to extremely acid; Pigeonroost—moderately acid to very strongly acid

Depth to bedrock: Cliffield—20 to 40 inches to hard bedrock; Pigeonroost—20 to 40 inches to soft, weathered bedrock and typically 40 to 60 inches to hard bedrock

Minor Components

Dissimilar:
- Evard soils that have bedrock at a depth of more than 60 inches; in the concave, less stony areas
- Randomly scattered soils that have bedrock at a depth of less than 20 inches

Similar:
- Soils that are similar to the Pigeonroost soil but have a clayey subsoil
- Soils that are similar to the Pigeonroost soil but have a redder subsoil
- Soils that are similar to the Cliffield soil but have soft bedrock at a depth of 20 to 40 inches

Land Use

Dominant Uses: Woodland
Other Uses: Dwellings

Agricultural Development

Cropland
Suitability: Cliffield—unsuited; Pigeonroost—poorly suited
Management concerns: Erodibility, equipment use, and droughtiness
Management measures and considerations:
- All surface stones that are large enough to interfere with cropland management should be removed.
- Special equipment or planning may be needed to plant and harvest crops safely on these soils.

Pasture and hayland
Suitability for pasture: Cliffield—poorly suited; Pigeonroost—suited
Suitability for hayland: Cliffield—unsuited; Pigeonroost—poorly suited
Management concerns: Erodibility, equipment use, and droughtiness
Management measures and considerations:
- The slope limits equipment use in the steeper areas.
- All surface stones that are large enough to interfere with the management of forage and livestock should be removed.
- Persistent drought-resistant forages are recommended for management.

Woodland
Suitability: Suited
Management concerns: Cliffield—erodibility, equipment use, seedling survival rates, and windthrow hazard (fig. 10); Pigeonroost—erodibility, equipment use, and windthrow hazard
Management measures and considerations:
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of these soils.
- Suitable equipment access should be maintained for the periodic salvage of windthrown trees.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Figure 10.—Windthrown tree in an area of Cliffield-Pigeonroost complex, 15 to 30 percent slopes, very stony. Windthow is a management concern for the Cliffield soil in this map unit because of the depth to bedrock and the high content of rock fragments in the subsoil.

Urban Development

Dwellings

Suitability: Poorly suited
Management concerns: Cliffield—depth to bedrock, large stones, and slope; Pigeonroost—depth to bedrock and slope
Management measures and considerations:

- Drilling and blasting of rock or special earthmoving equipment is needed because of the limited depth of these soils.

Septic tank absorption fields

Suitability: Poorly suited
Management concerns: Depth to bedrock and slope
Management measures and considerations:

- Onsite waste disposal systems in areas of this map unit may require special design, or the deeper included soils may need to be located for use.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets

Suitability: Poorly suited
Management concerns: Cliffield—depth to bedrock, slope, and frost action; Pigeonroost—slope and frost action
Management measures and considerations:

- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.

- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.
- Blasting or special grading equipment may be needed to construct roads on these soils.

Interpretive Groups

Land capability classification: Cliffield—6s; Pigeonroost—6e
Woodland ordination symbol: Based on chestnut oak as the indicator species, 2R in areas of the Cliffield soil and 3R in areas of the Pigeonroost soil

CpE—Cliffield-Pigeonroost complex, 30 to 50 percent slopes, very stony

Setting

Landscape: Mountains
Landform: Divides
Landform position: Cliffield—the more stony, convex areas on side slopes; Pigeonroost—the less stony, concave areas on side slopes
Shape of areas: Irregular
Size of areas: 50 to 400 acres

Composition

Cliffield soil and similar soils: 55 percent
Pigeonroost soil and similar soils: 30 percent
Dissimilar inclusions: 15 percent

Typical Profile

Cliffield
Surface layer:
0 to 3 inches—yellowish brown very cobbly sandy loam

Subsoil:
3 to 25 inches—dark brown very cobbly sandy clay loam

Underlying material:
25 inches—hard schist bedrock

Pigeonroost
Surface layer:
0 to 3 inches—brown gravelly sandy loam

Subsoil:
3 to 12 inches—dark yellowish brown gravelly sandy clay loam
12 to 26 inches—strong brown gravelly sandy clay loam

Underlying material:
26 to 61 inches—soft, weathered schist bedrock

Soil Properties and Qualities

Depth class: Moderately deep
Drainage class: Well drained
General texture class: Cliffield—loamy with many rock fragments; Pigeonroost—loamy

Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.1 to 3.0 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Moderate
Soil reaction: Cliffield—strongly acid to extremely acid; Pigeonroost—moderately acid to extremely acid
Depth to bedrock: Cliffield—20 to 40 inches to hard bedrock; Pigeonroost—20 to 40 inches to soft, weathered bedrock and typically 40 to 60 inches to hard bedrock

Minor Components

Dissimilar:
- Evard soils that have bedrock at a depth of more than 60 inches; in the concave, less stony areas
- Small, randomly scattered areas of Rock outcrop
- Randomly scattered soils that have bedrock at a depth of less than 20 inches

Similar:
- Soils that are similar to the Pigeonroost soil but have a redder subsoil
- Soils that are similar to the Cliffield soil but have soft bedrock at a depth of 20 to 40 inches

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope is a severe limitation affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability for pasture: Poorly suited
Suitability for hayland: Unsuited
Management concerns: Erodibility, equipment use, and droughtiness
Management measures and considerations:
- Special equipment or planning may be needed to harvest or maintain forages safely on these soils.
- Applying lime, fertilizer, seed, and herbicides by hand helps to increase productivity in the steeper areas.
- All surface stones that are large enough to interfere with the management of forage and livestock should be removed.
- Persistent drought-resistant forages are recommended for management.

Woodland
Suitability: Suited
Management concerns: Cliffield—erodibility, equipment use, seedling survival rates, and windthrow hazard; Pigeonroost—erodibility, equipment use, and windthrow hazard

Management measures and considerations:
- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Cliffield soil.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings
Suitability for dwellings without basements: Poorly suited
Suitability for dwellings with basements: Cliffield—unsuited; Pigeonroost—poorly suited
Management concerns: Cliffield—depth to bedrock, large stones, and slope; Pigeonroost—depth to bedrock and slope
Management measures and considerations:
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Special design of dwellings or expensive excavation may be needed.
- Drilling and blasting of rock or special earthmoving equipment is needed because of the limited depth of these soils.

Septic tank absorption fields
Suitability: Poorly suited
Management concerns: Depth to bedrock and slope
Management measures and considerations:
- Onsite waste disposal systems in areas of this map unit may require special design, or the deeper included soils may need to be located for use.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Cliffield—depth to bedrock, slope, and frost action; Pigeonroost—slope and frost action
Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.
- Blasting or special grading equipment may be needed to construct roads on these soils.

Interpretive Groups

Land capability classification: Cliffield—7s; Pigeonroost—7e
Woodland ordination symbol: Based on chestnut oak as the indicator species, 2R in areas of the Cliffield soil and 3R in areas of the Pigeonroost soil

CrF—Cliffield-Rock outcrop complex, 50 to 95 percent slopes

Setting

Landscape: Mountains
Landform: Rocky mountain escarpments
Landform position: Cliffield—side slopes in areas adjacent to Rock outcrop; Rock outcrop—randomly scattered areas
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Cliffield soil and similar soils: 60 percent
Rock outcrop: 25 percent
Dissimilar soils: 15 percent

Areas of the Cliffield soil and Rock outcrop are too small in size and too intricately mixed to be mapped separately. The number of observations in this map unit was less than in others because of the steep slopes, inaccessibility, and hazardous footing. The detail of mapping, however, is adequate for the expected use of the map unit.

Typical Profile

Cliffield
Surface layer:
0 to 3 inches—yellowish brown very cobbly sandy loam

Subsoil:
3 to 25 inches—dark brown very cobbly sandy clay loam

Bedrock:
25 inches—hard schist bedrock

Rock outcrop
Rock outcrop consists of areas where bedrock extends above the surface of the soil.

Properties and Qualities of the Cliffield Soil

Depth class: Moderately deep
Drainage class: Well drained
General texture class: Loamy-skeletal
Permeability: Moderate
Available water capacity: Low
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Very steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.1 to 3.0 percent surface coverage
Potential frost action: Moderate
Soil reaction: Strongly acid to extremely acid
Depth to bedrock: 20 to 40 inches to hard bedrock

Minor Components

Dissimilar:
- Cleveland soils that have hard bedrock at a depth of less than 20 inches; in landform positions similar to those of the Cliffield soil

Similar:
- Cliffield soils that have hard bedrock at a depth of less than 60 inches

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability: Unsuited
Management concerns:
- The slope, depth to bedrock, and rockiness are severe limitations affecting the production of pasture and hay crops. A site should be selected on better suited soils.

Woodland
Suitability: Suited
Management concerns: Erodibility, equipment use, seedling survival rates, and windthrow hazard
Management measures and considerations:
- Using cable logging methods helps to overcome limited road and trail construction resulting from the slope and the large amount of rock outcrops.
- Roads and skid trails should be constructed on the contour and, where possible, around rock outcrops.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Cliffield soil.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- The slope, depth to bedrock, and rockiness are severe limitations affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The slope, depth to bedrock, and rockiness are severe limitations affecting septic tank absorption fields.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Unsuited

Management concerns:
- The slope, depth to bedrock, and rockiness are severe limitations affecting roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: Cliffield—7s; Rock outcrop—8s
Woodland ordination symbol: Cliffield—2R, based on chestnut oak as the indicator species; Rock outcrop—none assigned

DoB—Dogue loam, 1 to 6 percent slopes, rarely flooded

Setting

Landscape: Piedmont
Landform: Low stream terraces
Landform position: Planar to slightly concave slopes
Shape of areas: Irregular
Size of areas: 5 to 15 acres

Composition

Dogue soil and similar soils: 85 percent
Dissimilar soils: 15 percent

Typical Profile

Surface layer:
0 to 11 inches—brown loam

Subsoil:
11 to 16 inches—dark yellowish brown clay loam
16 to 27 inches—strong brown clay that has yellowish red masses of iron accumulation
27 to 43 inches—strong brown clay that has red masses of iron accumulation and light gray iron depletions
43 to 55 inches—brownish yellow clay loam that has light gray iron depletions and strong brown masses of iron accumulation

Underlying material:
55 to 62 inches—light gray gravelly sandy clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
General texture class: Clayey
Permeability: Moderately slow (0.2 to 0.6 inch per hour)
Available water capacity: High (9 to 12 inches within a 60-inch profile)
Depth to high water table: 1.5 to 3.0 feet from December to March
Flooding: Rare
Shrink-swell potential: Moderate
Slope class: Nearly level or gently sloping
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Potential frost action: None

Soil reaction: Strongly acid to extremely acid; ranging to slightly acid in the upper part of the profile in limed areas
Depth to bedrock: More than 72 inches

Minor Components

Dissimilar:
- Poorly drained soils in depressions
- The well drained Skyuka soils in the higher areas
- The loamy, occasionally flooded Chewacla soils near stream channels

Similar:
- Dogue soils that have an eroded surface layer of sandy clay loam or clay loam
- Soils that are similar to the Dogue soil but have less clay in the subsoil
- Soils that are similar to the Dogue soil but are less acid

Land Use

Dominant Uses: Cropland and pasture and hayland
Other Uses: Woodland

Agricultural Development

Cropland
Suitability: Well suited
Commonly grown crops: Corn, small grain, and soybeans
Management concerns: Erodibility, wetness, and limited size of areas
Management measures and considerations:
- Resource management systems that include terraces and diversions, stripcropping, contour tillage, no-till farming, and crop residue management help to minimize erosion, control surface runoff, and maximize the infiltration of rainfall.
- Installing an artificial drainage system helps to reduce the wetness limitation and improve soil productivity.
- This map unit may be difficult to manage for crop production because of the small size of areas.

Pasture and hayland
Suitability: Well suited
Commonly grown crops: Tall fescue and clover
Management concerns: Wetness and limited size of areas
Management measures and considerations:
- Preventing overgrazing or preventing grazing when the soil is too wet helps to prevent soil compaction, decreased productivity, and a rough soil surface.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.
- This map unit is difficult to manage for the production of pasture and hay crops because of the small size of areas.

Woodland
Suitability: Well suited
Management concerns: Equipment use
Management measures and considerations:
- Restricting the use of standard wheeled and tracked equipment to dry periods helps to prevent rutting and soil compaction that occurs when the soil is saturated.
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

Urban Development

Dwellings
Suitability: Suited
Management concerns: Wetness, flooding, and shrink-swell potential
Management measures and considerations:
- Reinforcing foundations or backfilling with coarse-textured material helps to strengthen buildings and prevents damage caused by shrinking and swelling.
- Building structures on the highest part of the landscape and using artificial drainage help to reduce the risk of damage caused by wetness and flooding.
- Installing a subsurface drainage system helps to lower the high water table.

Septic tank absorption fields
Suitability: Poorly suited
Management concerns: Restricted permeability and wetness
Management measures and considerations:
- Suitable fill material can be used to raise the filter field a sufficient distance above the high water table and thus help to improve the performance of septic systems.
- Onsite waste disposal systems in areas of this map unit may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Low strength and wetness
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Constructing roads on raised and well compacted fill material helps to overcome the wetness limitation.

Interpretive Groups

Land capability classification: 2e
Woodland ordination symbol: 10A, based on loblolly pine as the indicator species

EcD—Edneyville-Chestnut complex, 15 to 30 percent slopes, very stony

Setting

Landscape: Mountains
Landform: Divides
Landform position: Edneyville—the less stony, concave areas on summits; Chestnut—the more stony, convex areas on summits
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Edneyville soil and similar soils: 75 percent
Chestnut soil and similar soils: 20 percent
Dissimilar inclusions: 5 percent

Typical Profile

Edneyville
Surface layer:
0 to 4 inches—very dark grayish brown sandy loam

4 to 8 inches—brown sandy loam

Subsoil:
8 to 26 inches—yellowish brown sandy loam

Underlying material:
26 to 53 inches—gravelly sandy loam saprolite that is multicolored in shades of brown, yellow, and gray
53 to 65 inches—sandy loam saprolite that is multicolored in shades of gray, brown, and white

Chestnut
Surface layer:
0 to 3 inches—dark brown gravelly sandy loam

Subsoil:
3 to 17 inches—strong brown gravelly sandy loam
17 to 23 inches—brown gravelly sandy loam

Underlying material:
23 to 28 inches—multicolored gravelly loamy sand saprolite
28 to 42 inches—soft, weathered gneiss bedrock
42 inches—hard gneiss bedrock

Soil Properties and Qualities

Depth class: Edneyville—very deep; Chestnut—moderately deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderately rapid (2 to 6 inches per hour)
Available water capacity: Edneyville—moderate (6 to 9 inches within a 60-inch profile); Chestnut—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.1 to 3.0 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Moderate
Soil reaction: Edneyville—moderately acid to very strongly acid; Chestnut—moderately acid to extremely acid
Depth to bedrock: Edneyville—more than 60 inches; Chestnut—20 to 40 inches to soft bedrock and typically 40 to 60 inches to hard bedrock

Minor Components

Dissimilar:
- Randomly scattered small areas of Rock outcrop
- Cleveland soils that have hard bedrock at a depth of less than 20 inches; near small areas of Rock outcrop
- Ashe soils that have hard bedrock at a depth of less than 40 inches; in landform positions similar to those of the Edneyville and Chestnut soils

Similar:
- Soils that are similar to the Edneyville and Chestnut soils but have a higher content of mica
- Soils that are similar to the Edneyville and Chestnut soils but have a red subsoil
- Soils that are similar to the Edneyville soil but have more clay in the subsoil

Land Use

Dominant Uses: Woodland
Other Uses: Dwellings

Agricultural Development

Cropland
Suitability: Poorly suited
Management concerns: Erodibility and equipment use
Management measures and considerations:
- The successful application of resource management systems for controlling erosion and maintaining soil fertility is difficult on these soils.
- Special equipment or planning may be needed to plant and harvest crops safely on these soils.

Pasture and hayland
Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Special care is needed when renovating pastures and establishing seedbeds to prevent further erosion.
- Special equipment or planning may be needed to harvest or maintain forages safely on these soils.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Edneyville—well suited; Chestnut—suited
Management concerns: Edneyville—equipment use and erodibility; Chestnut—equipment use, erodibility, and windthrow hazard
Management measures and considerations:
- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Chestnut soil.

Urban Development

Dwellings
Suitability: Poorly suited
Management concerns: Edneyville—slope; Chestnut—slope and depth to bedrock
Management measures and considerations:
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.

- Special excavation equipment may be needed because of the limited depth of the Chestnut soil.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Poorly suited
Management concerns: Edneyville—restricted permeability and slope; Chestnut—restricted permeability, slope, and depth to bedrock
Management measures and considerations:
- Onsite waste disposal systems in areas of this map unit may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Slope and frost action
Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soils and prevent excessive erosion.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.

Interpretive Groups

Land capability classification: Edneyville—6s; Chestnut—7s
Woodland ordination symbol: Based on eastern white pine as the indicator species, 12R in areas of the Edneyville soil and 10R in areas of the Chestnut soil

EcE—Edneyville-Chestnut complex, 30 to 50 percent slopes, very stony

Setting

Landscape: Mountains
Landform: Divides
Landform position: Edneyville—the less stony, concave areas on summits and side slopes; Chestnut—the more stony, convex areas on summits and side slopes
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Edneyville soil and similar soils: 50 percent
Chestnut soil and similar soils: 20 percent
Dissimilar inclusions: 30 percent

Typical Profile

Edneyville
Surface layer:
0 to 4 inches—very dark grayish brown sandy loam
4 to 8 inches—brown sandy loam

Subsoil:
8 to 26 inches—yellowish brown sandy loam

Underlying material:
26 to 53 inches—gravelly sandy loam saprolite that is multicolored in shades of brown, yellow, and gray
53 to 65 inches—sandy loam saprolite that is multicolored in shades of gray, brown, and white

Chestnut
Surface layer:
0 to 3 inches—dark brown gravelly sandy loam

Subsoil:
3 to 17 inches—strong brown gravelly sandy loam
17 to 23 inches—brown gravelly sandy loam

Underlying material:
23 to 28 inches—multicolored gravelly loamy sand saprolite
28 to 42 inches—soft, weathered gneiss bedrock
42 inches—hard gneiss bedrock

Soil Properties and Qualities

Depth class: Edneyville—very deep; Chestnut—moderately deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderately rapid (2 to 6 inches per hour)
Available water capacity: Edneyville—moderate (6 to 9 inches within a 60-inch profile); Chestnut—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.1 to 3.0 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Moderate
Soil reaction: Edneyville—moderately acid to very strongly acid; Chestnut—moderately acid to extremely acid
Depth to bedrock: Edneyville—more than 60 inches; Chestnut—20 to 40 inches to soft bedrock and typically 40 to 60 inches to hard bedrock

Minor Components

Dissimilar:
- Randomly scattered small areas of Rock outcrop
- Cleveland soils that have hard bedrock at a depth of less than 20 inches; near small areas of Rock outcrop
- Ashe soils that have hard bedrock at a depth of less than 40 inches; in landform positions similar to those of the Edneyville and Chestnut soils
- The extremely bouldery Greenlee soils near drainageways

Similar:
- Soils that are similar to the Edneyville and Chestnut soils but have a higher content of mica
- Soils that are similar to the Edneyville and Chestnut soils but have a red subsoil
- Soils that are similar to the Edneyville soil but have more clay in the subsoil

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope is a severe limitation affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability for pasture: Poorly suited
Suitability for hayland: Unsuited
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Special equipment or planning may be needed to harvest or maintain forages safely on these soils.
- Applying lime, fertilizer, seed, and herbicides by hand helps to increase productivity in the steeper areas.

Woodland
Suitability: Suited
Management concerns: Edneyville—equipment use and erodibility; Chestnut—equipment use, erodibility, and windthrow hazard
Management measures and considerations:
- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Chestnut soil.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings
Suitability: Poorly suited
Management concerns: Edneyville—slope; Chestnut—slope and depth to bedrock
Management measures and considerations:
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Special design of dwellings or expensive excavation may be needed.
- Special excavation equipment may be needed because of the limited depth of the Chestnut soil.

Septic tank absorption fields
Suitability: Edneyville—poorly suited; Chestnut—unsuited
Management concerns: Edneyville—slope; Chestnut—slope and depth to bedrock
Management measures and considerations:
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Slope and frost action

Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.

Interpretive Groups

Land capability classification: 7s
Woodland ordination symbol: Based on eastern white pine as the indicator species, 12R in areas of the Edneyville soil and 10R in areas of the Chestnut soil

EvD—Evard-Cowee complex, 15 to 30 percent slopes, stony

Setting

Landscape: Mountains
Landform: Divides
Landform position: Evard—the less stony, concave areas on summits; Cowee—the more stony, convex areas on summits
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Evard soil and similar soils: 55 percent
Cowee soil and similar soils: 40 percent
Dissimilar soils: 5 percent

Typical Profile

Evard
Surface layer:
0 to 3 inches—brown sandy loam
3 to 6 inches—dark yellowish brown sandy loam

Subsoil:
6 to 12 inches—strong brown sandy clay loam
12 to 30 inches—yellowish red clay loam
30 to 37 inches—strong brown sandy clay loam

Underlying material:
37 to 56 inches—brownish yellow fine sandy loam saprolite
56 to 65 inches—light yellowish brown sandy loam saprolite that has mottles in shades of gray and brown

Cowee
Surface layer:
0 to 5 inches—dark yellowish brown gravelly sandy loam
5 to 10 inches—brown gravelly sandy loam

Subsoil:
10 to 21 inches—brown gravelly sandy clay loam
21 to 34 inches—yellowish red gravelly clay loam that has red and reddish yellow mottles

Bedrock:
34 to 42 inches—soft, weathered gneiss bedrock
42 inches—hard gneiss bedrock

Soil Properties and Qualities

Depth class: Evard—very deep; Cowee—moderately deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Evard—moderate (6 to 9 inches within a 60-inch profile); Cowee—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.01 to 0.1 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Moderate
Soil reaction: Evard—moderately acid to very strongly acid; Cowee—moderately acid to extremely acid
Depth to bedrock: Evard—more than 60 inches; Cowee—20 to 40 inches to soft bedrock and typically 40 to 60 inches to hard bedrock

Minor Components

Dissimilar:
- Cliffield and Ashe soils that have hard bedrock at a depth of less than 40 inches; in landform positions similar to those of the Evard and Cowee soils

Similar:
- Soils that are similar to the Evard and Cowee soils but have a higher content of mica
- Soils that are similar to the Evard soil but have more clay in the subsoil
- Soils that are similar to the Evard and Cowee soils but have a brown subsoil

Land Use

Dominant Uses: Woodland
Other Uses: Dwellings

Agricultural Development

Cropland
Suitability: Poorly suited
Management concerns: Erodibility and equipment use
Management measures and considerations:
- The successful application of resource management systems for controlling erosion and maintaining soil fertility is difficult on these soils.
- Special equipment or planning may be needed to plant and harvest crops safely on these soils.

Pasture and hayland
Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns: Erodibility and equipment use

Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Special care is needed when renovating pastures and establishing seedbeds to prevent further erosion.
- Special equipment or planning may be needed to harvest or maintain forages safely on these soils.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Evard—well suited; Cowee—suited
Management concerns: Evard—equipment use and erodibility; Cowee—equipment use, erodibility, and windthrow hazard
Management measures and considerations:
- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Cowee soil.

Urban Development

Dwellings
Suitability: Poorly suited
Management concerns: Evard—slope; Cowee—slope and depth to bedrock
Management measures and considerations:
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Special excavation equipment may be needed because of the limited depth of the Cowee soil.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Poorly suited
Management concerns: Evard—restricted permeability and slope; Cowee—restricted permeability, slope, and depth to bedrock
Management measures and considerations:
- Onsite waste disposal systems in areas of this map unit may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Slope and frost action

Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soils and prevent excessive erosion.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.

Interpretive Groups

Land capability classification: 6e
Woodland ordination symbol: Based on eastern white pine as the indicator species, 12R in areas of the Evard soil and 10R in areas of the Cowee soil

EvE—Evard-Cowee complex, 30 to 50 percent slopes, stony

Setting

Landscape: Mountains
Landform: Divides
Landform position: Evard—the less stony, concave areas on summits and side slopes; Cowee—the more stony, convex areas on summits and side slopes
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Evard soil and similar soils: 80 percent
Cowee soil and similar soils: 10 percent
Dissimilar inclusions: 10 percent

Typical Profile

Evard
Surface layer:
0 to 3 inches—brown sandy loam
3 to 6 inches—dark yellowish brown sandy loam

Subsoil:
6 to 12 inches—strong brown sandy clay loam
12 to 30 inches—yellowish red clay loam
30 to 37 inches—strong brown sandy clay loam

Underlying material:
37 to 56 inches—brownish yellow fine sandy loam saprolite
56 to 65 inches—light yellowish brown sandy loam saprolite that has mottles in shades of gray and brown

Cowee
Surface layer:
0 to 5 inches—dark yellowish brown gravelly sandy loam
5 to 10 inches—brown gravelly sandy loam

Subsoil:
10 to 21 inches—brown gravelly sandy clay loam

21 to 34 inches—yellowish red gravelly clay loam that has red and reddish yellow mottles

Bedrock:
34 to 42 inches—soft, weathered gneiss bedrock
42 inches—hard gneiss bedrock

Soil Properties and Qualities

Depth class: Evard—very deep; Cowee—moderately deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Evard—moderate (6 to 9 inches within a 60-inch profile); Cowee—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.01 to 0.1 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Moderate
Soil reaction: Evard—moderately acid to very strongly acid; Cowee—moderately acid to extremely acid
Depth to bedrock: Evard—more than 60 inches; Cowee—20 to 40 inches to soft bedrock and typically 40 to 60 inches to hard bedrock

Minor Components

Dissimilar:
- Randomly scattered small areas of Rock outcrop
- Cliffield and Ashe soils that have hard bedrock at a depth of less than 40 inches; in landform positions similar to those of the Evard and Cowee soils
- The extremely bouldery Greenlee soils near drainageways

Similar:
- Soils that are similar to the Evard and Cowee soils but have a higher content of mica
- Soils that are similar to the Evard and Cowee soils but have a brown subsoil
- Soils that are similar to the Evard soil but have a clayey subsoil

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope is a severe limitation affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability for pasture: Poorly suited
Suitability for hayland: Unsuited
Management concerns: Erodibility and equipment use

Management measures and considerations:
- Special equipment or planning may be needed to harvest or maintain forages safely on these soils.
- Applying lime, fertilizer, seed, and herbicides by hand helps to increase productivity in the steeper areas.

Woodland
Suitability: Suited
Management concerns: Evard—equipment use and erodibility; Cowee—equipment use, erodibility, and windthrow hazard
Management measures and considerations:
- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Cowee soil.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings
Suitability: Poorly suited
Management concerns: Evard—slope; Cowee—slope and depth to bedrock
Management measures and considerations:
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Special design of dwellings or expensive excavation may be needed.
- Special excavation equipment may be needed because of the limited depth of the Cowee soil.

Septic tank absorption fields
Suitability: Evard—poorly suited; Cowee—unsuited
Management concerns: Evard—slope; Cowee—slope and depth to bedrock
Management measures and considerations:
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Slope and frost action
Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: Based on eastern white pine as the indicator species, 12R in areas of the Evard soil and 10R in areas of the Cowee soil

EwD—Evard-Cowee complex, 15 to 30 percent slopes, rocky

Setting

Landscape: Mountains
Landform: Divides
Landform position: Evard—the less rocky, concave areas on summits; Cowee—the more rocky, convex areas on summits
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Evard soil and similar soils: 80 percent
Cowee soil and similar soils: 10 percent
Dissimilar soils: 10 percent

Typical Profile

Evard
Surface layer:
0 to 3 inches—brown sandy loam
3 to 6 inches—dark yellowish brown sandy loam

Subsoil:
6 to 12 inches—strong brown sandy clay loam
12 to 30 inches—yellowish red clay loam
30 to 37 inches—strong brown sandy clay loam

Underlying material:
37 to 56 inches—brownish yellow fine sandy loam saprolite
56 to 65 inches—light yellowish brown sandy loam saprolite that has mottles in shades of gray and brown

Cowee
Surface layer:
0 to 5 inches—dark yellowish brown gravelly sandy loam
5 to 10 inches—brown gravelly sandy loam

Subsoil:
10 to 21 inches—brown gravelly sandy clay loam
21 to 34 inches—yellowish red gravelly clay loam that has red and reddish yellow mottles

Bedrock:
34 to 42 inches—soft, weathered gneiss bedrock
42 inches—hard gneiss bedrock

Soil Properties and Qualities

Depth class: Evard—very deep; Cowee—moderately deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Evard—moderate (6 to 9 inches within a 60-inch profile); Cowee—low (3 to 6 inches within a 60-inch profile)

Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.01 to 0.1 percent surface coverage
Extent of rock outcrops: 0.1 to 2.0 percent surface coverage
Potential frost action: Moderate
Soil reaction: Evard—moderately acid to very strongly acid; Cowee—moderately acid to extremely acid
Depth to bedrock: Evard—more than 60 inches; Cowee—20 to 40 inches to soft bedrock and typically 40 to 60 inches to hard bedrock

Minor Components

Dissimilar:
- Ashe and Cliffield soils that have hard bedrock at a depth of less than 40 inches; near areas of Rock outcrop
- Cleveland soils that have hard bedrock at a depth of less than 20 inches; near areas of Rock outcrop

Similar:
- Soils that are similar to the Evard soil but have more clay in the subsoil
- Soils that are similar to the Evard and Cowee soils but have a brown subsoil

Land Use

Dominant Uses: Woodland
Other Uses: Dwellings

Agricultural Development

Cropland
Suitability: Poorly suited
Management concerns: Erodibility, equipment use, and rockiness
Management measures and considerations:
- The successful application of resource management systems for controlling erosion and maintaining soil fertility is difficult on these soils.
- Special equipment or planning may be needed to plant and harvest crops safely on these soils.

Pasture and hayland
Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns: Erodibility, equipment use, and rockiness
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Special care is needed when renovating pastures and establishing seedbeds to prevent further erosion.
- Special equipment or planning may be needed to harvest or maintain forages safely on these soils.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.
- Sites should be selected in areas where scattered rock outcrops are least restrictive to equipment use.

- Sites should be selected in areas where scattered rock outcrops are least restrictive to equipment use.

Woodland

Suitability: Evard—well suited; Cowee—suited
Management concerns: Evard—equipment use, erodibility, and rockiness; Cowee—equipment use, erodibility, rockiness, and windthrow hazard
Management measures and considerations:

- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Cowee soil.

Urban Development

Dwellings

Suitability: Poorly suited
Management concerns: Evard—slope and rockiness; Cowee—slope, depth to bedrock, and rockiness
Management measures and considerations:

- Sites should be selected in areas where the slope and scattered rock outcrops are least restrictive to construction and equipment use.
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Special excavation equipment may be needed because of the limited depth of the Cowee soil.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields

Suitability: Poorly suited
Management concerns: Evard—restricted permeability, slope, and rockiness; Cowee—restricted permeability, slope, depth to bedrock, and rockiness
Management measures and considerations:

- Onsite waste disposal systems in areas of this map unit may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets

Suitability: Poorly suited
Management concerns: Slope, frost action, and rockiness
Management measures and considerations:

- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soils and prevent excessive erosion.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.
- Carefully planning roads so that scattered areas of rock outcrops are avoided helps to minimize construction costs.

Interpretive Groups

Land capability classification: 6e
Woodland ordination symbol: Based on eastern white pine as the indicator species, 12R in areas of the Evard soil and 10R in areas of the Cowee soil

EwE—Evard-Cowee complex, 30 to 50 percent slopes, rocky

Setting

Landscape: Mountains
Landform: Divides
Landform position: Evard—the less stony, concave areas on summits and side slopes; Cowee—the more stony, convex areas on summits and side slopes
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Evard soil and similar soils: 65 percent
Cowee soil and similar soils: 25 percent
Dissimilar soils: 10 percent

Typical Profile

Evard
Surface layer:
0 to 3 inches—brown sandy loam
3 to 6 inches—dark yellowish brown sandy loam

Subsoil:
6 to 12 inches—strong brown sandy clay loam
12 to 30 inches—yellowish red clay loam
30 to 37 inches—strong brown sandy clay loam

Underlying material:
37 to 56 inches—brownish yellow fine sandy loam saprolite
56 to 65 inches—light yellowish brown sandy loam saprolite that has mottles in shades of gray and brown

Cowee
Surface layer:
0 to 5 inches—dark yellowish brown gravelly sandy loam
5 to 10 inches—brown gravelly sandy loam

Subsoil:
10 to 21 inches—brown gravelly sandy clay loam
21 to 34 inches—yellowish red gravelly clay loam that has red and reddish yellow mottles

Bedrock:
34 to 42 inches—soft, weathered gneiss bedrock
42 inches—hard gneiss bedrock

Soil Properties and Qualities

Depth class: Evard—very deep; Cowee—moderately deep
Drainage class: Well drained

General texture class: Loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Evard—moderate (6 to 9 inches within a 60-inch profile); Cowee—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.01 to 0.1 percent surface coverage
Extent of rock outcrops: 0.1 to 2.0 percent surface coverage
Potential frost action: Moderate
Soil reaction: Evard—moderately acid to very strongly acid; Cowee—moderately acid to extremely acid
Depth to bedrock: Evard—more than 60 inches; Cowee—20 to 40 inches to soft bedrock and typically 40 to 60 inches to hard bedrock

Minor Components

Dissimilar:
- Cliffield and Ashe soils that have hard bedrock at a depth of less than 40 inches; near areas of Rock outcrop
- The extremely bouldery Greenlee soils near drainageways

Similar:
- Soils that are similar to the Evard and Cowee soils but have a higher content of mica
- Soils that are similar to the Evard and Cowee soil but have a brown subsoil
- Soils that are similar to the Evard soil but have a clayey subsoil

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability for pasture: Poorly suited
Suitability for hayland: Unsuited
Management concerns: Erodibility, rockiness, and equipment use
Management measures and considerations:
- Special equipment or planning may be needed to harvest or maintain forages safely on these soils.
- Applying lime, fertilizer, seed, and herbicides by hand helps to increase productivity in the steeper areas.

Woodland
Suitability: Suited
Management concerns: Evard—equipment use, rockiness, and erodibility; Cowee—equipment use, rockiness, erodibility, and windthrow hazard
Management measures and considerations:
- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.

- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Cowee soil.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings

Suitability: Evard—poorly suited; Cowee—unsuited
Management concerns: Evard—slope and rockiness; Cowee—slope, rockiness, and depth to bedrock
Management measures and considerations:
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Special design of dwellings or expensive excavation may be needed.
- Special excavation equipment may be needed because of the limited depth of the Cowee soil.

Septic tank absorption fields

Suitability: Evard—poorly suited; Cowee—unsuited
Management concerns: Evard—slope and rockiness; Cowee—slope, rockiness, and depth to bedrock
Management measures and considerations:
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets

Suitability: Poorly suited
Management concerns: Slope, rockiness, and frost action
Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: Based on eastern white pine as the indicator species, 12R in areas of the Evard soil and 10R in areas of the Cowee soil

EwF—Evard-Cowee complex, 50 to 85 percent slopes, rocky

Setting

Landscape: Mountains
Landform: Divides and escarpments
Landform position: Evard—the less rocky, concave areas on side slopes; Cowee—the more rocky, convex areas on side slopes

Shape of areas: Irregular
Size of areas: 10 to 1,000 acres

Composition

Evard soil and similar soils: 60 percent
Cowee soil and similar soils: 30 percent
Dissimilar soils: 10 percent

Typical Profile

Evard
Surface layer:
0 to 3 inches—brown sandy loam
3 to 6 inches—dark yellowish brown sandy loam

Subsoil:
6 to 12 inches—strong brown sandy clay loam
12 to 30 inches—yellowish red clay loam
30 to 37 inches—strong brown sandy clay loam

Underlying material:
37 to 56 inches—brownish yellow fine sandy loam saprolite
56 to 65 inches—light yellowish brown sandy loam saprolite that has mottles in shades of gray and brown

Cowee
Surface layer:
0 to 5 inches—dark yellowish brown gravelly sandy loam
5 to 10 inches—brown gravelly sandy loam

Subsoil:
10 to 21 inches—brown gravelly sandy clay loam
21 to 34 inches—yellowish red gravelly clay loam

Bedrock:
34 to 42 inches—soft, weathered gneiss bedrock
42 inches—hard gneiss bedrock

Soil Properties and Qualities

Depth class: Evard—very deep; Cowee—moderately deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Evard—moderate (6 to 9 inches within a 60-inch profile); Cowee—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Very steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.01 to 0.1 percent surface coverage
Extent of rock outcrops: 1 to 2 percent surface coverage
Potential frost action: Moderate
Soil reaction: Evard—moderately acid to very strongly acid; Cowee—moderately acid to extremely acid
Depth to bedrock: Evard—more than 60 inches; Cowee—20 to 40 inches to soft bedrock and typically 40 to 60 inches to hard bedrock

Minor Components

Dissimilar:
- Cliffield and Ashe soils that have hard bedrock at a depth of less than 40 inches; in landform positions similar to those of the Evard and Cowee soils
- Cleveland soils that have hard bedrock at a depth of less than 20 inches; in landform positions similar to those of the Evard and Cowee soils

Similar:
- Soils that are similar to the Evard and Cowee soils but have a higher content of mica
- Soils that are similar to the Evard and Cowee soils but have a brown subsoil

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting the production of pasture and hay crops. A site should be selected on better suited soils.

Woodland
Suitability: Suited
Management concerns: Evard—equipment use, rockiness, and erodibility; Cowee—equipment use, rockiness, erodibility, and windthrow hazard
Management measures and considerations:
- Using cable logging methods helps to overcome the equipment use limitation and prevent the acceleration of erosion caused by road construction and skid trails.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Cowee soil.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- This map unit has severe limitations affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The slope and depth to bedrock are severe limitations affecting septic tank absorption fields.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Unsuited

Management concerns:
- The slope and rockiness are severe limitations affecting local roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: Based on eastern white pine as the indicator species, 12R in areas of the Evard soil and 10R in areas of the Cowee soil

FaD—Fannin fine sandy loam, 15 to 30 percent slopes, stony

Setting

Landscape: Mountains
Landform: Divides
Landform position: Summits
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Fannin soil and similar soils: 85 percent
Dissimilar soils: 15 percent

Typical Profile

Surface layer:
0 to 3 inches—dark yellowish brown fine sandy loam

Subsoil:
3 to 6 inches—strong brown sandy clay loam
6 to 17 inches—yellowish red clay loam
17 to 24 inches—yellowish red sandy clay loam

Underlying material:
24 to 34 inches—strong brown loam saprolite that has a high content of mica
34 to 60 inches—loam saprolite that is multicolored in shades of brown, yellow, and black and has a high content of mica

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.01 to 0.1 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Moderate
Soil reaction: Slightly acid to very strongly acid
Depth to bedrock: More than 72 inches

Minor Components

Dissimilar:
- Ashe soils that have hard bedrock at a depth of less than 40 inches; in landform positions similar to those of the Fannin soil

Similar:
- Soils that are similar to the Fannin soil but have a lower content of mica
- Soils that are similar to the Fannin soil but have a clayey subsoil
- Soils that are similar to the Fannin soil but have a brown subsoil

Land Use

Dominant Uses: Woodland
Other Uses: Dwellings

Agricultural Development

Cropland
Suitability: Poorly suited
Management concerns: Erodibility and equipment use
Management measures and considerations:
- The successful application of resource management systems for controlling erosion and maintaining soil fertility is difficult on this soil.
- Special equipment or planning may be needed to plant and harvest crops safely on this soil.

Pasture and hayland
Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Special care is needed when renovating pastures and establishing seedbeds to prevent further erosion.
- Special equipment or planning may be needed to harvest or maintain forages safely on this soil.

Woodland
Suitability: Well suited
Management concerns: Equipment use and erodibility
Management measures and considerations:
- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.

Urban Development

Dwellings
Suitability: Poorly suited
Management concerns: Slope

Management measures and considerations:
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Poorly suited
Management concerns: Restricted permeability and slope
Management measures and considerations:
- Onsite waste disposal systems in areas of this map unit may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Slope and frost action
Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soil and prevent excessive erosion.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: 7R, based on yellow-poplar as the indicator species

FaE—Fannin fine sandy loam, 30 to 50 percent slopes, stony

Setting

Landscape: Mountains
Landform: Divides
Landform position: Side slopes and summits
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Fannin soil and similar soils: 85 percent
Dissimilar inclusions: 15 percent

Typical Profile

Surface layer:
0 to 3 inches—dark yellowish brown fine sandy loam

Subsoil:
3 to 6 inches—strong brown sandy clay loam
6 to 17 inches—yellowish red clay loam
17 to 24 inches—yellowish red sandy clay loam

Underlying material:
24 to 34 inches—strong brown loam saprolite that has a high content of mica
34 to 60 inches—loam saprolite that is multicolored in shades of brown, yellow, and black and has a high content of mica

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.01 to 0.1 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Moderate
Soil reaction: Slightly acid to very strongly acid
Depth to bedrock: More than 72 inches

Minor Components

Dissimilar:
- Randomly scattered small areas of Rock outcrop
- Cowee soils that have soft bedrock at a depth of less than 40 inches; in landform positions similar to those of the Fannin soil
- Ashe soils that have hard bedrock at a depth of less than 40 inches; in landform positions similar to those of the Fannin soil
- The extremely bouldery Greenlee soils near drainageways

Similar:
- Soils that are similar to the Fannin soil but have a clayey subsoil
- Soils that are similar to the Fannin soil but have a lower content of mica
- Soils that are similar to the Fannin soil but have a brown subsoil

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope is a severe limitations affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability for pasture: Poorly suited
Suitability for hayland: Unsuited
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Special equipment or planning may be needed to harvest or maintain forages safely on this soil.
- Applying lime, fertilizer, seed, and herbicides by hand helps to increase productivity in the steeper areas.

Woodland
Suitability: Suited
Management concerns: Equipment use and erodibility
Management measures and considerations:
- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Suitable equipment access should be maintained for the periodic salvage of windthrown trees.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.
- This soil is best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings
Suitability: Poorly suited
Management concerns: Slope
Management measures and considerations:
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Special design of dwellings or expensive excavation may be needed.
- Special excavation equipment may be needed in some areas because of the limited depth of the included Cowee soils.

Septic tank absorption fields
Suitability: Poorly suited
Management concerns: Slope
Management measures and considerations:
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Slope and frost action
Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: 7R, based on yellow-poplar as the indicator species

FbF—Fannin-Chestnut complex, 50 to 85 percent slopes, rocky

Setting

Landscape: Mountains
Landform: Divides and escarpments

Landform position: Fannin—the less rocky, concave areas on side slopes; Chestnut—the more rocky, convex areas on side slopes
Shape of areas: Irregular
Size of areas: 10 to 1,000 acres

Composition

Fannin soil and similar soils: 56 percent
Chestnut soil and similar soils: 27 percent
Dissimilar soils: 17 percent

Typical Profile

Fannin
Surface layer:
0 to 3 inches—dark yellowish brown fine sandy loam

Subsoil:
3 to 6 inches—strong brown sandy clay loam
6 to 17 inches—yellowish red clay loam
17 to 24 inches—yellowish red sandy clay loam

Underlying material:
24 to 34 inches—strong brown loam saprolite that has a high content of mica
34 to 60 inches—loam saprolite that is multicolored in shades of brown, yellow, and black and has a high content of mica

Chestnut
Surface layer:
0 to 3 inches—dark brown gravelly sandy loam

Subsoil:
3 to 17 inches—strong brown gravelly sandy loam
17 to 23 inches—brown gravelly sandy loam

Underlying material:
23 to 28 inches—multicolored gravelly loamy sand saprolite
28 to 42 inches—soft, weathered gneiss bedrock
42 inches—hard gneiss bedrock

Soil Properties and Qualities

Depth class: Fannin—very deep; Chestnut—moderately deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Fannin—moderate (0.6 inch to 2.0 inches per hour); Chestnut—moderately rapid (2 to 6 inches per hour)
Available water capacity: Fannin—moderate (6 to 9 inches within a 60-inch profile); Chestnut—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Very steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.01 to 0.1 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Moderate
Soil reaction: Fannin—slightly acid to very strongly acid; Chestnut—moderately acid to extremely acid

Depth to bedrock: Fannin—more than 72 inches; Chestnut—20 to 40 inches to soft bedrock and typically 40 to 60 inches to hard bedrock

Minor Components

Dissimilar:
- Cliffield and Ashe soils that have hard bedrock at a depth of less than 40 inches; in landform positions similar to those of the Fannin and Chestnut soils
- Cleveland soils that have hard bedrock at a depth of less than 20 inches; in landform positions similar to those of the Fannin and Chestnut soils

Similar:
- Soils that are similar to the Fannin soil but have a lower content of mica
- Soils that are similar to the Fannin and Chestnut soils but have a brown subsoil

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting the production of pasture and hay crops. A site should be selected on better suited soils.

Woodland
Suitability: Suited
Management concerns: Fannin—equipment use, rockiness, and erodibility; Chestnut—equipment use, rockiness, erodibility, and windthrow hazard
Management measures and considerations:
- Using cable logging methods helps to overcome the equipment use limitation and prevent the acceleration of erosion caused by road construction and skid trails.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Chestnut soil.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- This map unit has severe limitations affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The slope and depth to bedrock are severe limitations affecting septic tank absorption fields.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting local roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: Fannin—7R, based on yellow-poplar as the indicator species; Chestnut—10R, based on eastern white pine as the indicator species

FvA—Fluvaquents-Udifluvents complex, 0 to 2 percent slopes, occasionally flooded

Setting

Landscape: Mountains
Landform: Areas along flood plains
Landform position: Planar to slightly convex slopes
Shape of areas: Long and narrow
Size of areas: 5 to 25 acres

Composition

Fluvaquents and similar soils: 60 percent
Udifluvents and similar soils: 35 percent
Dissimilar inclusions: 5 percent

Typical Profile

This map unit consists of areas along flood plains where the natural soil material was altered by excavation activities that removed gold or gravel. These areas were later reclaimed by grading, filling, and land shaping. Fluvaquents are typically loamy in the upper part and are sand or a mixture of sand, gravel, and cobbles in the lower part. Udifluvents are commonly sandy in the upper part and consist of sand, gravel, and cobbles in the lower part, or they have sand, gravel, and cobbles throughout. A typical profile is not given for the soils in this map unit because of their variability.

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Fluvaquents—somewhat poorly drained; Udifluvents—moderately well drained or well drained
General texture class: Fluvaquents—loamy; Udifluvents—sandy or sandy-skeletal
Permeability: Fluvaquents—moderate; Udifluvents—moderate to very rapid
Available water capacity: Fluvaquents—moderately high; Udifluvents—moderate to very low
Depth to high water table: Fluvaquents—1 to 2.0 feet; Udifluvents—2.0 to 4 feet
Shrink-swell potential: Low
Slope class: Nearly level
Flooding: Occasional for brief periods
Potential frost action: None
Soil reaction: Neutral to strongly acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Poorly drained soils in depressions
- Well drained soils that have a high water table below a depth of 4 feet; in the higher spots
- Randomly scattered pits, trenches, or mounds

Similar:
- Randomly intermingled spots containing less disturbed soils that have soil properties and qualities similar to those of the major soils

Land Use

Dominant Uses: Pasture and hayland
Other Uses: Nursery or Christmas tree production in a few areas

Agricultural Development

Cropland
Suitability: Suited
Management concerns: Flooding, wetness, and variable soil properties and qualities
Management measures and considerations:
- Onsite investigation is recommended to determine the appropriate management measures needed because of highly variable soil properties.

Pasture and hayland
Suitability: Suited
Management concerns: Flooding, wetness, and variable soil properties and qualities
Management measures and considerations:
- Onsite investigation is recommended to determine the appropriate management measures needed because of highly variable soil properties.

Woodland
Suitability: Well suited
Management concerns: Equipment use and seedling mortality
Management measures and considerations:
- Restricting the use of standard wheeled and tracked equipment to dry periods helps to prevent rutting and soil compaction that occurs when the soils are saturated.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting septic tank absorption fields. A site should be selected on better suited soils.

Local roads and streets
Suitability: Unsuited

Management concerns:
- The flooding and wetness are severe limitations affecting roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: None assigned
Woodland ordination symbol: Based on yellow-poplar as the indicator species, 8W in areas of Fluvaquents and 9W in areas of Udifluvents

GaC—Greenlee-Tate complex, 6 to 15 percent slopes, extremely bouldery

Setting

Landscape: Mountains
Landform: Colluvial fans
Landform position: Greenlee—the more bouldery areas on foot slopes and toe slopes; Tate—the less bouldery areas on foot slopes and toe slopes
Shape of areas: Irregular or long and narrow
Size of areas: 15 to 150 acres

Composition

Greenlee soil and similar soils: 50 percent
Tate soil and similar soils: 40 percent
Dissimilar soils: 10 percent

Typical Profile

Greenlee
Surface layer:
0 to 5 inches—dark brown very cobbly sandy loam

Subsoil:
5 to 61 inches—dark yellowish brown very cobbly sandy loam

Tate

Surface layer:
0 to 5 inches—dark brown cobbly sandy loam

Subsurface layer:
5 to 10 inches—dark yellowish brown cobbly sandy loam

Subsoil:
10 to 22 inches—yellowish brown sandy clay loam
22 to 51 inches—strong brown sandy clay loam
51 to 61 inches—strong brown sandy loam that has yellowish red and red mottles

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Greenlee—loamy with many rock fragments; Tate—loamy

Permeability: Greenlee—moderately rapid (2 to 6 inches per hour); Tate—moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Greenlee—low (3 to 6 inches within a 60-inch profile); Tate—moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Strongly sloping
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 3.0 to 15.0 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Tate—moderate; Greenlee—low
Soil reaction: Greenlee—moderately acid to extremely acid; Tate—slightly acid to very strongly acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Ostin soils that are sandy and have many rock fragments; adjacent to drainageways

Similar:
- Soils that are similar to the Greenlee and Tate soils but have a redder subsoil
- Soils that are similar to the Greenlee and Tate soils but have a dark surface layer that contains more organic matter
- Soils that are similar to the Tate soil but have more clay in the subsoil

Land Use

Dominant Uses: Woodland
Other Uses: Dwellings

Agricultural Development

Cropland
Suitability: Greenlee—unsuited; Tate—poorly suited
Management concerns: Erodibility and large stones
Management measures and considerations:
- Heavy equipment is needed to remove stones and boulders large enough to interfere with cropland management.

Pasture and hayland
Suitability for pasture: Greenlee—unsuited; Tate—suited
Suitability for hayland: Greenlee—unsuited; Tate—poorly suited
Management concerns: Slope and large stones
Management measures and considerations:
- Heavy equipment is needed to remove stones and boulders large enough to interfere with the management of pasture and hayland.
- Areas of the less stony Tate soil may be too intermingled with areas of the Greenlee soil to manage separately.

Woodland
Suitability: Greenlee—suited; Tate—well suited
Management concerns: Greenlee—equipment use and seedling mortality; Tate—no significant limitations

Management measures and considerations:
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Using cable logging methods helps to overcome limited road and trail construction resulting from the large number of stones and boulders on the soil surface.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings
Suitability: Greenlee—poorly suited; Tate—suited
Management concerns: Greenlee—slope and large stones; Tate—slope
Management measures and considerations:
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Drainage systems may be needed around the foundation of dwellings to control seasonal springs and wetness.
- Large boulders in the subsoil can make excavation difficult or impractical in some areas.
- Areas of the less stony Tate soil may be too intermingled with areas of the Greenlee soil to use separately.

Septic tank absorption fields
Suitability: Greenlee—poorly suited; Tate—suited
Management concerns: Greenlee—slope and large stones; Tate—slope and restricted permeability
Management measures and considerations:
- Large boulders in the subsoil can make excavation difficult or impractical in some areas.
- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Areas of the less stony Tate soil may be too intermingled with areas of the Greenlee soil to use separately.

Local roads and streets
Suitability: Greenlee—poorly suited; Tate—suited
Management concerns: Greenlee—slope, large stones, and frost action; Tate—slope and frost action
Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Carefully planning the location of roads helps to minimize the removal of large stones.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.
- Areas of the less stony Tate soil may be too intermingled with areas of the Greenlee soil to use separately.

Interpretive Groups

Land capability classification: Greenlee—7s; Tate—4s
Woodland ordination symbol: Based on yellow-poplar as the indicator species, 8X in areas of the Greenlee soil and 6A in areas of the Tate soil

GaD—Greenlee-Tate complex, 15 to 30 percent slopes, extremely bouldery

Setting

Landscape: Mountains
Landform: Colluvial fans
Landform position: Greenlee—the more bouldery areas on foot slopes and toe slopes; Tate—the less bouldery areas on foot slopes and toe slopes
Shape of areas: Irregular or long and narrow
Size of areas: 15 to 150 acres

Composition

Greenlee soil and similar soils: 55 percent
Tate soil and similar soils: 35 percent
Dissimilar soils: 10 percent

Typical Profile

Greenlee
Surface layer:
0 to 5 inches—dark brown very cobbly sandy loam

Subsoil:
5 to 61 inches—dark yellowish brown very cobbly sandy loam

Tate
Surface layer:
0 to 5 inches—dark brown cobbly sandy loam

Subsurface layer:
5 to 10 inches—dark yellowish brown cobbly sandy loam

Subsoil:
10 to 22 inches—yellowish brown sandy clay loam
22 to 51 inches—strong brown sandy clay loam
51 to 61 inches—strong brown sandy loam that has yellowish red and red mottles

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Tate—loamy; Greenlee—loamy with many rock fragments
Permeability: Greenlee—moderately rapid (2 to 6 inches per hour); Tate—moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Greenlee—low (3 to 6 inches within a 60-inch profile); Tate—moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 3.0 to 15.0 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Greenlee—low; Tate—moderate

Soil reaction: Greenlee—moderately acid to extremely acid; Tate—slightly acid to very strongly acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Ostin soils that are sandy and have many rock fragments; adjacent to drainageways

Similar:
- Soils that are similar to the Greenlee and Tate soils but have a redder subsoil
- Soils that are similar to the Greenlee and Tate soils but have a dark surface layer that contains more organic matter

Land Use

Dominant Uses: Woodland
Other Uses: Dwellings

Agricultural Development

Cropland
Suitability: Greenlee—unsuited; Tate—poorly suited
Management concerns: Erodibility and large stones
Management measures and considerations:
- Heavy equipment is needed to remove stones and boulders large enough to interfere with cropland management.
- Areas of the less stony Tate soil may be too intermingled with areas of the Greenlee soil to manage separately.

Pasture and hayland
Suitability for pasture: Greenlee—unsuited; Tate—suited
Suitability for hayland: Greenlee—unsuited; Tate—poorly suited
Management concerns: Slope and large stones
Management measures and considerations:
- Heavy equipment is needed to remove stones and boulders large enough to interfere with the management of pasture and hayland.
- Areas of the less stony Tate soil may be too intermingled with areas of the Greenlee soil to manage separately.

Woodland
Suitability: Greenlee—suited; Tate—well suited
Management concerns: Greenlee—equipment use and seedling mortality; Tate—no significant limitations
Management measures and considerations:
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Using cable logging methods helps to overcome limited road and trail construction resulting from the large number of stones and boulders on the soil surface.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings
Suitability: Poorly suited
Management concerns: Greenlee—slope and large stones; Tate—slope

Management measures and considerations:
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Special design of retaining structures may be needed to stabilize excavation walls and cutbanks in areas of the Greenlee soil.
- Drainage systems may be needed around the foundation of dwellings to control seasonal springs and wetness.
- Large boulders in the subsoil can make excavation difficult or impractical in some areas.

Septic tank absorption fields
Suitability: Poorly suited
Management concerns: Greenlee—slope and large stones; Tate—slope and restricted permeability
Management measures and considerations:
- Large boulders in the subsoil can make excavation difficult or impractical in some areas.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Greenlee—slope, large stones, and frost action; Tate—slope and frost action
Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Carefully planning the location of roads helps to minimize the removal of large stones.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.

Interpretive Groups

Land capability classification: Greenlee—7s; Tate—6s
Woodland ordination symbol: Based on yellow-poplar as the indicator species, 8X in areas of the Greenlee soil and 6R in areas of the Tate soil

GbF—Greenlee-Tate complex, 30 to 70 percent slopes, rubbly

Setting

Landscape: Mountains
Landform: Colluvial fans
Landform position: Greenlee—the more bouldery areas on foot slopes and toe slopes; Tate—the less bouldery areas on foot slopes and toe slopes
Shape of areas: Irregular or long and narrow
Size of areas: 15 to 150 acres

Composition

Greenlee soil and similar soils: 60 percent
Tate soil and similar soils: 35 percent
Dissimilar inclusions: 5 percent

Typical Profile

Greenlee
Surface layer:
0 to 5 inches—dark brown very cobbly sandy loam

Subsoil:
5 to 61 inches—dark yellowish brown very cobbly sandy loam

Tate
Surface layer:
0 to 5 inches—dark brown cobbly sandy loam

Subsurface layer:
5 to 10 inches—dark yellowish brown cobbly sandy loam

Subsoil:
10 to 22 inches—yellowish brown sandy clay loam
22 to 51 inches—strong brown sandy clay loam
51 to 61 inches—strong brown sandy loam that has yellowish red and red mottles

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Loamy with many rock fragments
Permeability: Greenlee—moderately rapid (2 to 6 inches per hour); Tate—moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Greenlee—low (3 to 6 inches within a 60-inch profile); Tate—moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Steep or very steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: More than 15.0 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Greenlee—low; Tate—moderate
Soil reaction: Greenlee—moderately acid to extremely acid; Tate—slightly acid to very strongly acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Small areas of Rock outcrop adjacent to drainageways
- Ashe soils that have bedrock at a depth of less than 40 inches; adjacent to drainageways or areas of Rock outcrop

Similar:
- Soils that are similar to the Greenlee and Tate soils but have a redder subsoil
- Soils that are similar to the Greenlee and Tate soils but have a dark surface layer that contains more organic matter
- Soils that are similar to the Greenlee and Tate soils but have saprolite at a depth of less than 40 inches

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope and large stones are severe limitations affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability: Unsuited
Management concerns:
- The slope and large stones are severe limitations affecting the production of pasture and hay crops. A site should be selected on better suited soils.

Woodland
Suitability: Suited
Management concerns: Greenlee—erodibility, equipment use, and seedling mortality; Tate—erodibility and equipment use
Management measures and considerations:
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Using cable logging methods helps to overcome limited road and trail construction resulting from the large number of stones and boulders on the soil surface.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings
Suitability for dwellings without basements: Poorly suited
Suitability for dwellings with basements: Greenlee—unsuited; Tate—poorly suited
Management concerns: Greenlee—slope, large stones, and instability of the soil when disturbed; Tate—slope
Management measures and considerations:
- Sites should be selected in areas where the slope and large stones are least restrictive to construction and equipment use.
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Special design of retaining structures may be needed to stabilize excavation walls and cutbanks in areas of the Greenlee soil.
- Drainage systems may be needed around the foundation of dwellings to control seasonal springs and wetness.
- Large boulders in the subsoil can make excavation difficult or impractical in some areas.

Septic tank absorption fields
Suitability: Greenlee—unsuited; Tate—poorly suited
Management concerns: Greenlee—slope and large stones; Tate—slope
Management measures and considerations:
- Large boulders in the subsoil can make excavation difficult or impractical in some areas.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited

Management concerns: Greenlee—slope, large stones, frost action, and instability of the soil when disturbed; Tate—slope and frost action
Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Carefully planning the location of roads helps to minimize the removal of large stones.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.

Interpretive Groups

Land capability classification: 7s
Woodland ordination symbol: Based on yellow-poplar as the indicator species, 8R in areas of the Greenlee soil and 6R in areas of the Tate soil

GrE—Grover loam, 25 to 45 percent slopes

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: 15 to 600 acres

Composition

Grover soil and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Typical Profile

Surface layer:
0 to 5 inches—brown loam

Subsoil:
5 to 19 inches—strong brown sandy clay loam
19 to 24 inches—strong brown loam

Underlying material:
24 to 62 inches—strong brown sandy loam saprolite that has a high content of mica and dark brown streaks

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None

Soil reaction: Moderately acid to very strongly acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Randomly scattered small areas of Rock outcrop
- Ashlar soils that have hard bedrock at a depth of less than 40 inches; in stony or bouldery areas or near small areas of Rock outcrop
- Bethlehem soils that have soft bedrock at a depth of less than 40 inches; in landform positions similar to those of the Grover soil

Similar:
- Soils that are similar to the Grover soil but have a lower content of mica
- Soils that are similar to the Grover soil but have a clayey subsoil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope is a severe limitation affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability for pasture: Poorly suited
Suitability for hayland: Unsuited
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Special equipment or planning may be needed to harvest or maintain forages safely on this soil.
- Applying lime, fertilizer, seed, and herbicides by hand helps to increase productivity in the steeper areas.

Woodland
Suitability: Suited
Management concerns: Equipment use and erodibility
Management measures and considerations:
- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- The slope is a severe limitation affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The slope is a severe limitation affecting septic tank absorption fields.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Unsuited
Management concerns:
- The slope is a severe limitation affecting roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: 7R, based on shortleaf pine as the indicator species

HaC2—Hayesville sandy clay loam, 8 to 15 percent slopes, eroded

Setting

Landscape: Mountains
Landform: Divides
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: 10 to 35 acres

Composition

Hayesville soil and similar soils: 85 percent
Dissimilar soils: 15 percent

Typical Profile

Surface layer:
0 to 5 inches—dark reddish brown sandy clay loam

Subsoil:
5 to 26 inches—red clay
26 to 35 inches—red clay loam

Underlying material:
35 to 45 inches—yellowish red loam saprolite
45 to 62 inches—sandy loam saprolite that is multicolored in shades of red, yellow, and brown

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed

Slope class: Strongly sloping
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Low
Soil reaction: Moderately acid to extremely acid; ranging to slightly acid in the upper part of the profile in limed areas
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Cowee soils that have soft, weathered bedrock at a depth of less than 40 inches; in landform positions similar to those of the Hayesville soil

Similar:
- Hayesville soils that have a less eroded surface layer of sandy loam
- Soils that are similar to the Hayesville soil but have a higher content of mica
- Soils that are similar to the Hayesville soil but have a browner subsoil
- Soils that are similar to the Hayesville soil but have a loamy subsoil

Land Use

Dominant Uses: Woodland and pasture and hayland
Other Uses: Dwellings and cropland

Agricultural Development

Cropland
Suitability: Suited
Management concerns: Erodibility and soil fertility
Commonly grown crops: Corn, small grain, and soybeans
Management measures and considerations:
- Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to minimize erosion, control surface runoff, and maximize the infiltration of water.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.

Pasture and hayland
Suitability for hayland: Well suited
Suitability for pasture: Suited
Commonly grown crops: Tall fescue, clover, and orchardgrass
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increase germination.
- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Well suited
Management concerns: No significant limitations
Management measures and considerations:
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

Urban Development

Dwellings
Suitability: Suited
Management concerns: Slope
Management measures and considerations:
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Grading or land shaping can divert upslope surface water away from foundations.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Suited
Management concerns: Restricted permeability and slope
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soil is not wet helps to reduce smearing and sealing of trench walls.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

Local roads and streets
Suitability: Suited
Management concerns: Low strength, slope, and frost action
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soil and prevent excessive erosion.

Interpretive Groups

Land capability classification: 4e
Woodland ordination symbol: 7A, based on yellow-poplar as the indicator species

HaD2—Hayesville sandy clay loam, 15 to 30 percent slopes, eroded

Setting

Landscape: Mountains
Landform: Divides
Landform position: Summits and side slopes
Shape of areas: Irregular
Size of areas: 10 to 35 acres

Composition

Hayesville soil and similar soils: 75 percent
Dissimilar soils: 25 percent

Typical Profile

Surface layer:
0 to 5 inches—dark reddish brown sandy clay loam

Subsoil:
5 to 26 inches—red clay
26 to 35 inches—red clay loam

Underlying material:
35 to 45 inches—yellowish red loam saprolite
45 to 62 inches—sandy loam saprolite that is multicolored in shades of red, yellow, and brown

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Low
Soil reaction: Moderately acid to extremely acid; ranging to slightly acid in the upper part of the profile in limed areas
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Cowee soils that have soft, weathered bedrock at a depth of less than 40 inches; in landform positions similar to those of the Hayesville soil

Similar:
- Hayesville soils that have a less eroded surface layer of sandy loam
- Soils that are similar to the Hayesville soil but have a higher content of mica
- Soils that are similar to the Hayesville soil but have a browner subsoil
- Soils that are similar to the Hayesville soil but have a loamy subsoil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and hayland

Agricultural Development

Cropland
Suitability: Poorly suited
Management concerns: Erodibility, equipment use, tilth, and soil fertility
Management measures and considerations:
- The successful application of resource management systems for controlling erosion and maintaining soil fertility is difficult on this soil.
- Special equipment or planning may be needed to plant and harvest crops safely on this soil.

Pasture and hayland

Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Commonly grown crops: Tall fescue, clover, and orchardgrass
Management concerns: Erodibility and equipment use
Management measures and considerations:

- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Special care is needed when renovating pastures and establishing seedbeds to prevent further erosion.
- Special equipment or planning may be needed to harvest or maintain forages safely on this soil.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland

Suitability: Suited
Management concerns: Equipment use, erodibility, and seedling survival rates
Management measures and considerations:

- Unsurfaced roads may be impassible during wet periods because of the high clay content in this soil.
- Restricting logging operations to periods when the soil is not wet helps to prevent rutting and root damage resulting from compaction.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.

Urban Development

Dwellings

Suitability: Poorly suited
Management concerns: Slope
Management measures and considerations:

- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields

Suitability: Poorly suited
Management concerns: Restricted permeability and slope
Management measures and considerations:

- Onsite waste disposal systems in areas of this map unit may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets

Suitability: Poorly suited
Management concerns: Low strength and slope

Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soil and prevent excessive erosion.

Interpretive Groups

Land capability classification: 6e
Woodland ordination symbol: 7R, based on yellow-poplar as the indicator species

HeB—Helena-Worsham complex, 1 to 6 percent slopes

Setting

Landscape: Piedmont
Landform: Heads of drainageways
Landform position: Helena—planar to slightly convex slopes; Worsham—planar to slightly concave slopes
Shape of areas: Irregular
Size of areas: 5 to 15 acres

Composition

Helena soil and similar soils: 65 percent
Worsham soil and similar soils: 25 percent
Dissimilar soils: 10 percent

Typical Profile

Helena
Surface layer:
0 to 5 inches—brown sandy loam
5 to 10 inches—dark yellowish brown sandy loam

Subsoil:
10 to 15 inches—yellowish brown sandy clay loam
15 to 29 inches—yellowish brown clay that has red and strong brown iron concentrations
29 to 36 inches—light yellowish brown clay that has light brownish gray iron depletions and yellowish red iron concentrations
36 to 53 inches—light brownish gray clay that has yellowish brown iron concentrations
53 to 63 inches—light gray clay loam that has olive yellow iron concentrations

Worsham
Surface layer:
0 to 3 inches—dark grayish brown loam

Subsoil:
3 to 11 inches—grayish brown clay loam
11 to 28 inches—gray clay that has yellowish brown and yellowish red iron concentrations
28 to 37 inches—gray clay that has yellowish red iron concentrations
37 to 45 inches—gray sandy clay loam

Underlying material:
45 to 58 inches—very dark gray sandy clay loam that is stratified with lenses of sandy loam and clay loam
58 to 65 inches—light brownish gray sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Helena—moderately well drained; Worsham—poorly drained
General texture class: Clayey
Permeability: Helena—slow (0.06 to 0.2 inch per hour); Worsham—slow or very slow (0.0 to 0.6 inch per hour)
Available water capacity: Helena—moderate (6 to 9 inches within a 60-inch profile); Worsham—high (9 to 12 inches within a 60-inch profile)
High water table: Helena—at a depth of 1.5 to 2.5 feet from November to April; Worsham—within a depth of 1.0 foot from November to April
Shrink-swell potential: Helena—high; Worsham—moderate
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Slope class: Helena—nearly level or gently sloping; Worsham—nearly level
Rock fragments on the surface: Less than 0.01 percent surface coverage
Potential frost action: None
Soil reaction: Helena—strongly acid to extremely acid; Worsham—strongly acid or very strongly acid; ranging to slightly acid in the upper part of the profile in limed areas
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- The loamy, occasionally flooded Chewacla soils near stream channels
- The loamy, frequently flooded Wehadkee soils in depressions near stream channels
- The well drained Appling soils in the higher areas

Similar:
- Soils that are similar to the Helena and Worsham soils but have less clay in the subsoil
- Soils that are similar to the Helena and Worsham soils and that overlie older deposits of alluvium and organic materials
- Soils that are similar to the Helena and Worsham soils but have saprolite at a depth of less than 40 inches
- Soils that are similar to the Helena and Worsham soils but have a thinner, clayey subsoil

Land Use

Dominant Uses: Woodland
Other Uses: Cropland and pasture and hayland

Agricultural Development

Cropland
Suitability: Helena—well suited; Worsham—suited
Management concerns: Helena—erodibility, wetness, and limited size of areas; Worsham—excessive wetness and limited size of areas
Management measures and considerations:
- Resource management systems that include terraces and diversions, stripcropping, contour tillage, no-till farming, and crop residue management help to minimize erosion, control surface runoff, and maximize the infiltration of rainfall.

- Installing an artificial drainage system helps to reduce the wetness limitation and improve productivity in areas of the included Dogue soils.
- Federal and State regulations protecting wetlands may restrict the use of drainage systems and other alterations to areas of the Worsham soil.
- This map unit is difficult to manage for crop production because of the small size of areas.

Pasture and hayland

Suitability: Helena—well suited; Worsham—suited

Management concerns: Helena—wetness and limited size of areas; Worsham—excessive wetness and limited size of areas

Management measures and considerations:

- Planting wetness-tolerant species in undrained areas helps to improve productivity.
- Preventing overgrazing or preventing grazing when the soils are too wet helps to prevent soil compaction, decreased productivity, and a rough soil surface.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.
- This map unit is difficult to manage for the production of pasture and hay crops because of the small size of areas.
- Federal and state regulations protecting wetlands may restrict the use of drainage systems and other alterations to areas of the Worsham soil.

Woodland

Suitability: Helena—well suited; Worsham—suited

Management concerns: Helena—equipment use and limited size of areas; Worsham—equipment use, seedling survival rates, competition from undesirable plants, and limited size of areas

Management measures and considerations:

- Restricting the use of standard wheeled and tracked equipment to dry periods helps to prevent rutting and soil compaction that occurs when the soils are saturated.
- Planting trees that are tolerant of wetness helps to increase seedling survival rates.
- Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.
- Federal and State regulations protecting wetlands may restrict the use of some woodland management measures and other alterations to areas of the Worsham soil.
- This map unit is difficult to manage for timber production because of the small size of areas.

Urban Development

Dwellings

Suitability: Poorly suited

Management concerns: Helena—wetness and shrink-swell potential; Worsham—excessive wetness

Management measures and considerations:

- Building structures on the highest part of the landscape and using artificial drainage help to reduce the risk of damage caused by wetness.
- Reinforcing foundations or backfilling with coarse-textured material helps to strengthen buildings and prevents damage caused by shrinking and swelling.

Septic tank absorption fields

Suitability: Poorly suited

Management concerns: Restricted permeability and wetness

Management measures and considerations:
- Suitable fill material can be used to raise the filter field a sufficient distance above the high water table and thus help to improve the performance of septic systems.
- Onsite waste disposal systems in areas of this map unit may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Helena—low strength and shrink-swell potential; Worsham—low strength and wetness
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Constructing roads on raised and well compacted fill material helps to overcome the wetness limitation.

Interpretive Groups

Land capability classification: Helena—2e; Worsham—4w
Woodland ordination symbol: Helena—8A, based on loblolly pine as the indicator species; Worsham—7W, based on yellow-poplar as the indicator species

HsB2—Hiwassee clay loam, 2 to 8 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: High stream terraces
Landform position: Planar to slightly concave slopes
Shape of areas: Irregular
Size of areas: 10 to 25 acres

Composition

Hiwassee soil and similar soils: 95 percent
Dissimilar soils: 5 percent

Typical Profile

Surface layer:
0 to 6 inches—dusky red clay loam

Subsoil:
6 to 10 inches—dark reddish brown clay loam
10 to 25 inches—dark red clay
25 to 45 inches—red clay
45 to 62 inches—red clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Gently sloping

Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Slightly acid to very strongly acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Randomly scattered areas of severely eroded soils that have a loamy subsoil with a high content of mica

Similar:
- Hiwassee soils that have a less eroded surface layer of sandy loam
- Soils that are similar to the Hiwassee soil but have a browner subsoil
- Soils that are similar to the Hiwassee soil but are less acid

Land Use

Dominant Uses: Cropland and pasture and hayland
Other Uses: Woodland

Agricultural Development

Cropland
Suitability: Well suited
Commonly grown crops: Corn, small grain, and soybeans
Management concerns: Erodibility, tilth, and soil fertility
Management measures and considerations:
- Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to prevent further erosion by stabilizing the soil, controlling surface runoff, and maximizing the infiltration of water.
- Incorporating crop residue into the soil or leaving residue on the soil surface helps to minimize clodding and crusting and maximize the infiltration of water.
- Restricting tillage to periods when the soil is not wet helps to reduce clodding and crusting and increases the infiltration of water.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.

Pasture and hayland
Suitability: Well suited
Commonly grown crops: Tall fescue, clover, and alfalfa
Management concerns: Erodibility
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Using a rotational grazing system and implementing a well-planned clipping and harvesting schedule help to maintain pastures and increase productivity.

Woodland
Suitability: Suited
Management concerns: Equipment use and seedling survival rates
Management measures and considerations:
- Unsurfaced roads may be impassible during wet periods because of the high clay content in this soil.

- Restricting logging operations to periods when the soil is not wet helps to prevent rutting and possible damage resulting from compaction.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.

Urban Development

Dwellings
Suitability: Well suited
Management concerns: No significant limitations
Management measures and considerations:
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Suited
Management concerns: Restricted permeability
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soil is not wet helps to reduce smearing and sealing of trench walls.

Local roads and streets
Suitability: Suited
Management concerns: Low strength
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.

Interpretive Groups

Land capability classification: 2e
Woodland ordination symbol: 10C, based on loblolly pine as the indicator species

HsC2—Hiwassee clay loam, 8 to 15 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: High stream terraces
Landform position: Planar to slightly concave slopes
Shape of areas: Irregular
Size of areas: 10 to 35 acres

Composition

Hiwassee soil and similar soils: 95 percent
Dissimilar soils: 5 percent

Typical Profile

Surface layer:
0 to 6 inches—dusky red clay loam

Subsoil:
6 to 10 inches—dark reddish brown clay loam
10 to 25 inches—dark red clay

25 to 45 inches—red clay
45 to 62 inches—red clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Strongly sloping
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Slightly acid to very strongly acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Randomly scattered areas of severely eroded soils that have a loamy subsoil with a high content of mica

Similar:
- Hiwassee soils that have a slightly eroded surface layer of sandy loam
- Soils that are similar to the Hiwassee soil but have a browner subsoil
- Soils that are similar to the Hiwassee soil but have a thinner subsoil
- Soils that are similar to the Hiwassee soil but are less acid

Land Use

Dominant Uses: Cropland and pasture and hayland
Other Uses: Woodland

Agricultural Development

Cropland
Suitability: Suited
Commonly grown crops: Corn, small grain, and soybeans
Management concerns: Erodibility, tilth, and soil fertility
Management measures and considerations:
- Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to prevent further erosion by stabilizing the soil, controlling surface runoff, and maximizing the infiltration of water.
- Incorporating crop residue into the soil or leaving residue on the soil surface helps to minimize clodding and crusting and maximize the infiltration of water.
- Restricting tillage to periods when the soil is not wet helps to reduce clodding and crusting and increases the infiltration of water.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.

Pasture and hayland
Suitability for pasture: Well suited
Suitability for hayland: Suited

Commonly grown crops: Tall fescue, clover, and alfalfa
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increase germination.
- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Well suited
Management concerns: Equipment use and seedling survival rates
Management measures and considerations:
- Unsurfaced roads may be impassible during wet periods because of the high clay content in this soil.
- Restricting logging operations to periods when the soil is not wet helps to prevent rutting and root damage resulting from compaction.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.

Urban Development

Dwellings
Suitability: Suited
Management concerns: Slope
Management measures and considerations:
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Grading or land shaping can divert upslope surface water away from foundations.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Suited
Management concerns: Restricted permeability and slope
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soil is not wet helps to reduce smearing and sealing of trench walls.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

Local roads and streets
Suitability: Suited
Management concerns: Low strength and slope
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soil and prevent excessive erosion.

Interpretive Groups

Land capability classification: 3e
Woodland ordination symbol: 10C, based on loblolly pine as the indicator species

IoA—Iotla sandy loam, 0 to 2 percent slopes, occasionally flooded

Setting

Landscape: Mountains
Landform: Iotla soils only occur on a few small flood plains in the northern part of Rutherford County near the McDowell County boundary
Landform position: Planar to slightly concave slopes
Shape of areas: Elongated or irregular
Size of areas: 4 to 100 acres

Composition

Iotla soil and similar soils: 90 percent
Dissimilar soils: 10 percent

Typical Profile

Surface layer:
0 to 12 inches—dark yellowish brown sandy loam

Underlying material:
12 to 21 inches—dark yellowish brown loam that has dark grayish brown iron depletions
21 to 26 inches—dark grayish brown fine sandy loam that has yellowish brown mottles and dark gray iron depletions
26 to 30 inches—multicolored light brownish gray, dark gray, and light yellowish brown sand
30 to 50 inches—very dark gray loam
50 to 60 inches—light brownish gray gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Somewhat poorly drained
General texture class: Loamy
Permeability: Moderately rapid (2 to 6 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: 1.5 to 3.5 feet from November to April
Shrink-swell potential: Low
Slope class: Nearly level
Flooding: Occasional from January to December for periods of 2 to 7 days
Potential frost action: Moderate
Soil reaction: Strongly acid to neutral
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Soils that are well drained and moderately well drained and in landform positions similar to those of the Iotla soil
- Soils that are excessively drained and nearer the stream channel

- Soils that are poorly drained and in frequently flooded depressions
- Soils in the higher areas that are rarely flooded

Similar:
- Soils that are similar to the Iotla soil but have more clay in the subsoil
- Soils that are similar to the Iotla soil but have more rock fragments in the underlying material

Land Use

Dominant Uses: Woodland, cropland, and pasture and hayland

Agricultural Development

Cropland
Suitability: Suited
Commonly grown crops: Corn, soybeans, small grain, and vegetable crops
Management concerns: Flooding and wetness
Management measures and considerations:
- Harvesting row crops as early as possible helps to reduce the risk of damage caused by flooding.
- Installing an artificial drainage system helps to reduce the wetness limitation and improve soil productivity.
- Planting wetness-tolerant species in undrained areas helps to improve productivity.

Pasture and hayland
Suitability for pasture: Well suited
Suitability for hayland: Suited
Commonly grown crops: Tall fescue and clover
Management concerns: Flooding and wetness
Management measures and considerations:
- Harvesting hay crops as early as possible helps to reduce the risk of damage caused by flooding.
- Livestock should be provided escape routes to higher areas during periods of flooding.
- Preventing overgrazing or preventing grazing when the soil is too wet helps to prevent soil compaction, decreased productivity, and a rough soil surface.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Well suited
Management concerns: Equipment use and plant competition
Management measures and considerations:
- Restricting the use of standard wheeled and tracked equipment to dry periods helps to prevent rutting and soil compaction that occurs when the soil is saturated.
- Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting septic tank absorption fields. A site should be selected on better suited soils.

Local roads and streets
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: 2w
Woodland ordination symbol: 7A, based on yellow-poplar as the indicator species

MaC2—Madison clay loam, 8 to 15 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: Broad and narrow interstream divides
Landform position: Side slopes and summits
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Madison soil and similar soils: 90 percent
Dissimilar soils: 10 percent

Typical Profile

Surface layer:
0 to 7 inches—yellowish red clay loam

Subsoil:
7 to 19 inches—red clay
19 to 30 inches—red clay loam
30 to 46 inches—yellowish red loam

Underlying material:
46 to 62 inches—yellowish red and reddish brown loam saprolite that has a high content of mica

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Strongly sloping
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage

Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Moderately acid to very strongly acid; ranging to slightly acid in the upper part of the profile in limed areas
Depth to bedrock: More than 72 inches

Minor Components

Dissimilar:
- Bethlehem soils that have soft, weathered bedrock at a depth of less than 40 inches; in landform positions similar to those of the Madison soil
- Saw soils that have hard bedrock at a depth of less than 40 inches; in stony or rocky spots

Similar:
- Madison soils that have a slightly eroded surface layer of sandy loam or loam
- Soils that are similar to the Madison soil but have a lower content of mica
- Soils that are similar to the Madison soil but have a thicker subsoil

Land Use

Dominant Uses: Woodland, pasture and hayland, and cropland
Other Uses: Dwellings and orchards

Agricultural Development

Cropland
Suitability: Suited
Commonly grown crops: Corn, small grain, and soybeans
Management concerns: Erodibility, tilth, and soil fertility
Management measures and considerations:
- Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to prevent further erosion by stabilizing the soil, controlling surface runoff, and maximizing the infiltration of water.
- Incorporating crop residue into the soil or leaving residue on the soil surface helps to minimize clodding and crusting and maximize the infiltration of water.
- Restricting tillage to periods when the soil is not wet helps to reduce clodding and crusting and increases the infiltration of water.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.

Pasture and hayland
Suitability for pasture: Well suited
Suitability for hayland: Suited
Commonly grown crops: Tall fescue, clover, and alfalfa
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increase germination.
- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Well suited

Management concerns: Equipment use and seedling survival rates
Management measures and considerations:
- Unsurfaced roads may be impassible during wet periods because of the high clay content in this soil.
- Restricting logging operations to periods when the soil is not wet helps to prevent rutting and root damage resulting from compaction.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.

Urban Development

Dwellings
Suitability: Suited
Management concerns: Slope and the very severe hazard of erosion of the underlying material
Management measures and considerations:
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Grading or land shaping can divert upslope surface water away from foundations.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Suited
Management concerns: Restricted permeability and slope
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soil is not wet helps to reduce smearing and sealing of trench walls.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

Local roads and streets
Suitability: Suited
Management concerns: Low strength, slope, and the very severe hazard of erosion of the underlying material
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soil and prevent excessive erosion.

Interpretive Groups

Land capability classification: 4e
Woodland ordination symbol: 7C, based on shortleaf pine as the indicator species

MaD2—Madison clay loam, 15 to 25 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: Broad and narrow interstream divides

Landform position: Side slopes and summits
Shape of areas: Irregular
Size of areas: 10 to 600 acres

Composition

Madison soil and similar soils: 85 percent
Dissimilar soils: 15 percent

Typical Profile

Surface layer:
0 to 7 inches—yellowish red clay loam

Subsoil:
7 to 19 inches—red clay
19 to 30 inches—red clay loam
30 to 46 inches—yellowish red loam

Underlying material:
46 to 62 inches—yellowish red and reddish brown sandy loam saprolite that has a high content of mica

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Moderately acid to very strongly acid; ranging to slightly acid in the upper part of the profile in limed areas
Depth to bedrock: More than 72 inches

Minor Components

Dissimilar:
- Bethlehem soils that have soft, weathered bedrock at a depth of less than 40 inches; in landform positions similar to those of the Madison soil
- Saw soils that have hard bedrock at a depth of less than 40 inches; in stony or rocky spots

Similar:
- Madison soils that have a less eroded surface layer of sandy loam
- Soils that are similar to the Madison soil but have a browner subsoil
- Soils that are similar to the Madison soil but have a higher content of mica

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Pasture and hayland and orchards

Agricultural Development

Cropland
Suitability: Poorly suited
Management concerns: Erodibility, equipment use, tilth, and soil fertility
Management measures and considerations:
- The successful application of resource management systems for controlling erosion and maintaining soil fertility is difficult on this soil.
- Special equipment or planning may be needed to plant and harvest crops safely on this soil.

Pasture and hayland
Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Commonly grown crops: Tall fescue and clover
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Special care is needed when renovating pastures and establishing seedbeds to prevent further erosion.
- Special equipment or planning may be needed to harvest or maintain forages safely on this soil.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Suited
Management concerns: Equipment use, erodibility, and seedling survival rates
Management measures and considerations:
- Unsurfaced roads may be impassible during wet periods because of the high clay content in this soil.
- Restricting logging operations to periods when the soil is not wet helps to prevent rutting and root damage resulting from compaction.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.

Urban Development

Dwellings
Suitability: Poorly suited
Management concerns: Slope and the very severe hazard of erosion of the underlying material
Management measures and considerations:
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Poorly suited
Management concerns: Restricted permeability and slope
Management measures and considerations:
- Onsite waste disposal systems in areas of this map unit may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Low strength, slope, and the very severe hazard of erosion of the underlying material
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soil and prevent excessive erosion.

Interpretive Groups

Land capability classification: 6e
Woodland ordination symbol: 7R, based on shortleaf pine as the indicator species

PaC2—Pacolet sandy clay loam, 8 to 15 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Side slopes and summits
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Pacolet soil and similar soils: 95 percent
Dissimilar soils: 5 percent

Typical Profile

Surface layer:
0 to 5 inches—dark reddish brown sandy clay loam

Subsoil:
5 to 26 inches—red clay
26 to 37 inches—red sandy clay loam

Underlying material:
37 to 52 inches—red sandy loam saprolite
52 to 62 inches—yellowish red sandy loam saprolite

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)

Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Strongly sloping
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Moderately acid to very strongly acid except where surface layers have been limed
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Bethlehem soils that have soft, weathered bedrock at a depth of less than 40 inches; in landform positions similar to those of the Pacolet soil
- Saw soils that have hard bedrock at a depth of less than 40 inches; in stony or rocky spots

Similar:
- Pacolet soils that have a less eroded surface layer of sandy loam
- Soils that are similar to the Pacolet soil but have a browner subsoil
- Soils that are similar to the Pacolet soil but have a higher content of mica
- Soils that are similar to the Pacolet soil but have a thicker subsoil

Land Use

Dominant Uses: Woodland, pasture and hayland, and cropland
Other Uses: Dwellings and orchards

Agricultural Development

Cropland
Suitability: Suited
Commonly grown crops: Cotton, corn, small grain, and soybeans
Management concerns: Erodibility, tilth, and soil fertility
Management measures and considerations:
- Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to prevent further erosion by stabilizing the soil, controlling surface runoff, and maximizing the infiltration of water.
- Incorporating crop residue into the soil or leaving residue on the soil surface helps to minimize clodding and crusting and maximize the infiltration of water.
- Restricting tillage to periods when the soil is not wet helps to reduce clodding and crusting and increases the infiltration of water.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.

Pasture and hayland
Suitability for pasture: Well suited
Suitability for hayland: Suited
Commonly grown crops: Tall fescue (fig. 11), clover, and alfalfa
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.

Figure 11.—Harvested fescue hay on Pacolet sandy clay loam, 8 to 15 percent slopes, eroded.

- Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increase germination.
- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Well suited
Management concerns: Equipment use and seedling survival rates
Management measures and considerations:
- Unsurfaced roads may be impassible during wet periods because of the high clay content in this soil.
- Restricting logging operations to periods when the soil is not wet helps to prevent rutting and root damage resulting from compaction.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.

Urban Development

Dwellings
Suitability: Suited
Management concerns: Slope
Management measures and considerations:
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Grading or land shaping can divert upslope surface water away from foundations.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Suited
Management concerns: Restricted permeability and slope
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soil is not wet helps to reduce smearing and sealing of trench walls.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

Local roads and streets
Suitability: Suited
Management concerns: Low strength and slope
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soil and prevent excessive erosion.

Interpretive Groups

Land capability classification: 4e
Woodland ordination symbol: 8C, based on loblolly pine as the indicator species

PaD2—Pacolet sandy clay loam, 15 to 25 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Summits and side slopes
Shape of areas: Irregular
Size of areas: 10 to 600 acres

Composition

Pacolet soil and similar soils: 90 percent
Dissimilar soils: 10 percent

Typical Profile

Surface layer:
0 to 5 inches—dark reddish brown sandy clay loam

Subsoil:
5 to 26 inches—red clay
26 to 37 inches—red sandy clay loam

Underlying material:
37 to 52 inches—red sandy loam saprolite
52 to 62 inches—yellowish red sandy loam saprolite

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained

General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Moderately acid to very strongly acid except where surface layers have been limed
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Bethlehem soils that have soft, weathered bedrock at a depth of less than 40 inches; in landform positions similar to those of the Pacolet soil
- Saw soils that have hard bedrock at a depth of less than 40 inches; in stony or rocky spots

Similar:
- Pacolet soils that have a less eroded surface layer of sandy loam
- Soils that are similar to the Pacolet soil but have a browner subsoil
- Soils that are similar to the Pacolet soil but have a higher content of mica

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and hayland and orchards

Agricultural Development

Cropland
Suitability: Poorly suited
Management concerns: Erodibility, equipment use, tilth, and soil fertility
Management measures and considerations:
- The successful application of resource management systems for controlling erosion and maintaining soil fertility is difficult on this soil.
- Special equipment or planning may be needed to plant and harvest crops safely on this soil.

Pasture and hayland
Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Commonly grown crops: Tall fescue and clover
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Special care is needed when renovating pastures and establishing seedbeds to prevent further erosion.
- Special equipment or planning may be needed to harvest or maintain forages safely on this soil.
- Fencing livestock away from creeks and streams and using pressure-fed watering

tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Suited
Management concerns: Equipment use, erodibility, and seedling survival rates
Management measures and considerations:
- Unsurfaced roads may be impassible during wet periods because of the high clay content in this soil.
- Restricting logging operations to periods when the soil is not wet helps to prevent rutting and root damage resulting from compaction.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.

Urban Development

Dwellings
Suitability: Poorly suited
Management concerns: Slope
Management measures and considerations:
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Poorly suited
Management concerns: Restricted permeability and slope
Management measures and considerations:
- Onsite waste disposal systems in areas of this map unit may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Low strength and slope
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soil and prevent excessive erosion.

Interpretive Groups

Land capability classification: 6e
Woodland ordination symbol: 8R, based on loblolly pine as the indicator species

PbB2—Pacolet-Bethlehem complex, 2 to 8 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Pacolet—the less gravelly, concave areas on summits; Bethlehem—the more gravelly, convex areas on summits
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Pacolet soil and similar soils: 70 percent
Bethlehem soil and similar soils: 25 percent
Dissimilar soils: 5 percent

Typical Profile

Pacolet
Surface layer:
0 to 5 inches—dark reddish brown sandy clay loam

Subsoil:
5 to 26 inches—red clay
26 to 37 inches—red sandy clay loam

Underlying material:
37 to 52 inches—red sandy loam saprolite
52 to 62 inches—yellowish red sandy loam saprolite

Bethlehem
Surface layer:
0 to 7 inches—brown gravelly sandy clay loam

Subsoil:
7 to 24 inches—red clay
24 to 33 inches—yellowish red gravelly sandy clay loam

Bedrock:
33 to 60 inches—soft, weathered sillimanite schist or mica schist

Soil Properties and Qualities

Depth class: Pacolet—very deep; Bethlehem—moderately deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Pacolet—moderate (6 to 9 inches within a 60-inch profile); Bethlehem—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Gently sloping
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None

Soil reaction: Pacolet—moderately acid to very strongly acid; Bethlehem—strongly acid or very strongly acid except where surface layers have been limed
Depth to bedrock: Pacolet—more than 60 inches; Bethlehem—20 to 40 inches to soft bedrock and 40 inches or more to hard bedrock

Minor Components

Dissimilar:
- Saw soils that have hard bedrock at a depth of less than 40 inches; in stony or rocky spots

Similar:
- Pacolet soils that have a slightly eroded surface layer of sandy loam or gravelly sandy loam
- Soils that are similar to the Pacolet soil but have a higher content of mica
- Soils that are similar to the Pacolet soil but have a thicker subsoil

Land Use

Dominant Uses: Woodland, pasture and hayland, and cropland
Other Uses: Dwellings and orchards

Agricultural Development

Cropland
Suitability: Suited
Commonly grown crops: Cotton, corn, small grain, and soybeans
Management concerns: Erodibility, tilth, and soil fertility
Management measures and considerations:
- Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to prevent further erosion by stabilizing the soils, controlling surface runoff, and maximizing the infiltration of water.
- Incorporating crop residue into the soils or leaving residue on the soil surface helps to minimize clodding and crusting and maximize the infiltration of water.
- Restricting tillage to periods when the soils are not wet helps to reduce clodding and crusting and increases the infiltration of water.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.

Pasture and hayland
Suitability: Well suited
Commonly grown crops: Tall fescue, clover, and alfalfa
Management concerns: Erodibility
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increase germination.

Woodland
Suitability: Well suited
Management concerns: Pacolet—equipment use and seedling survival rates; Bethlehem—equipment use, seedling survival rates, and windthrow hazard
Management measures and considerations:
- Unsurfaced roads may be impassible during wet periods because of the high clay content in these soils.
- Restricting logging operations to periods when the soils are not wet helps to prevent rutting and root damage resulting from compaction.

- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Bethlehem soil.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.

Urban Development

Dwellings

Suitability for dwellings without basements: Well suited
Suitability for dwellings with basements: Pacolet—well suited; Bethlehem—suited
Management concerns: Pacolet—no significant limitations; Bethlehem—depth to bedrock
Management measures and considerations:

- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.
- Special excavation equipment may be needed because of the limited depth of the Bethlehem soil.

Septic tank absorption fields

Suitability: Pacolet—suited; Bethlehem—poorly suited
Management concerns: Pacolet—restricted permeability; Bethlehem—restricted permeability and depth to bedrock
Management measures and considerations:

- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soils are not wet helps to reduce smearing and sealing of trench walls.
- Onsite waste disposal systems in areas of the Bethlehem soil may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Areas of the better suited Pacolet soil may be too intermingled with areas of the Bethlehem soil to use separately.

Local roads and streets

Suitability: Suited
Management concerns: Low strength
Management measures and considerations:

- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soils and prevent excessive erosion.

Interpretive Groups

Land capability classification: 3e
Woodland ordination symbol: Based on loblolly pine as the indicator species, 8R in areas of the Pacolet soil and 7D in areas of the Bethlehem soil

PbC2—Pacolet-Bethlehem complex, 8 to 15 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: Divides

Landform position: Pacolet—the less gravelly, concave areas on side slopes and summits; Bethlehem—the more gravelly, convex areas on side slopes and summits
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Pacolet soil and similar soils: 50 percent
Bethlehem soil and similar soils: 35 percent
Dissimilar soils: 15 percent

Typical Profile

Pacolet
Surface layer:
0 to 5 inches—dark reddish brown sandy clay loam

Subsoil:
5 to 26 inches—red clay
26 to 37 inches—red sandy clay loam

Underlying material:
37 to 52 inches—red sandy loam saprolite
52 to 62 inches—yellowish red sandy loam saprolite

Bethlehem
Surface layer:
0 to 7 inches—brown gravelly sandy clay loam

Subsoil:
7 to 24 inches—red clay
24 to 33 inches—yellowish red gravelly sandy clay loam

Bedrock:
33 to 60 inches—soft, weathered sillimanite schist or mica schist

Soil Properties and Qualities

Depth class: Pacolet—very deep; Bethlehem—moderately deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Pacolet—moderate (6 to 9 inches within a 60-inch profile); Bethlehem—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Strongly sloping
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Pacolet—moderately acid to very strongly acid; Bethlehem—strongly acid or very strongly acid except where surface layers have been limed
Depth to bedrock: Pacolet—more than 60 inches; Bethlehem—20 to 40 inches to soft bedrock and 40 inches or more to hard bedrock

Minor Components

Dissimilar:
- Cliffside soils that have hard bedrock at a depth of less than 40 inches; in very stony, convex areas
- Saw soils that have hard bedrock at a depth of less than 40 inches; in stony or rocky spots

Similar:
- Pacolet soils that have a slightly eroded surface layer of sandy loam or gravelly sandy loam
- Soils that are similar to the Pacolet soil but have a higher content of mica
- Soils that are similar to the Pacolet soil but have a thicker subsoil

Land Use

Dominant Uses: Woodland, pasture and hayland, and cropland
Other Uses: Dwellings, cropland, and orchards

Agricultural Development

Cropland
Suitability: Suited
Commonly grown crops: Cotton, corn, small grain, and soybeans
Management concerns: Erodibility, tilth, and soil fertility
Management measures and considerations:
- Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to prevent further erosion by stabilizing the soils, controlling surface runoff, and maximizing the infiltration of water.
- Incorporating crop residue into the soils or leaving residue on the soil surface helps to minimize clodding and crusting and maximize the infiltration of water.
- Restricting tillage to periods when the soils are not wet helps to reduce clodding and crusting and increases the infiltration of water.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.

Pasture and hayland
Suitability for pasture: Well suited
Suitability for hayland: Suited
Commonly grown crops: Tall fescue, clover, and alfalfa
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increase germination.
- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Well suited
Management concerns: Pacolet—equipment use and seedling survival rates; Bethlehem—equipment use, windthrow hazard, and seedling survival rates

Management measures and considerations:
- Unsurfaced roads may be impassible during wet periods because of the high clay content in these soils.
- Restricting logging operations to periods when the soils are not wet helps to prevent rutting and root damage resulting from compaction.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Bethlehem soil.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.

Urban Development

Dwellings
Suitability: Suited
Management concerns: Pacolet—slope; Bethlehem—slope and depth to bedrock
Management measures and considerations:
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Special excavation equipment may be needed because of the limited depth of the Bethlehem soil.
- Grading or land shaping can divert upslope surface water away from foundations.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Pacolet—suited; Bethlehem—poorly suited
Management concerns: Pacolet—restricted permeability and slope; Bethlehem—restricted permeability, slope, and depth to bedrock
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soils are not wet helps to reduce smearing and sealing of trench walls.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Onsite waste disposal systems in areas of the Bethlehem soil may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Areas of the better suited Pacolet soil may be too intermingled with areas of the Bethlehem soil to use separately.

Local roads and streets
Suitability: Suited
Management concerns: Low strength and slope
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soils and prevent excessive erosion.

Interpretive Groups

Land capability classification: 4e
Woodland ordination symbol: Based on loblolly pine as the indicator species, 8R in areas of the Pacolet soil and 7D in areas of the Bethlehem soil

PbD2—Pacolet-Bethlehem complex, 15 to 25 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Pacolet—the less gravelly, concave areas on side slopes and summits; Bethlehem—the more gravelly, convex areas on side slopes and summits
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Pacolet soil and similar soils: 43 percent
Bethlehem soil and similar soils: 29 percent
Dissimilar soils: 28 percent

Typical Profile

Pacolet
Surface layer:
0 to 5 inches—dark reddish brown sandy clay loam

Subsoil:
5 to 26 inches—red clay
26 to 37 inches—red sandy clay loam

Underlying material:
37 to 52 inches—red sandy loam saprolite
52 to 62 inches—yellowish red sandy loam saprolite

Bethlehem
Surface layer:
0 to 7 inches—brown gravelly sandy clay loam

Subsoil:
7 to 24 inches—red clay
24 to 33 inches—yellowish red gravelly sandy clay loam

Bedrock:
33 to 60 inches—soft, weathered sillimanite schist or mica schist

Soil Properties and Qualities

Depth class: Pacolet—very deep; Bethlehem—moderately deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Pacolet—moderate (6 to 9 inches within a 60-inch profile); Bethlehem—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage

Potential frost action: None
Soil reaction: Pacolet—moderately acid to very strongly acid; Bethlehem—strongly acid or very strongly acid except where surface layers have been limed
Depth to bedrock: Pacolet—more than 60 inches; Bethlehem—20 to 40 inches to soft bedrock and 40 inches or more to hard bedrock

Minor Components

Dissimilar:
- Cliffside soils that have hard bedrock at a depth of less than 40 inches; in very stony, convex areas
- Saw soils that have hard bedrock at a depth of less than 40 inches; in stony or rocky spots

Similar:
- Pacolet soils that have a slightly eroded surface layer of sandy loam or gravelly sandy loam
- Soils that are similar to the Pacolet soil but have a higher content of mica
- Soils that are similar to the Pacolet soil but have a thicker subsoil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and hayland

Agricultural Development

Cropland
Suitability: Poorly suited
Management concerns: Erodibility, equipment use, tilth, and soil fertility
Management measures and considerations:
- The successful application of resource management systems for controlling erosion and maintaining soil fertility is difficult on these soils.
- Special equipment or planning may be needed to plant and harvest crops safely on these soils.

Pasture and hayland
Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Potential productivity: Moderate
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Special care is needed when renovating pastures and establishing seedbeds to prevent further erosion.
- Special equipment or planning may be needed to harvest or maintain forages safely on these soils.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Suited
Management concerns: Pacolet—equipment use, erodibility, and seedling survival rates; Bethlehem—equipment use, erodibility, windthrow hazard, and seedling survival rates

Management measures and considerations:
- Unsurfaced roads may be impassible during wet periods because of the high clay content in these soils.
- Restricting logging operations to periods when the soils are not wet helps to prevent rutting and root damage resulting from compaction.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Bethlehem soil.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.

Urban Development

Dwellings
Suitability: Poorly suited
Management concerns: Pacolet—slope; Bethlehem—slope and depth to bedrock
Management measures and considerations:
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Special excavation equipment may be needed because of the limited depth of the Bethlehem soil.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Poorly suited
Management concerns: Pacolet—restricted permeability and slope; Bethlehem—restricted permeability, slope, and depth to bedrock
Management measures and considerations:
- Onsite waste disposal systems in areas of this map unit may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Low strength and slope
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soils and prevent excessive erosion.

Interpretive Groups

Land capability classification: 6e
Woodland ordination symbol: Based on loblolly pine as the indicator species, 8R in areas of the Pacolet soil and 7R in areas of the Bethlehem soil

PsB2—Pacolet-Saw complex, 2 to 8 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Pacolet—summits in areas away from small areas of Rock outcrop or stony spots; Saw—summits in areas near small areas of Rock outcrop or stony spots
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Pacolet soil and similar soils: 47 percent
Saw soil and similar soils: 29 percent
Dissimilar inclusions: 24 percent

Typical Profile

Pacolet
Surface layer:
0 to 5 inches—dark reddish brown sandy clay loam

Subsoil:
5 to 26 inches—red clay
26 to 37 inches—red sandy clay loam

Underlying material:
37 to 52 inches—red sandy loam saprolite
52 to 62 inches—yellowish red sandy loam saprolite

Saw
Surface layer:
0 to 7 inches—strong brown sandy loam

Subsoil:
7 to 19 inches—yellowish red sandy clay
19 to 25 inches—strong brown sandy clay that has yellowish red mottles

Underlying material:
25 to 28 inches—multicolored gravelly sandy loam saprolite
28 inches—hard granitic gneiss bedrock

Soil Properties and Qualities

Depth class: Pacolet—very deep; Saw—moderately deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Pacolet—moderate (6 to 9 inches within a 60-inch profile); Saw—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Gently sloping
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed

Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Moderately acid to very strongly acid; ranging to neutral in the upper part of the profile in limed areas
Depth to bedrock: Pacolet—more than 60 inches; Saw—20 to 40 inches to hard granite bedrock

Minor Components

Dissimilar:
- The moderately well drained Helena soils on the lower foot slopes
- Bethlehem soils that have soft, weathered bedrock at a depth of less than 40 inches; in landform positions similar to those of the Pacolet and Saw soils
- Small, randomly scattered areas of Rock outcrop
- Soils that have hard bedrock at a depth of less than 20 inches; adjacent to small areas of Rock outcrop

Similar:
- Soils that are similar to the Pacolet soil but have a browner subsoil
- Pacolet and Saw soils that are slightly eroded and have a thick surface layer of sandy loam
- Soils that have a higher content of mica than the Pacolet and Saw soils

Land Use

Dominant Uses: Woodland and pasture and hayland
Other Uses: Dwellings and cropland

Agricultural Development

Cropland
Suitability: Pacolet—well suited; Saw—suited
Commonly grown crops: Corn, small grain, and soybeans
Management concerns: Pacolet—erodibility, tilth, and soil fertility; Saw—erodibility, tilth, soil fertility, and randomly scattered surface stones
Management measures and considerations:
- Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to prevent further erosion by stabilizing the soils, controlling surface runoff, and maximizing the infiltration of water.
- Incorporating crop residue into the soils or leaving residue on the soil surface helps to minimize clodding and crusting and maximize the infiltration of water.
- Restricting tillage to periods when the soils are not wet helps to reduce clodding and crusting and increases the infiltration of water.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- Surface stones may need to be removed from small areas.

Pasture and hayland
Suitability: Well suited
Commonly grown crops: Tall fescue and clover
Management concerns: Pacolet—no significant limitations; Saw—randomly scattered surface stones
Management measures and considerations:
- Surface stones may need to be removed from small areas.
- Using a rotational grazing system helps to maximize productivity.

Woodland
Suitability: Suited
Management concerns: Pacolet—equipment use and seedling survival rates; Saw—equipment use, seedling survival rates, and windthrow hazard
Management measures and considerations:
- Unsurfaced roads may be impassible during wet periods because of the high clay content in these soils.
- Restricting logging operations to periods when the soils are not wet helps to prevent rutting and root damage resulting from compaction.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Saw soil.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.

Urban Development

Dwellings
Suitability without basements: Pacolet—well suited; Saw—suited
Suitability with basements: Pacolet—well suited; Saw—poorly suited
Management concerns: Pacolet—no significant limitations; Saw—depth to bedrock
Management measures and considerations:
- Drilling and blasting of rock or special earthmoving equipment is needed because of the limited depth of the Saw soil.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Pacolet—suited; Saw—poorly suited
Management concerns: Pacolet—restricted permeability; Saw—restricted permeability and depth to bedrock
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soils are not wet helps to reduce smearing and sealing of trench walls.
- Onsite waste disposal systems in areas of the Saw soil may require special design.
- The local Health Department should be contacted for additional guidance in developing sanitary facilities.

Local roads and streets
Suitability: Suited
Management concerns: Pacolet—low strength; Saw—low strength and depth to bedrock
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Blasting or special grading equipment may be needed to construct roads on the Saw soil.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soils and prevent excessive erosion.

Interpretive Groups

Land capability classification: 3e
Woodland ordination symbol: Based on loblolly pine as the indicator species, 8R in areas of the Pacolet soil and 6D in areas of the Saw soil

PsC2—Pacolet-Saw complex, 8 to 15 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Pacolet—summits and side slopes in areas away from small areas of Rock outcrop or stony spots; Saw—summits and side slopes in areas near small areas of Rock outcrop or stony spots
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Pacolet soil and similar soils: 55 percent
Saw soil and similar soils: 25 percent
Dissimilar inclusions: 20 percent

Typical Profile

Pacolet
Surface layer:
0 to 5 inches—dark reddish brown sandy clay loam

Subsoil:
5 to 26 inches—red clay
26 to 37 inches—red sandy clay loam

Underlying material:
37 to 52 inches—red sandy loam saprolite
52 to 62 inches—yellowish red sandy loam saprolite

Saw
Surface layer:
0 to 7 inches—strong brown sandy loam

Subsoil:
7 to 19 inches—yellowish red sandy clay
19 to 25 inches—strong brown sandy clay that has yellowish red mottles

Underlying material:
25 to 28 inches—multicolored gravelly sandy loam saprolite

Bedrock:
28 inches—hard granitic gneiss bedrock

Soil Properties and Qualities

Depth class: Pacolet—very deep; Saw—moderately deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Pacolet—moderate (6 to 9 inches within a 60-inch profile); Saw—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Strongly sloping
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed

Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Moderately acid to very strongly acid; ranging to neutral in the upper part of the profile in limed areas
Depth to bedrock: Pacolet—more than 60 inches; Saw—20 to 40 inches to hard granite bedrock

Minor Components

Dissimilar:
- Bethlehem soils that have soft, weathered bedrock at a depth of less than 40 inches; in landform positions similar to those of the Pacolet and Saw soils
- Small, randomly scattered areas of Rock outcrop
- Soils that have hard bedrock at a depth of less than 20 inches; adjacent to small areas of Rock outcrop

Similar:
- Soils that are similar to the Pacolet soil but have a browner subsoil
- Pacolet and Saw soils that are slightly eroded and have a thick surface layer of sandy loam
- Soils that have a higher content of mica than the Pacolet and Saw soils

Land Use

Dominant Uses: Woodland and pasture and hayland
Other Uses: Dwellings and cropland

Agricultural Development

Cropland
Suitability: Suited
Commonly grown crops: Corn, small grain, and soybeans
Management concerns: Pacolet—erodibility, tilth, and soil fertility; Saw—erodibility, tilth, soil fertility, and randomly scattered surface stones
Management measures and considerations:
- Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to prevent further erosion by stabilizing the soils, controlling surface runoff, and maximizing the infiltration of water.
- Incorporating crop residue into the soils or leaving residue on the soil surface helps to minimize clodding and crusting and maximize the infiltration of water.
- Restricting tillage to periods when the soils are not wet helps to reduce clodding and crusting and increases the infiltration of water.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- Surface stones may need to be removed from small areas.

Pasture and hayland
Suitability for pasture: Well suited
Suitability for hayland: Suited
Commonly grown crops: Tall fescue and clover
Management concerns: Pacolet—erodibility and equipment use; Saw—erodibility, equipment use, and randomly scattered surface stones
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.

- Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increase germination.
- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.
- Surface stones may need to be removed from small areas.

Woodland
Suitability: Suited
Management concerns: Pacolet—equipment use and seedling survival rates; Saw—equipment use, seedling survival rates, and windthrow hazard
Management measures and considerations:
- Unsurfaced roads may be impassible during wet periods because of the high clay content in these soils.
- Restricting logging operations to periods when the soils are not wet helps to prevent rutting and root damage resulting from compaction.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Saw soil.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.

Urban Development

Dwellings
Suitability for dwellings without basements: Suited
Suitability for dwellings with basements: Pacolet—suited; Saw—poorly suited
Management concerns: Pacolet—slope; Saw—slope and depth to bedrock
Management measures and considerations:
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Drilling and blasting of rock or special earthmoving equipment is needed because of the limited depth of the Saw soil.
- Grading or land shaping can divert upslope surface water away from foundations.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Pacolet—suited; Saw—poorly suited
Management concerns: Pacolet—restricted permeability; Saw—restricted permeability and depth to bedrock
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soils are not wet helps to reduce smearing and sealing of trench walls.
- Onsite waste disposal systems in areas of the Saw soil may require special design.
- The local Health Department should be contacted for additional guidance.

Local roads and streets
Suitability: Suited
Management concerns: Pacolet—low strength; Saw—low strength and depth to bedrock
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Blasting or special grading equipment may be needed to construct roads on the Saw soil.

- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soils and prevent excessive erosion.

Interpretive Groups

Land capability classification: 4e
Woodland ordination symbol: Based on loblolly pine as the indicator species, 8C in areas of the Pacolet soil and 6D in areas of the Saw soil

PsD2—Pacolet-Saw complex, 15 to 25 percent slopes, eroded

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Pacolet—summits and side slopes in areas away from small areas of Rock outcrop or stony spots; Saw—summits and side slopes in areas near small areas of Rock outcrop or stony spots
Shape of areas: Irregular
Size of areas: 10 to 400 acres

Composition

Pacolet soil and similar soils: 35 percent
Saw soil and similar soils: 35 percent
Dissimilar inclusions: 30 percent

Typical Profile

Pacolet
Surface layer:
0 to 5 inches—dark reddish brown sandy clay loam

Subsoil:
5 to 26 inches—red clay
26 to 37 inches—red sandy clay loam

Underlying material:
37 to 52 inches—red sandy loam saprolite
52 to 62 inches—yellowish red sandy loam saprolite

Saw
Surface layer:
0 to 7 inches—strong brown sandy loam

Subsoil:
7 to 19 inches—yellowish red sandy clay
19 to 25 inches—strong brown sandy clay that has yellowish red mottles

Underlying material:
25 to 28 inches—multicolored gravelly sandy loam saprolite
28 inches—hard granitic gneiss bedrock

Soil Properties and Qualities

Depth class: Pacolet—very deep; Saw—moderately deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)

Available water capacity: Pacolet—moderate (6 to 9 inches within a 60-inch profile); Saw—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.1 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Low
Soil reaction: Moderately acid to very strongly acid; ranging to neutral in the upper part of the profile in limed areas
Depth to bedrock: Pacolet—more than 60 inches; Saw—20 to 40 inches to hard granite bedrock

Minor Components

Dissimilar:
- Bethlehem soils that have soft, weathered bedrock at a depth of less than 40 inches; in landform positions similar to those of the Pacolet and Saw soils
- Small, randomly scattered areas of Rock outcrop
- Soils that have hard bedrock at a depth of less than 20 inches; adjacent to small areas of Rock outcrop

Similar:
- Soils that are similar to the Pacolet soil but have a browner subsoil
- Pacolet and Saw soils that are slightly eroded and have a thick surface layer of sandy loam
- Soils that have a higher content of mica than the Pacolet and Saw soils

Land Use

Dominant Uses: Woodland
Other Uses: Pasture and hayland

Agricultural Development

Cropland
Suitability: Poorly suited
Management concerns: Pacolet—erodibility, tilth, and soil fertility; Saw—erodibility, tilth, soil fertility, and randomly scattered surface stones
Management measures and considerations:
- The successful application of resource management systems for controlling erosion and maintaining soil fertility is difficult on these soils.
- Special equipment or planning may be needed to plant and harvest crops safely on these soils.

Pasture and hayland
Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns: Pacolet—erodibility and equipment use; Saw—erodibility, equipment use, and randomly scattered surface stones
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Special care is needed when renovating pastures and establishing seedbeds to prevent further erosion.

- Special equipment or planning may be needed to harvest or maintain forages safely on these soils.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.
- Surface stones may need to be removed from small areas.

Woodland
Suitability: Suited
Management concerns: Pacolet—equipment use and seedling survival rates; Saw—equipment use, seedling survival rates, and windthrow hazard
Management measures and considerations:
- Unsurfaced roads may be impassible during wet periods because of the high clay content in these soils.
- Restricting logging operations to periods when the soils are not wet helps to prevent rutting and root damage resulting from compaction.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Bethlehem soil.
- Areas of seedling mortality can be replanted; planting seedlings during wet, cool periods helps to increase survival rates.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.

Urban Development

Dwellings
Suitability: Poorly suited
Management concerns: Pacolet—slope; Saw—slope and depth to bedrock
Management measures and considerations:
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Drilling and blasting of rock or special earthmoving equipment is needed because of the limited depth of the Saw soil.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Poorly suited
Management concerns: Pacolet—restricted permeability; Saw—restricted permeability and depth to bedrock
Management measures and considerations:
- Onsite waste disposal systems in areas of this map unit may require special design.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Pacolet—low strength; Saw—low strength and depth to bedrock
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.

- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Blasting or special grading equipment may be needed to construct roads on the Saw soil.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soils and prevent excessive erosion.

Interpretive Groups

Land capability classification: 6e
Woodland ordination symbol: Based on loblolly pine as the indicator species, 8R in areas of the Pacolet soil and 6R in areas of the Saw soil

Qp—Pits, quarry

Setting

Landscape: Piedmont
Landform: Divides
Shape of areas: Irregular
Size of areas: 5 to 80 acres

Composition

Pits, quarry: 95 percent
Dissimilar soils: 5 percent

Typical Profile

This map unit consists of open excavations from which the soil material and commonly the underlying material have been removed, exposing rock or other material that supports little or no vegetation. A typical profile is not given for this map unit because of its variability.

Minor Components

Dissimilar:
- Small areas of Udorthents or unexcavated natural soils

Land Use

Dominant Uses: Construction aggregate

Suitability for land use:
- Onsite investigation is needed before planning the use and management of areas of this map unit.

Management concerns: Slope, exposed bedrock, stoniness, and instability of the pit faces

Interpretive Groups

Land capability classification: 8s
Woodland ordination symbol: None assigned

RaE—Rion sandy loam, 25 to 45 percent slopes

Setting

Landscape: Piedmont
Landform: Divides

Landform position: Side slopes
Shape of areas: Irregular
Size of areas: 15 to 600 acres

Composition

Rion soil and similar soils: 90 percent
Dissimilar inclusions: 10 percent

Typical Profile

Surface layer:
0 to 5 inches—dark yellowish brown sandy loam

Subsoil:
5 to 17 inches—strong brown sandy clay loam
17 to 25 inches—yellowish red clay loam
25 to 38 inches—yellowish red and red sandy clay loam that has pockets of sandy loam

Underlying material:
38 to 62 inches—yellowish red sandy loam saprolite

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Slightly acid to very strongly acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Randomly scattered small areas of Rock outcrop
- Ashlar and Cliffside soils that have hard bedrock at a depth of less than 40 inches; in stony or bouldery areas or near small areas of Rock outcrop
- Bethlehem soils that have soft bedrock at a depth of less than 40 inches; in landform positions similar to those of the Rion soil

Similar:
- Soils that are similar to the Rion soil but have a higher content of mica
- Soils that are similar to the Rion soil but have a clayey subsoil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope is a severe limitation affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability for pasture: Poorly suited
Suitability for hayland: Unsuited
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Special equipment or planning may be needed to harvest or maintain forages safely on this soil.
- Applying lime, fertilizer, seed, and herbicides by hand helps to increase productivity in the steeper areas.

Woodland
Suitability: Suited
Management concerns: Equipment use and erodibility
Management measures and considerations:
- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- The slope is a severe limitation affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The slope is a severe limitation affecting septic tank absorption fields.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Unsuited
Management concerns:
- The slope is a severe limitation affecting roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: 8R, based on shortleaf pine as the indicator species

RcF—Rion-Ashlar-Rock outcrop complex, 45 to 70 percent slopes

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Rion—the less stony, concave areas on side slopes; Ashlar—the more stony or rocky areas on side slopes; Rock outcrop—shoulder slopes and nose slopes
Shape of areas: Irregular
Size of areas: 15 to 600 acres

Composition

Rion soil and similar soils: 45 percent
Ashlar soil and similar soils: 25 percent
Rock outcrop: 20 percent
Dissimilar soils: 10 percent

Typical Profile

Rion
Surface layer:
0 to 5 inches—dark yellowish brown sandy loam

Subsoil:
5 to 17 inches—strong brown sandy clay loam
17 to 25 inches—yellowish red clay loam
25 to 38 inches—yellowish red and red sandy clay loam that has pockets of sandy loam

Underlying material:
38 to 62 inches—yellowish red sandy loam saprolite

Ashlar
Surface layer:
0 to 5 inches—brown gravelly sandy loam

Subsoil:
5 to 17 inches—dark yellowish brown sandy loam
17 to 27 inches—yellowish brown gravelly sandy loam

Bedrock:
27 to 32 inches—soft, weathered gneiss bedrock
32 inches—hard gneiss bedrock

Rock outcrop
Rock outcrop consists of areas where bedrock extends above the surface of the soil.

Properties and Qualities of the Rion and Ashlar Soils

Depth class: Rion—very deep; Ashlar—moderately deep
Drainage class: Rion—well drained; Ashlar—excessively drained
General texture class: Loamy
Permeability: Rion—moderate (0.6 inch to 2.0 inches per hour); Ashlar—moderately rapid (2 to 6 inches per hour)

Available water capacity: Rion—moderate (6 to 9 inches within a 60-inch profile); Ashlar—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Very steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.01 to 0.1 percent surface coverage
Extent of rock outcrops: 15 percent surface coverage
Potential frost action: None
Soil reaction: Rion—slightly acid to very strongly acid; Ashlar—moderately acid to very strongly acid in the upper part and strongly acid to extremely acid in the lower part
Depth to bedrock: Rion—more than 60 inches; Ashlar—20 to 40 inches to hard bedrock

Minor Components

Dissimilar:
- Soils that have hard bedrock at a depth of less than 20 inches; adjacent to areas of Rock outcrop
- Cliffside soils that have more rock fragments in the subsoil than the major soils and are in similar landform positions

Similar:
- Soils that are similar to the Rion and Ashlar soils but have a higher content of mica
- Soils that are similar to the Rion soil but have more clay in the subsoil

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- This map unit has severe limitations affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability: Unsuited
Management concerns:
- This map unit has severe limitations affecting the production of pasture and hay crops. A site should be selected on better suited soils.

Woodland
Suitability: Suited
Management concerns: Rion—erodibility and equipment use; Ashlar—erodibility, windthrow hazard, and equipment use
Management measures and considerations:
- Using cable logging methods helps to overcome limited road and trail construction resulting from the slope and the large amount of rock outcrops.
- Productivity may be increased by the periodic harvesting of windthrown trees caused by high winds and the limited rooting depth of the Ashlar soil.
- Roads and skid trails should be constructed on the contour and, where possible, around rock outcrops.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- This map unit has severe limitations affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- This map unit has severe limitations affecting septic tank absorption fields. A site should be selected on better suited soils.

Local roads and streets
Suitability: Unsuited
Management concerns:
- This map unit has severe limitations affecting roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: Rion and Ashlar—7e; Rock outcrop—none assigned
Woodland ordination symbol: Based on shortleaf pine as the indicator species, 8R in areas of the Rion soil and 7R in areas of the Ashlar soil; Rock outcrop—none assigned

RnE—Rion-Cliffside complex, 25 to 60 percent slopes, very stony

Setting

Landscape: Piedmont
Landform: Divides
Landform position: Very stony side slopes
Shape of areas: Irregular
Size of areas: 15 to 600 acres

Composition

Rion soil and similar soils: 38 percent
Cliffside soil and similar soils: 48 percent
Dissimilar inclusions: 14 percent

Typical Profile

Rion
Surface layer:
0 to 5 inches—dark yellowish brown sandy loam

Subsoil:
5 to 17 inches—strong brown sandy clay loam
17 to 25 inches—yellowish red clay loam
25 to 38 inches—yellowish red and red sandy clay loam that has pockets of sandy loam

Underlying material:
38 to 62 inches—yellowish red sandy loam saprolite

Cliffside

Surface layer:
0 to 3 inches—dark brown cobbly sandy loam
3 to 7 inches—brown cobbly sandy loam

Subsoil:
7 to 11 inches—dark yellowish brown very gravelly sandy clay loam
11 to 27 inches—dark yellowish brown very cobbly sandy clay loam

Bedrock:
27 inches—hard schist bedrock

Soil Properties and Qualities

Depth class: Rion—very deep; Cliffside—moderately deep
Drainage class: Well drained
General texture class: Rion—loamy; Cliffside—loamy with many rock fragments
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Rion—moderate (6 to 9 inches within a 60-inch profile); Cliffside—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.1 to 3.0 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Rion—slightly acid to very strongly acid; Cliffside—strongly acid or very strongly acid
Depth to bedrock: Rion—more than 60 inches; Cliffside—20 to 40 inches to hard bedrock

Minor Components

Dissimilar:
- Randomly scattered small areas of Rock outcrop
- Ashlar soils that have fewer rock fragments in the subsoil than the Rion and Cliffside soils; in similar landform positions

Similar:
- Soils that are similar to the Rion soil but have a higher content of mica
- Soils that are similar to the Rion soil but have more clay in the subsoil

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope and stoniness are severe limitations affecting crop production (fig. 12). A site should be selected on better suited soils.

Pasture and hayland
Suitability for pasture: Poorly suited
Suitability for hayland: Unsuited

Figure 12.—The slope and stoniness limit cropland and other agricultural development in areas of Rion-Cliffside complex, 25 to 60 percent slopes, very stony.

Management concerns: Rion—erodibility and equipment use; Cliffside—erodibility, equipment use, and droughtiness

Management measures and considerations:

- Special equipment or planning may be needed to harvest or maintain forages safely on these soils.
- Applying lime, fertilizer, seed, and herbicides by hand helps to increase productivity in the steeper areas.
- All surface stones that are large enough to interfere with the management of forage and livestock should be removed.

Woodland

Suitability: Suited

Management concerns: Rion—equipment use and erodibility; Cliffside—equipment use, erodibility, and windthrow hazard

Management measures and considerations:

- Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.
- Suitable equipment access should be maintained for the periodic salvage of windthrown trees.

Urban Development

Dwellings

Suitability for dwellings without basements: Poorly suited
Suitability for dwellings with basements: Rion—poorly suited; Cliffside—unsuited
Management concerns: Rion—slope; Cliffside—slope, large stones, and depth to bedrock
Management measures and considerations:
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Drilling and blasting of rock or special earthmoving equipment is needed because of the limited depth of the Cliffside soil.

Septic tank absorption fields

Suitability: Rion—poorly suited; Cliffside—unsuited
Management concerns: Rion—slope; Cliffside—slope, large stones, and depth to bedrock
Management measures and considerations:
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets

Suitability: Poorly suited
Management concerns: Rion—slope; Cliffside—slope, large stones, and depth to bedrock
Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Blasting or special grading equipment may be needed to construct roads on the Cliffside soil.

Interpretive Groups

Land capability classification: Rion—7e; Cliffside—7s
Woodland ordination symbol: Rion—8R, based on shortleaf pine as the indicator species; Cliffside—3R, based on chestnut oak as the indicator species

RsC—Rock outcrop-Ashlar complex, 2 to 15 percent slopes

Setting

Landscape: Piedmont
Landform: Rocky escarpments
Landform position: Rock outcrop—randomly scattered areas; Ashlar—summits and side slopes in areas adjacent to Rock outcrop
Shape of areas: Irregular or long and narrow
Size of areas: 10 to 200 acres

Composition

Rock outcrop: 70 percent
Ashlar soil and similar soils: 25 percent
Dissimilar soils: 5 percent

Typical Profile

Rock outcrop

Rock outcrop consists of areas where bedrock extends above the surface of the soil.

Ashlar

Surface layer:
0 to 5 inches—dark brown gravelly sandy loam

Subsoil:
5 to 17 inches—dark yellowish brown sandy loam
17 to 27 inches—yellowish brown gravelly sandy loam

Bedrock:
27 to 32 inches—soft, weathered gneiss bedrock
32 inches—hard gneiss bedrock

Properties and Qualities of the Ashlar Soil

Depth class: Moderately deep
Drainage class: Excessively drained
General texture class: Loamy
Permeability: Moderately rapid (2 to 6 inches per hour)
Available water capacity: Low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Gently sloping to strongly sloping
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.1 to 3.0 percent surface coverage
Extent of rock outcrops: 70 percent surface coverage
Potential frost action: None
Soil reaction: Strongly acid or very strongly acid
Depth to bedrock: 20 to 40 inches to hard bedrock

Minor Components

Dissimilar:
- Pacolet soils that have bedrock at a depth of more than 60 inches; in the less stony areas away from Rock outcrop
- Soils that have hard bedrock at a depth of less than 20 inches; in landform positions similar to those of the Ashlar soil

Similar:
- Soils that are similar to the Ashlar soil but have a sandy subsoil
- Soils that are similar to the Ashlar soil but have more clay in the subsoil

Land Use

Dominant Uses: Woodland (fig. 13)
Other Uses: Pasture

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
- The rockiness is a severe limitation affecting crop production. Areas of the Ashlar soil cannot be used separately because they are too small in size and are

Figure 13.—An area of Rock outcrop-Ashlar complex, 2 to 15 percent slopes. Because the Ashlar soil and Rock outcrop occur in small, intricately mixed areas, this map unit has limited land use potential.

intermingled with areas of Rock outcrop. A site should be selected on better suited soils.

Pasture and hayland
Suitability: Unsuited
Management concerns:
- The rockiness is a severe limitation affecting the production of pasture and hay crops. Areas of the Ashlar soil cannot be used separately because they are too small in size and are intermingled with areas of Rock outcrop. A site should be selected on better suited soils.

Woodland
Suitability: Unsuited
Management concerns:
- The rockiness is a severe limitation affecting woodland. Areas of the Ashlar soil cannot be used separately because they are too small in size and are intermingled with areas of Rock outcrop. A site should be selected on better suited soils.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- The rockiness is a severe limitation affecting dwellings. Areas of the Ashlar soil cannot be used separately because they are too small in size and are intermingled with areas of Rock outcrop. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited

Management concerns:
- The rockiness is a severe limitation affecting septic tank absorption fields. Areas of the Ashlar soil cannot be used separately because they are too small in size and are intermingled with areas of Rock outcrop. A site should be selected on better suited soils.

Local roads and streets
Suitability: Unsuited
Management concerns:
- The rockiness is a severe limitation affecting local roads and streets. Areas of the Ashlar soil cannot be used separately because they are too small in size and are intermingled with areas of Rock outcrop. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: Rock outcrop—none assigned; Ashlar—4e
Woodland ordination symbol: Rock outcrop—none assigned; Ashlar—7S, based on Virginia pine as the indicator species

RxF—Rock outcrop-Cleveland complex, 30 to 95 percent slopes

Setting

Landscape: Mountains
Landform: Rocky escarpments
Landform position: Rock outcrop—areas that support little or no vegetation; Cleveland—side slopes adjacent to Rock outcrop
Shape of areas: Irregular or long and narrow
Size of areas: 10 to 200 acres

Composition

Rock outcrop: 75 percent
Cleveland soil and similar soils: 20 percent
Dissimilar soils: 5 percent

Areas of Rock outcrop and the Cleveland soil are too small in size and too intricately mixed to be mapped separately. The number of observations in this map unit was less than in others because of the very steep slopes, inaccessibility, and hazardous footing. The detail of mapping, however, is adequate for the expected use of the map unit.

Typical Profile

Rock outcrop
Rock outcrop consists of areas where bedrock extends above the surface of the soil.

Cleveland
Surface layer:
0 to 3 inches—very dark grayish brown gravelly sandy loam

Subsoil:
3 to 13 inches—dark yellowish brown gravelly sandy loam

Underlying material:
13 inches—hard gneiss bedrock

Properties and Qualities of the Cleveland Soil

Depth class: Shallow
Drainage class: Somewhat excessively drained
General texture class: Loamy
Permeability: Moderately rapid (2 to 6 inches per hour)
Available water capacity: Very low (0 to 3 inches in a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Slope class: Very steep
Rock fragments on the surface: 0.1 to 15 percent surface coverage
Extent of rock outcrops: 75 percent surface coverage
Potential frost action: Moderate
Soil reaction: Moderately acid to very strongly acid
Depth to bedrock: 10 to 20 inches to hard bedrock

Minor Components

Dissimilar:
- Ashe soils that have hard bedrock at a depth of 20 to 40 inches; in landform positions similar to those of the Cleveland soil

Similar:
- Soils that are similar to the Cleveland soil but have a sandy subsoil

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting the production of pasture and hay crops. A site should be selected on better suited soils.

Woodland
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting woodland. Areas of the Cleveland soil cannot be used separately because they are too small in size and are intermingled with areas of Rock outcrop. A site should be selected on better suited soils.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting septic tank absorption fields. A site should be selected on better suited soils.

Local roads and streets
Suitability: Unsuited
Management concerns:
- The slope and rockiness are severe limitations affecting local roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: Rock outcrop—none assigned; Cleveland—7e
Woodland ordination symbol: Rock outcrop—none assigned; Cleveland—3R, based on Virginia pine as the indicator species

SkB—Skyuka loam, 2 to 6 percent slopes

Setting

Landscape: Piedmont
Landform: Low stream terraces
Landform position: Planar to slightly concave slopes
Shape of areas: Irregular
Size of areas: 10 to 25 acres

Composition

Skyuka soil and similar soils: 70 percent
Dissimilar soils: 30 percent

Typical Profile

Surface layer:
0 to 6 inches—brown loam

Subsoil:
6 to 11 inches—brown clay loam
11 to 21 inches—strong brown clay
21 to 33 inches—strong brown clay that has reddish yellow mottles
33 to 52 inches—strong brown clay that has yellowish red and strong brown mottles
52 to 65 inches—yellowish red clay loam that has grayish brown iron depletions

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Clayey
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High (9 to 12 inches within a 60-inch profile)
Depth to high water table: 4 to 6 feet
Shrink-swell potential: Moderate
Slope class: Gently sloping
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed

Rock fragments on the surface: Less than 0.01 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: None
Soil reaction: Slightly acid to strongly acid; ranging to neutral in the upper part of the profile in limed areas
Depth to bedrock: More than 72 inches

Minor Components

Dissimilar:
- The moderately well drained Dogue soils in the lower areas

Similar:
- Skyuka soils that have a moderately eroded surface layer of clay loam
- Soils that are similar to the Skyuka soil but have a redder subsoil
- Soils that are similar to the Skyuka soil but have a lower shrink-swell potential
- Soils that are similar to the Skyuka soil but are more acid
- Soils that are similar to the Skyuka soil but have a high water table below a depth of 6 feet

Land Use

Dominant Uses: Cropland and pasture and hayland
Other Uses: Woodland

Agricultural Development

Cropland
Suitability: Well suited
Commonly grown crops: Cotton, corn, small grain, and soybeans
Management concerns: Erodibility, tilth, and soil fertility
Management measures and considerations:
- Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to minimize erosion by stabilizing the soil, controlling surface runoff, and maximizing the infiltration of water.
- Incorporating crop residue into the soil or leaving residue on the soil surface helps to minimize clodding and crusting and maximize the infiltration of water.
- Restricting tillage to periods when the soil is not wet helps to reduce clodding and crusting and increases the infiltration of water.

Pasture and hayland
Suitability: Well suited
Commonly grown crops: Tall fescue, clover, and alfalfa
Management concerns: No significant limitations
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Using a rotational grazing system and implementing a well-planned clipping and harvesting schedule help to maintain pastures and increase productivity.

Woodland
Suitability: Well suited
Management concerns: No significant limitations
Management measures and considerations:
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.
- Restricting logging operations to periods when the soil is not wet helps to prevent rutting and soil compaction.

Urban Development

Dwellings
Suitability: Suited
Management concerns: Shrink-swell potential and wetness
Management measures and considerations:
- Reinforcing foundations or backfilling with coarse-textured material helps to strengthen buildings and prevents damage caused by shrinking and swelling.
- Building structures on the highest part of the landscape and using artificial drainage help to reduce the risk of damage caused by wetness.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Suited
Management concerns: Restricted permeability and wetness
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soil is not wet helps to reduce smearing and sealing of trench walls.
- Suitable fill material can be used to raise the filter field a sufficient distance above the high water table and thus help to improve the performance of septic systems.

Local roads and streets
Suitability: Poorly suited
Management concerns: Low strength
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.

Interpretive Groups

Land capability classification: 2e
Woodland ordination symbol: 10C, based on loblolly pine as the indicator species

TaC—Tate sandy loam, 8 to 15 percent slopes

Setting

Landscape: Mountains
Landform: Colluvial fans
Landform position: Foot slopes and toe slopes
Shape of areas: Irregular
Size of areas: 5 to 25 acres

Composition

Tate soil and similar soils: 95 percent
Dissimilar soils: 5 percent

Typical Profile

Surface layer:
0 to 10 inches—brown gravelly loam

Subsoil:
10 to 26 inches—yellowish brown clay loam
26 to 34 inches—strong brown clay loam

34 to 47 inches—yellowish brown sandy clay loam
47 to 58 inches—yellowish brown sandy loam

Underlying material:
58 to 72 inches—dark yellowish brown cobbly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: Moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Slope class: Strongly sloping
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: Less than 0.01 surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Moderate
Soil reaction: Slightly acid to very strongly acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Small areas of Tate soils that have more stones or boulders on the surface
- Ostin soils that are sandy and have many rock fragments; adjacent to drainageways
- Soils that are similar to the Tate soil but have a high water table within a depth of 6.0 feet; in depressions, on toe slopes, and along stream channels
- Soils that are similar to the Tate soil but have more clay in the subsoil

Similar:
- Tate soils that have a surface layer of fine sandy loam, loam, sandy clay loam, or clay loam
- Soils that are similar to the Tate soil but have a redder subsoil
- Soils that are similar to the Tate soil but have a dark surface layer that contains more organic matter

Land Use

Dominant Uses: Pasture and hayland and cropland
Other Uses: Woodland

Agricultural Development

Cropland
Suitability: Suited
Management concerns: Erodibility and tilth
Management measures and considerations:
- Resource management systems that include terraces and diversions, stripcropping, contour tillage, no-till farming, and crop residue management help to minimize erosion, control surface runoff, and maximize the infiltration of rainfall.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.

Pasture and hayland
Suitability for pasture: Well suited
Suitability for hayland: Suited
Commonly grown crops: Tall fescue, clover, and orchardgrass
Management concerns: Erodibility and equipment use
Management measures and considerations:
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increase germination.
- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Well suited
Management concerns: No significant limitations
Management measures and considerations:
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

Urban Development

Dwellings
Suitability: Suited
Management concerns: Slope
Management measures and considerations:
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Grading or land shaping can divert upslope surface water away from foundations.
- Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments onsite.

Septic tank absorption fields
Suitability: Suited
Management concerns: Restricted permeability, large stones, and slope
Management measures and considerations:
- Increasing the size of the absorption field helps to improve the performance of septic tanks.
- Installing the distribution lines of septic systems during periods when the soil is not wet helps to reduce smearing and sealing of trench walls.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Large boulders in the subsoil can make excavation difficult or impractical in some areas.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Suited
Management concerns: Low strength, slope, large stones, and frost action
Management measures and considerations:
- Providing sand and gravel and compacting roadbeds help to improve soil strength.
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.

- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soil and prevent excessive erosion.
- Large stones may be a problem during excavation.

Interpretive Groups

Land capability classification: 4e
Woodland ordination symbol: 6A, based on yellow-poplar as the indicator species

TbC—Tate-Greenlee complex, 6 to 15 percent slopes, very stony

Setting

Landscape: Mountains
Landform: Colluvial fans
Landform position: Tate—the less stony areas on foot slopes and toe slopes; Greenlee—the more stony areas on foot slopes and toe slopes
Shape of areas: Irregular
Size of areas: 5 to 50 acres

Composition

Tate soil and similar soils: 70 percent
Greenlee soil and similar soils: 25 percent
Dissimilar soils: 5 percent

Typical Profile

Tate
Surface layer:
0 to 5 inches—dark brown cobbly sandy loam

Subsurface layer:
5 to 10 inches—dark yellowish brown cobbly sandy loam

Subsoil:
10 to 22 inches—yellowish brown sandy clay loam
22 to 51 inches—strong brown sandy clay loam
51 to 61 inches—strong brown sandy loam that has yellowish red and red mottles

Greenlee
Surface layer:
0 to 5 inches—dark brown very cobbly sandy loam

Subsoil:
5 to 61 inches—dark yellowish brown very cobbly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Tate—loamy; Greenlee—loamy with many rock fragments
Permeability: Tate—moderate (0.6 inch to 2.0 inches per hour); Greenlee—moderately rapid (2 to 6 inches per hour)

Available water capacity: Tate—moderate (6 to 9 inches within a 60-inch profile); Greenlee—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Slope class: Strongly sloping
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.1 to 3.0 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Tate—moderate; Greenlee—low
Soil reaction: Tate—slightly acid to very strongly acid; Greenlee—moderately acid to extremely acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Small areas of Tate and Greenlee soils that have more stones or boulders on the surface
- Ostin soils that are sandy and have many rock fragments; adjacent to drainageways

Similar:
- Soils that are similar to the Tate soil but have less clay in the subsoil
- Soils that are similar to the Greenlee soil but have more clay in the subsoil
- Soils that are similar to the Tate and Greenlee soils but have a redder subsoil
- Soils that are similar to the Greenlee and Tate soils but have a dark surface layer that contains more organic matter

Land Use

Dominant Uses: Woodland
Other Uses: Pasture

Agricultural Development

Cropland
Suitability: Tate—poorly suited; Greenlee—unsuited
Management concerns: Erodibility and large stones
Management measures and considerations:
- Heavy equipment is needed to remove stones and boulders large enough to interfere with cropland management.
- Areas of the less stony Tate soil may be too intermingled with areas of the Greenlee soil to manage separately.

Pasture and hayland
Suitability for pasture: Tate—suited for pasture; Greenlee—unsuited
Suitability for hayland: Tate—poorly suited; Greenlee—unsuited
Management concerns: Slope and large stones
Management measures and considerations:
- Heavy equipment is needed to remove stones and boulders large enough to interfere with the management of pasture and hayland.
- Areas of the less stony Tate soil may be too intermingled with areas of the Greenlee soil to manage separately.

Woodland

Suitability: Tate—well suited; Greenlee—suited

Management concerns: Tate—no significant limitations; Greenlee—equipment use and seedling mortality

Management measures and considerations:

- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Using cable logging methods helps to overcome limited road and trail construction resulting from the large number of stones and boulders on the soil surface.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings

Suitability: Tate—suited; Greenlee—poorly suited

Management concerns: Tate—slope; Greenlee—slope and large stones

Management measures and considerations:

- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Special design of retaining structures may be needed to stabilize excavation walls and cutbanks in areas of the Greenlee soil.
- Drainage systems may be needed around the foundation of dwellings to control seasonal springs and wetness.
- Large boulders in the subsoil can make excavation difficult or impractical in some areas.

Septic tank absorption fields

Suitability: Tate—suited; Greenlee—poorly suited

Management concerns: Tate—slope and restricted permeability; Greenlee—slope and large stones

Management measures and considerations:

- Large boulders in the subsoil can make excavation difficult or impractical in some areas.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets

Suitability: Tate—suited; Greenlee—poorly suited

Management concerns: Tate—slope and frost action; Greenlee—slope, large stones, and frost action

Management measures and considerations:

- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Carefully planning the location of roads helps to minimize the removal of large stones.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.

Interpretive Groups

Land capability classification: Tate—4s; Greenlee—7s

Woodland ordination symbol: Based on yellow-poplar as the indicator species, 6A in areas of the Tate soil and 8X in areas of the Greenlee soil

TbD—Tate-Greenlee complex, 15 to 30 percent slopes, very stony

Setting

Landscape: Mountains
Landform: Colluvial fans
Landform position: Tate—the less stony areas on foot slopes and toe slopes; Greenlee—the more stony areas on foot slopes and toe slopes
Shape of areas: Irregular
Size of areas: 5 to 50 acres

Composition

Tate soil and similar soils: 70 percent
Greenlee soil and similar soils: 25 percent
Dissimilar soils: 5 percent

Typical Profile

Tate
Surface layer:
0 to 5 inches—dark brown cobbly sandy loam

Subsurface layer:
5 to 10 inches—dark yellowish brown cobbly sandy loam

Subsoil:
10 to 22 inches—yellowish brown sandy clay loam
22 to 51 inches—strong brown sandy clay loam
51 to 61 inches—strong brown sandy loam that has yellowish red and red mottles

Greenlee
Surface layer:
0 to 5 inches—dark brown very cobbly sandy loam

Subsoil:
5 to 61 inches—dark yellowish brown very cobbly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Tate—loamy; Greenlee—loamy with many rock fragments
Permeability: Tate—moderate (0.6 inch to 2.0 inches per hour); Greenlee—moderately rapid (2 to 6 inches per hour)
Available water capacity: Tate—moderate (6 to 9 inches within a 60-inch profile); Greenlee—low (3 to 6 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Rock fragments on the surface: 0.1 to 3.0 percent surface coverage
Extent of rock outcrops: Less than 0.1 percent surface coverage
Potential frost action: Tate—moderate; Greenlee—low
Soil reaction: Tate—slightly acid to very strongly acid; Greenlee—moderately acid to extremely acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Small areas of Tate and Greenlee soils that have more stones or boulders on the surface
- Ostin soils that are sandy and have many rock fragments; adjacent to drainageways

Similar:
- Soils that are similar to the Tate soil but have less clay in the subsoil
- Soils that are similar to the Greenlee soil but have more clay in the subsoil
- Soils that are similar to the Tate and Greenlee soils but have a redder subsoil
- Soils that are similar to the Tate and Greenlee soils but have a dark surface layer that contains more organic matter

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Tate—poorly suited; Greenlee—unsuited
Management concerns: Erodibility and large stones
Management measures and considerations:
- Heavy equipment is needed to remove stones and boulders large enough to interfere with cropland management.
- Areas of the less stony Tate soil may be too intermingled with areas of the Greenlee soil to manage separately.

Pasture and hayland
Suitability for pasture: Tate—suited for pasture; Greenlee—unsuited
Suitability for hayland: Tate—poorly suited; Greenlee—unsuited
Management concerns: Slope and large stones
Management measures and considerations:
- Heavy equipment is needed to remove stones and boulders large enough to interfere with the management of pasture and hayland.
- Areas of the less stony Tate soil may be too intermingled with areas of the Greenlee soil to manage separately.

Woodland
Suitability: Tate—well suited; Greenlee—suited
Management concerns: Tate—no significant limitations; Greenlee—equipment limitations and seedling mortality
Management measures and considerations:
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Using cable logging methods helps to overcome limited road and trail construction resulting from the large number of stones and boulders on the soil surface.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings
Suitability: Poorly suited
Management concerns: Tate—slope; Greenlee—slope and large stones

Management measures and considerations:
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Special design of retaining structures may be needed to stabilize excavation walls and cutbanks in areas of the Greenlee soil.
- Drainage systems may be needed around the foundation of dwellings to control seasonal springs and wetness.
- Large boulders in the subsoil can make excavation difficult or impractical in some areas.

Septic tank absorption fields
Suitability: Poorly suited
Management concerns: Tate—slope and restricted permeability; Greenlee—slope and large stones
Management measures and considerations:
- Large boulders in the subsoil can make excavation difficult or impractical in some areas.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Tate—slope and frost action; Greenlee—slope, large stones, and frost action
Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Carefully planning the location of roads helps to minimize the removal of large stones.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.

Interpretive Groups

Land capability classification: Tate—6s; Greenlee—7s
Woodland ordination symbol: Based on yellow-poplar as the indicator species, 6R in areas of the Tate soil and 8X in areas of the Greenlee soil

ToA—Toccoa sandy loam, 0 to 3 percent slopes, occasionally flooded

Setting

Landscape: Piedmont
Landform: Flood plains
Landform position: Planar to slightly convex slopes
Shape of areas: Elongated or irregular
Size of areas: 4 to 100 acres

Composition

Toccoa soil and similar soils: 85 percent
Dissimilar soils: 15 percent

Typical Profile

Surface layer:
0 to 12 inches—dark yellowish brown sandy loam

Underlying material:
12 to 22 inches—dark yellowish brown loam
22 to 35 inches—yellowish brown loam
35 to 50 inches—dark yellowish brown loam
50 to 62 inches—dark yellowish brown loamy sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained or moderately well drained
General texture class: Loamy
Permeability: Moderately rapid (2 to 6 inches per hour)
Available water capacity: Low or moderate (3 to 9 inches within a 60-inch profile)
Depth to high water table: 2.5 to 5.0 feet from December to April
Shrink-swell potential: Low
Slope class: Nearly level
Flooding: Occasional from January to December for periods of 2 to 7 days
Potential frost action: None
Soil reaction: Slightly acid to strongly acid except where surface layers have been limed
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- The somewhat poorly drained Chewacla soils in depressions
- The excessively drained, sandy Buncombe soils adjacent to the stream channel
- Small, randomly scattered, convex areas of soils that are rarely flooded

Similar:
- Soils that are similar to the Toccoa soil but have a sandy surface layer
- Soils that are similar to the Toccoa soil but have more clay in the subsoil

Land Use

Dominant Uses: Cropland and pasture and hayland
Other Uses: Woodland

Agricultural Development

Cropland
Suitability: Well suited
Commonly grown crops: Corn, soybeans, small grain, and vegetable crops
Management concerns: Flooding (fig. 14)
Management measures and considerations:
- Harvesting row crops as early as possible helps to reduce the risk of damage caused by flooding.
- Incorporating crop residue or organic matter from outside sources into the soil helps to improve the available water capacity.

Pasture and hayland
Suitability: Well suited
Commonly grown crops: Tall fescue and clover
Management concerns: Flooding
Management measures and considerations:
- Harvesting hay crops as early as possible helps to reduce the risk of damage caused by flooding.
- Livestock should be provided escape routes to higher areas during periods of flooding.

Figure 14.—An area of Toccoa sandy loam, 0 to 3 percent slopes, occasionally flooded. Flooding has damaged crops, stripped away valuable topsoil, and thus reduced the potential productivity of the soil.

- Restricting use after heavy rains may be necessary if flooding is possible.
- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.

Woodland
Suitability: Well suited
Management concerns: No significant limitations
Management measures and considerations:
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the water surface.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- The flooding is a severe limitation affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting septic tank absorption fields. A site should be selected on better suited soils.

Local roads and streets
Suitability: Unsuited
Management concerns:
- The flooding is a severe limitation affecting roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: 2w
Woodland ordination symbol: 8A, based on yellow-poplar as the indicator species

TtD—Toecane-Tusquitee complex, 15 to 30 percent slopes, very stony

Setting

Landscape: Mountains
Landform: Toecane and Tusquitee soils only occur on a few small colluvial fans in the northwestern part of Rutherford County along the Buncombe County boundary
Landform position: Toecane—the more stony areas on foot slopes and toe slopes; Tusquitee—the less stony areas on foot slopes and toe slopes
Shape of areas: Irregular or oblong
Size of areas: 3 to 13 acres

Composition

Toecane soil and similar soils: 45 percent
Tusquitee soil and similar soils: 45 percent
Dissimilar soils: 10 percent

Typical Profile

Toecane

Surface layer:
0 to 4 inches—very dark brown cobbly loam

Subsurface layer:
4 to 8 inches—dark brown cobbly loam

Subsoil:
8 to 17 inches—yellowish brown cobbly loam
17 to 31 inches—strong brown very cobbly sandy clay loam
31 to 38 inches—strong brown very cobbly sandy loam

Underlying material:
38 to 62 inches—dark yellowish brown extremely cobbly loamy sand

Tusquitee
Surface layer:
0 to 6 inches—very dark brown fine sandy loam

Subsurface layer:
6 to 9 inches—dark brown fine sandy loam

Subsoil:
9 to 22 inches—strong brown fine sandy loam
22 to 31 inches—brown loam
31 to 42 inches—yellowish brown loam

42 to 71 inches—yellowish brown sandy loam
71 to 86 inches—yellowish brown sandy clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Toecane—loamy skeletal; Tusquitee—loamy
Permeability: Moderately rapid (2 to 6 inches per hour)
Available water capacity: Toecane—low (3 to 6 inches within a 60-inch profile); Tusquitee—moderate (6 to 9 inches within a 60-inch profile)
Depth to high water table: More than 6 feet
Flooding: None
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Hazard of water erosion: Very severe
Rock fragments on the surface: About 3.0 percent surface stones and boulders that average about 10 to 48 inches in diameter and 10 to 65 feet apart
Potential frost action: Toecane—low; Tusquitee—moderate
Soil reaction: Toecane—moderately acid to extremely acid; Tusquitee—slightly acid to very strongly acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Small areas of Tusquitee and Toecane soils that have more stones or boulders on the surface

Similar:
- Soils that are similar to the Toecane and Tusquitee soils but have more clay in the subsoil
- Soils that are similar to the Toecane and Tusquitee soils but have a light-colored surface layer that contains less organic matter

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Toecane—unsuited; Tusquitee—poorly suited
Management concerns: Erodibility and large stones
Management measures and considerations:
- Heavy equipment is needed to remove stones and boulders large enough to interfere with cropland management.
- Areas of the less stony Tusquitee soil may be too intermingled with areas of the Toecane soil to manage separately.

Pasture and hayland
Suitability for pasture: Toecane—unsuited; Tusquitee—suited
Suitability for hayland: Toecane—unsuited; Tusquitee—poorly suited
Management concerns: Slope and large stones
Management measures and considerations:
- Heavy equipment is needed to remove stones and boulders large enough to interfere with the management of pasture and hayland.

- Areas of the less stony Tusquitee soil may be too intermingled with areas of the Toecane soil to manage separately.

Woodland
Suitability: Toecane—suited; Tusquitee—well suited
Management concerns: Toecane—equipment use and seedling mortality; Tusquitee—no significant limitations
Management measures and considerations:
- Installing broad-based dips, water bars, and culverts helps to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent erosion.
- Using cable logging methods helps to overcome limited road and trail construction resulting from the large number of stones and boulders on the soil surface.
- These soils are best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings
Suitability: Poorly suited
Management concerns: Toecane—slope and large stones; Tusquitee—slope
Management measures and considerations:
- Designing structures so that they conform to the natural slope helps to overcome the slope limitation.
- Special design of retaining structures may be needed to stabilize excavation walls and cutbanks in areas of the Toecane soil.
- Drainage systems may be needed around the foundation of dwellings to control seasonal springs and wetness.
- Large boulders in the subsoil can make excavation difficult or impractical in some areas.

Septic tank absorption fields
Suitability: Poorly suited
Management concerns: Toecane—slope and large stones; Tusquitee—slope and restricted permeability
Management measures and considerations:
- Large boulders in the subsoil can make excavation difficult or impractical in some areas.
- The local Health Department should be contacted for guidance in developing sanitary facilities.

Local roads and streets
Suitability: Poorly suited
Management concerns: Toecane—slope, large stones, and frost action; Tusquitee—slope and frost action
Management measures and considerations:
- Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
- Carefully planning the location of roads helps to minimize the removal of large stones.
- Using suitable subgrade or base material helps to minimize the damage caused by frost heaving.

Interpretive Groups

Land capability classification: Toecane—7s; Tusquitee—6s
Woodland ordination symbol: 8R, based on yellow-poplar as the indicator species

UdC—Udorthents, loamy, 0 to 15 percent slopes

Setting

Landform position: Areas where the natural soil has been greatly altered by excavation or intensive grading or covered by earthy fill material
Shape of areas: Irregular
Size of areas: About 6 to 50 acres

Composition

Udorthents: 85 percent
Dissimilar inclusions: 15 percent

Typical Profile

Udorthents are dominantly loamy. A typical profile is not given for this map unit because the soils vary in color and depth.

Soil Properties and Qualities

Depth class: Shallow to very deep
Drainage class: Somewhat excessively drained to moderately well drained
Permeability: Very slow to moderately rapid
Available water capacity: Low to high
Depth to high water table: 1.5 feet to more than 6 feet
Flooding: None
Shrink-swell potential: Low or moderate
Erosion: Slight or moderate, about 0 to 75 percent of the original surface layer has been removed
Slope class: Nearly level to extremely steep
Stoniness: Less than 0.01 percent to 50 percent surface coverage
Soil reaction: Slightly acid to extremely acid
Depth to bedrock: 10 to more than 60 inches

Minor Components

Dissimilar:
- Randomly scattered areas of exposed bedrock
- Small areas of natural soils that have not been greatly altered
- Small areas where the surface has been covered with asphalt, concrete, buildings, or other impervious material

Land Use

Dominant Uses: Landfills, borrow pits, and golf courses

Suitability for land use: Not assigned
Management concerns: Variable soil properties and qualities
Management measures and considerations:
- Onsite investigation is needed before planning the use and management of these soils.

Interpretive Groups

Land capability classification: None assigned
Woodland ordination symbol: None assigned

UoA—Udorthents, loamy, 0 to 3 percent slopes, rarely flooded

Setting

Landform position: Areas along flood plains where the natural soil has been greatly altered by cutting, filling, mining, or shaping
Shape of areas: Irregular
Size of areas: About 6 to 30 acres

Composition

Udorthents: 85 percent
Dissimilar inclusions: 15 percent

Typical Profile

Udorthents are dominantly loamy. A typical profile is not given for this map unit because the soils vary in color and depth.

Soil Properties and Qualities

Depth class: Deep or very deep
Drainage class: Well drained to somewhat poorly drained
Permeability: Very slow to moderately rapid
Available water capacity: Low to high
Depth to high water table: 0.5 foot to more than 6 feet
Flooding: Rare
Shrink-swell potential: Low or moderate
Slope class: Nearly level or gently sloping
Stoniness: Less than 0.01 percent to 15 percent surface coverage
Soil reaction: Slightly acid to extremely acid
Depth to bedrock: 10 to more than 60 inches

Minor Components

Dissimilar:
- Small unaltered areas that have natural soil properties and qualities
- Areas where the surface has been covered with asphalt, concrete, buildings, or other impervious material
- Udorthents in the higher areas that do not have a flooding hazard

Land Use

Dominant Uses: Borrow pits or urban development

Suitability for land use: Not assigned
Management concerns: Variable soil properties and qualities
Management measures and considerations:
- Onsite investigation is needed before planning the use and management of these soils.

Interpretive Groups

Land capability classification: None assigned
Woodland ordination symbol: None assigned

UpA—Udorthents-Pits complex, mounded, 0 to 2 percent slopes, occasionally flooded

Setting

Landscape: Mountains
Landform: Areas along flood plains
Landform position: Udorthents—planar to convex slopes, on mounds, in shallow pits, in trenches, or in natural areas randomly scattered throughout the map unit; Pits—open excavations scattered throughout the map unit
Shape of areas: Long and narrow
Size of areas: 10 to 75 acres

Composition

Udorthents: 80 percent
Pits: 15 percent
Dissimilar soils: 5 percent

Areas of Udorthents and Pits are too small in size and too intricately mixed to be mapped separately. The number of observations in this map unit was less than in others because of the small acreage and soil disturbance. The detail of mapping, however, is adequate for the expected use of the map unit.

Typical Profile

This map unit consists of areas along flood plains where the natural soil material has been altered by excavation activities that removed gold or gravel. Shallow pits, trenches, and mounds are scattered throughout most of the map unit. Udorthents are commonly sandy in the upper part and consist of sand, gravel, and cobbles in the lower part, or they have sand, gravel, and cobbles throughout. Pits consist of open excavations from which the soil material and commonly the underlying material have been removed, exposing rock or other material that supports little or no vegetation. A typical profile is not given for the soils in this map unit because of their variability.

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Udorthents—moderately well drained or well drained; Pits—not applicable
General texture class: Udorthents—loamy to sandy-skeletal; Pits—not applicable
Permeability: Moderate to very rapid
Available water capacity: Moderate to very low
High water table: Udorthents—at a depth of 2.0 to more than 6 feet; Pits—within a depth of 1.5 feet
Shrink-swell potential: Low
Slope class: Nearly level
Flooding: Occasional for brief periods
Potential frost action: Moderate
Soil reaction: Neutral to strongly acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- Randomly intermingled spots of less disturbed soils that are more suitable for agricultural development

Land Use

Dominant Uses: Woodland

Agricultural Development

Cropland
Suitability: Poorly suited
Management concerns: Flooding, wetness, and highly disturbed soils
Management measures and considerations:
- Land shaping or grading that removes mounds and the filling of pits and trenches are usually needed before the soils can be considered for cropland use.
- Federal and State regulations protecting wetlands may restrict land shaping, grading, the use of drainage systems, and other alterations to areas of this map unit.

Pasture and hayland
Suitability: Poorly suited
Management concerns: Flooding, wetness, and highly disturbed soils
Management measures and considerations:
- Land shaping or grading that removes mounds and the filling of pits and trenches are usually needed before the soils can be considered for cropland use.
- Federal and State regulations protecting wetlands may restrict land shaping, grading, the use of drainage systems, and other alterations to areas of this map unit.

Woodland
Suitability: Well suited
Management concerns: Equipment use and highly disturbed soils
Management measures and considerations:
- Restricting the use of standard wheeled and tracked equipment to dry periods helps to prevent rutting and soil compaction that occurs when the soils are saturated.
- Cable logging methods can be used in areas where the mounded surface restricts road and trail construction.
- Federal and State regulations protecting wetlands may restrict the use of some woodland management measures and other alterations to areas of this map unit.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting dwellings. A site should be selected on better suited soils.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting septic tank absorption fields. A site should be selected on better suited soils.

Local roads and streets
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: None assigned
Woodland ordination symbol: None assigned

Ur—Urban land

Setting

Landscape: Piedmont
Landform: Divides
Shape of areas: Irregular
Size of areas: 3 to 200 acres

Composition

Urban land: 85 percent
Dissimilar soils: 15 percent

Typical Profile

This map unit consists of areas where much of the soil surface is covered with asphalt, concrete, buildings, or other impervious material. A typical profile is not given.

Minor Components

Dissimilar:
- Small areas of Udorthents or natural soils having pervious surfaces

Land Use

Dominant Uses: Urban development

Suitability for land use:
- Onsite investigation is needed before planning the use and management of these areas.

Management concerns: Excessive runoff from streets, roofs, and parking lots, which may increase the flooding hazard in low-lying areas

Interpretive Groups

Land capability classification: None assigned
Woodland ordination symbol: None assigned

WeA—Wehadkee silt loam, 0 to 2 percent slopes, frequently flooded

Setting

Landscape: Piedmont
Landform: Flood plains
Landform position: Slightly concave slopes
Shape of areas: Elongated or irregular
Size of areas: 4 to 130 acres

Composition

Wehadkee soil and similar soils: 70 percent
Dissimilar soils: 30 percent

Typical Profile

Surface layer:
0 to 6 inches—dark grayish brown silt loam

Subsoil:
6 to 20 inches—dark gray silty clay loam that has olive brown masses of iron accumulation

Underlying material:
20 to 48 inches—dark gray sandy loam
48 to 62 inches—gray sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Poorly drained
General texture class: Loamy
Permeability: Moderate (0.6 inch to 2.0 inches per hour)
Available water capacity: High (9 to 12 inches within a 60-inch profile)
High water table: Within a depth of 1.0 foot from November to May
Shrink-swell potential: Low
Slope class: Nearly level
Flooding: Frequent from November to June for periods of 7 to 30 days
Potential frost action: None
Soil reaction: Slightly acid to very strongly acid
Depth to bedrock: More than 60 inches

Minor Components

Dissimilar:
- The somewhat poorly drained Chewacla soils in landform positions similar to those of the Wehadkee soil
- The moderately well drained Dogue soils in the higher, rarely flooded areas

Similar:
- Poorly drained soils that are more sandy or more silty than the Wehadkee soil

Land Use

Dominant Uses: Woodland
Other Uses: Pasture

Agricultural Development

Cropland
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting crop production. A site should be selected on better suited soils.

Pasture and hayland
Suitability for pasture: Poorly suited
Suitability for hayland: Unsuited
Management concerns: Flooding and wetness
Management measures and considerations:
- Unless drainage systems are used, hayland and pasture should be managed for forage species that are tolerant of excessive wetness.

- Fencing livestock away from creeks and streams and using pressure-fed watering tanks help to prevent streambank caving, sedimentation, and water contamination by animal waste.
- Federal and State regulations protecting wetlands may restrict the use of drainage systems and other alterations to areas of the Wehadkee soil.

Woodland
Suitability: Suited
Management concerns: Equipment use and plant competition
Management measures and considerations:
- Using low-pressure ground equipment helps to prevent rutting and damage to tree roots due to soil compaction.
- Harvesting timber during summer helps to reduce the risk of damage caused by flooding.
- Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.
- Woodland should be managed for trees that are tolerant of wetness (fig. 15).
- Federal and State regulations protecting wetlands may restrict the use of some woodland management measures and other alterations to areas of the Wehadkee soil.

Urban Development

Dwellings
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting dwellings. A site should be selected on better suited soils.

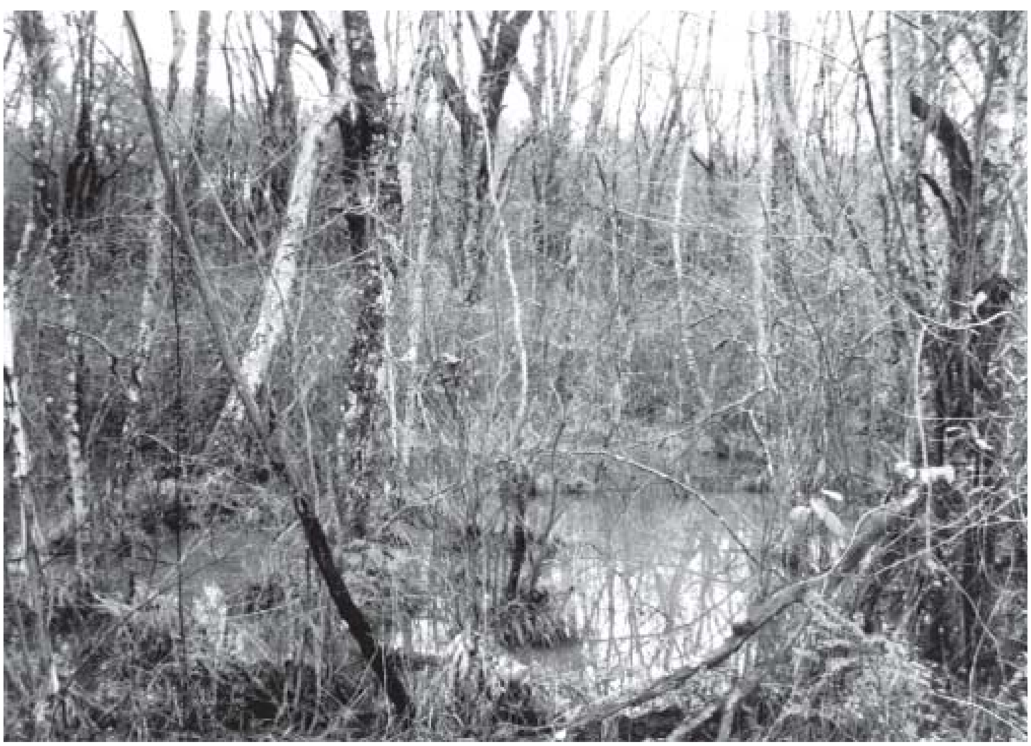

Figure 15.—Flooded woodland on Wehadkee silt loam, 0 to 2 percent slopes, frequently flooded. The wetness limits productivity and selection of tree species for woodland management.

Septic tank absorption fields
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting septic tank absorption fields. A site should be selected on better suited soils.

Local roads and streets
Suitability: Unsuited
Management concerns:
- The flooding and wetness are severe limitations affecting roads and streets. A site should be selected on better suited soils.

Interpretive Groups

Land capability classification: 6w
Woodland ordination symbol: 8W, based on willow oak as the indicator species

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Generally, the soils in Rutherford County that are well suited to crops are also well suited to urban uses. The data concerning specific soils in the county can be used in planning future land use patterns. The potential for farming should be considered relative to any soil limitations and the potential for nonfarm development.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Albert Moore, District Conservationist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils are identified, the system of land capability classification used by the Natural Resources Conservation Service is explained, the estimated yields of the main crops and hay and pasture plants are listed for each soil, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading “Detailed Soil Map Units” and in the tables. Specific information can be obtained from the local office of the Soil and Water Conservation District, the Natural Resources Conservation Service, or the North Carolina Cooperative Extension Service.

Federal and State regulations require that any area designated as wetlands cannot be altered without prior approval. Contact the local office of the Natural Resources Conservation Service for identification of hydric soils and potential wetlands.

In 1996, about 55,200 acres in Rutherford County was used for crops or pasture and hayland. Of this total, about 10,700 acres was used for cultivated crops, such as corn, soybeans, wheat, and cotton. Other crops included in this total are barley, sorghum, burley tobacco, and vegetables, such as squash, cucumbers, pumpkins, watermelons, and tomatoes. About 32,500 acres was used for pasture, and about 12,000 acres was used for hayland *(14)*. Tall fescue, sericea lespedeza, orchardgrass, ladino clover, bermudagrass, and alfalfa are the main forage crops. Forage crops are grown mainly for hogs, milk cows, cattle, and broilers. Apples and peaches are also grown in the county, mainly in the Piedmont area.

The most productive soils for crops and pasture are nearly level or gently sloping, have good internal drainage, have an adequate available water capacity, and require minimum erosion control. Cropland management practices are necessary to increase or maintain soil productivity and lower the costs of crop production. These practices include erosion control, water management, maintenance of soil fertility, and weed control.

Some areas that are idle, wooded, or pastured have good potential for use as cropland. Food production could be increased considerably by applying the latest technology to all of the cropland in the survey area. The information in this soil survey can facilitate the application of such technology.

The latest information about crops and pasture can be obtained at the local office of the North Carolina Cooperative Extension Service or the Natural Resources Conservation Service.

Cropland

Management considerations on cropland in the county include controlling erosion, water management, improving soil fertility, applying a system of weed control, and improving tilth.

Erosion control.—Water erosion is a major concern on most of the soils used for crops in Rutherford County. It is a hazard on soils that have slopes of more than 2 percent. Appling, Cecil, and Pacolet soils are examples. As the slope increases, the hazard of erosion and the difficulty in controlling erosion also increase.

Loss of the surface layer through erosion is damaging. Soil productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil and on soils that have a layer in or below the subsoil that limits the depth of the root zone. Cecil, Pacolet, Madison, and Appling soils, in the Piedmont area of Rutherford County, are examples of soils that have a clayey subsoil. Saw and Bethlehem soils are examples of soils that have a limiting layer of bedrock. Erosion on farmland results in the sedimentation of streams. Controlling erosion minimizes the pollution of water by runoff carrying plant nutrients, pesticides, soil particles, and plant residue (fig. 16). It improves the quality of water for municipal use, for recreation, and for fish and wildlife.

In many sloping areas of clayey soils, preparing a good seedbed is difficult because much or all of the original friable surface layer has been lost through erosion. This degree of erosion is common on clayey soils on Piedmont divides. Implementing resource management systems that include no-till farming or minimizing tillage and leaving crop residue on the surface help to create a favorable seedbed, increase the rate of water infiltration, and reduce the hazards of runoff and erosion. These practices are effective on most of the soils in the survey area. In the more sloping areas that are used for corn or cotton or are double cropped with soybeans, no-till farming is especially effective in controlling erosion.

Figure 16.—A grassed waterway in a cultivated area of Cecil and Pacolet soils. It helps to minimize sedimentation by controlling erosion and runoff.

Erosion-control practices provide a protective surface cover, help to control runoff, and increase the rate of water infiltration *(18)*. Keeping a vegetative cover on the soil surface helps to minimize soil loss and maintain the productive capacity of the soil. In sloping areas, including forage crops of grasses and legumes in the cropping system helps to control erosion. The forage crops also add nitrogen to the soil and improve tilth.

Terraces and diversions shorten the length of slopes and thus minimize erosion caused by runoff. They are most effective on very deep, well drained soils that have regular slopes. Cecil, Pacolet, and Madison soils are examples. These measures are less effective on soils that have irregular slopes because these soils would be excessively wet in terrace channels. They are also not recommended for soils that would have a clayey subsoil exposed in the terrace channels or that have bedrock within a depth of 40 inches.

Contour farming and contour stripcropping help to control erosion on many of the soils in the survey area. They are best suited to soils that have smooth, uniform slopes, including most areas of Cecil and Pacolet soils.

Information about erosion-control measures for each kind of soil is available at the local office of the Rutherford Soil and Water Conservation District or the Natural Resources Conservation Service.

Water management.—Water management includes limiting flood damage, improving subsurface drainage, and retaining soil moisture. All flood plain soils have some degree of flooding hazard. Flooding can result from runoff from adjacent slopes or from streambank overflow. Excessive surface water due to floods can delay equipment use and damage crops and forages (fig. 17). Tillage patterns can increase the problem by creating low areas and blocking surface water outlets. Some soils, such as Chewacla and Toccoa soils, flood occasionally but are commonly used for crops. Harvesting crops as soon as possible prevents the risk of damage from flooding. Diversions, land smoothing, and waterways are effective in removing the surface water runoff from adjacent slopes. Floodwater-retarding structures, such as

Figure 17.—Corn in an area of Toccoa sandy loam, 0 to 3 percent slopes, occasionally flooded, which has been damaged by flooding.

dikes and levees, can minimize the risk of flooding from streambank overflow. Completely eliminating this flooding hazard, however, is commonly too costly to achieve.

Subsurface drainage is a moderate management concern on the somewhat poorly drained Chewacla soils. It is less of a concern on moderately well drained soils, such as Dogue soils. The poorly drained Wehadkee and Worsham soils have severe subsurface drainage problems and are generally not used for cropland. A seasonal high water table can limit equipment use and crop selection. Soils that have a seasonal high water table are generally slow to warm in the spring and poorly aerated, and the crops grown on these soils are often susceptible to disease and have pest management problems. Artificial drainage systems can improve soil productivity for cropland use. Tile drains and open ditches can be used where suitable outlets are available to lower the water table and improve soil aeration. Undrained areas of Chewacla soils are commonly planted with crops that can tolerate wetness, such as corn.

Managing drainage in conformance with regulations concerning wetlands may require special permits and extra planning. The local office of the Rutherford Soil and Water Conservation District or the Natural Resources Conservation Service should be contacted for identification of hydric soils and potential wetlands.

Retaining soil moisture is a severe management concern for the droughty Buncombe and Ostin soils. Stream-fed irrigation systems and additions of large amounts of organic matter are needed to improve levels of available soil moisture. Unless irrigated, these soils are limited for cropland use. Soils such as Cecil, Pacolet, and Hiwassee soils can become droughty, especially during summer. Generally, management practices used to control erosion also help to conserve available soil moisture by decreasing surface runoff, maximizing the infiltration of water, and lowering evapotranspiration rates.

Soil fertility.—The soils in Rutherford County are naturally acid and low in natural fertility. Additions of lime and fertilizer are needed for the production of most kinds of crops.

Liming requirements are a major concern on cropland. The acidity level in the soil affects the availability of many nutrients to plants and the activity of beneficial bacteria. Lime neutralizes exchangeable aluminum in the soil and thus reduces the potential for aluminum toxicity. Liming adds calcium (from calcitic lime) or calcium and magnesium (from dolomitic lime) to the soil.

A soil test is a guide to what amount and kind of lime should be used. The desired pH levels may differ, depending on the soil properties and the crop to be grown.

Nitrogen fertilizer is required for most crops. It is generally not required, however, for clover, in some rotations of soybeans, and for alfalfa that is established. A reliable soil test is not available for predicting nitrogen requirements. Appropriate rates of nitrogen application are described in the section "Yields per Acre."

Soil tests can also indicate the need for phosphorus, potassium, and micronutrients. Phosphorus and potassium tend to build up in the soil.

Chemical weed control.—The use of herbicides for weed control is a common practice on the cropland in Rutherford County. It decreases the need for tillage and is an integral part of modern farming. Selected soil properties, such as organic matter content and texture of the surface layer, affect the rate of herbicide application. Estimates of both of these properties were determined for the soils in this survey area. Table 14 shows a general range of organic matter content in the surface layer of the soils. The texture of the surface layer is shown in the USDA texture column in table 13.

In some areas the organic matter content projected for the different soils is outside the range shown in the table. The content can be higher in soils that have received large amounts of animal or manmade waste. Soils that have recently been brought into cultivation may have a higher content of organic matter in the surface layer than similar soils that have been cultivated for a long time. Conservation tillage can increase the content of organic matter in the surface layer. A lower content of organic matter is common where the surface layer has been partly or completely removed by erosion or land smoothing. Current soil tests should be used for specific organic matter determinations.

Tilth.—Soil tilth is an important factor in the germination of seeds and the infiltration of water into the soil. Soils that have good tilth have a granular and porous surface layer.

Some of the soils in the survey area that are used for crops are eroded, have a surface layer of clay loam or sandy clay loam, and are low in organic matter. Examples are Cecil, Hiwassee, and Pacolet soils. These soils become cloddy if they are plowed outside a narrow, optimum range in moisture content, especially during wet periods. Also, a surface crust forms on unprotected surfaces after a heavy rainfall. The crust is hard when dry and nearly impervious to water. It reduces the rate of water infiltration and increases the runoff rate. Regular additions of crop residue, manure, and other organic material can improve soil structure and prevent the formation of a crust.

Rock fragments are a limitation affecting good tilth. Their content and size affect the use of tillage implements. Bethlehem soils in the survey area have poor tilth because of many fragments of gravel in the surface layer. Some areas of Saw soils have randomly scattered stones that can damage plows and other tillage implements. Stones should be removed from cultivated areas. Large stones and boulders are common in some of the colluvial soils in the mountains. Areas of Tate and Greenlee soils contain so many rock fragments that in most places it is too difficult to remove enough rock fragments for cropland management.

Pasture and Hayland

In 1994, according to estimates by the North Carolina Department of Agriculture, Rutherford County had about 16,500 beef and dairy cattle *(14)*. Most of the pasture and hayland supports a mixture of grasses and legumes. Most of the hay is grown in rotation with pasture. The harvested hay commonly is rolled into large, round bales.

Selection of forage species.—In 1996, about 48 percent of the total farm income in the survey area was derived from the sale of livestock, including poultry. A successful livestock enterprise depends on a forage program that provides large quantities of good-quality feed. In most areas of hayland and pasture in Rutherford County, renovation, brush control, and measures that prevent overgrazing are needed.

The soils in the survey area vary widely in their ability to produce grasses and legumes because of differences in such properties as depth to bedrock or to other limiting layers, internal drainage, and available water capacity. The forage species selected for planting should be appropriate for the soil.

The nearly level and gently sloping, deep and very deep, well drained soils, such as Cecil and Appling soils, should be planted to the highest producing crops, such as corn silage, alfalfa, or a mixture of alfalfa and orchardgrass. Sod-forming grasses, such as tall fescue and orchardgrass, minimize erosion in the steeper areas. Alfalfa can be seeded with cool-season grasses or grown in pure stands in areas where the soil is at least 2 feet deep and is well drained. The moderately well drained and somewhat poorly drained soils, such as Dogue and Chewacla soils, are suited to clover-grass mixtures and to pure stands of clover or grasses. Legumes can be established through renovation in areas that support sod-forming grasses.

The intended use should be considered when forage species are selected. Selected species should provide maximum quality and versatility in the forage program. Legumes generally produce higher quality feed than grasses. They should be grown to the maximum possible extent. The taller legumes, such as alfalfa and red clover, are more versatile than the legumes that are used primarily for grazing, such as white clover. Orchardgrass and tall fescue are best suited to use as hay and silage.

Tall fescue is an important cool-season grass and is suited to a wide range of soil conditions. It is grown for both pasture and hay. The growth that occurs from August through November commonly accumulates in the field and is used for grazing in late fall and in winter. For maximum production, nitrogen fertilizer should be applied during the period when the grass is accumulating. The rate of application should be based on the desired level of production.

Warm-season grasses that are planted during the period from early April through late May help to supplement the cool-season grasses, such as tall fescue. They grow well during warm periods, especially from mid-June to September, when the growth of cool-season grasses is slow. Examples of warm-season grasses are switchgrass, big bluestem, and bermudagrass or bermudagrass hybrids.

Maintenance of pasture and hayland.—Renovation can increase forage yields in areas that have a good stand of grass. It includes partially destroying the sod, applying lime and fertilizer, and seeding desirable forage species. Adding legumes to the stand of grass provides high-quality feed. Legumes increase summer production and transfer nitrogen from the air into the soil. Under growing conditions, alfalfa can fix 200 to 300 pounds of nitrogen per acre per year, red clover can fix 100 to 200 pounds, and ladino clover can fix 100 to 150 pounds. An acre of annual forage legumes, such as sericea lespedeza or vetch, can fix 75 to 100 pounds of nitrogen per year.

In Rutherford County, many farmers are fencing pastures to prevent livestock from entering creeks and streams. This helps to prevent water pollution from streambank caving, sedimentation, and contamination of the water from animal waste. Alternative methods of providing water to livestock include pressure-fed watering tanks installed away from low areas and surface waters.

Additional information about managing pasture and hayland can be obtained from the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

Orchards

Conditions are favorable for apple and peach production in Rutherford County. Peaches grow best on the warmer Piedmont soils. Apples are grown on both Piedmont and mountain soils. The establishment and management of orchards requires careful site selection, orchard layout, and maintenance planning. The fruit is grown for the fresh market and the juice market.

Site selection.—Apple and peach trees require deep, well drained soils and landscapes that offer protection from early season freezing. Other management considerations are the potential for water storage and site maintenance costs. Topography can affect the degree of freeze and wind damage, subsurface drainage, and orchard layout. Mountain landscapes have colder climates, which discourage peach production. In both Piedmont and mountain areas, cold air generally moves from the higher, more sloping areas and accumulates on the lower, flatter landscapes. Most severe crop losses are caused by early season freezing, which damages buds and flowers. Orchards should be located on sloping soils where air movement is uniform and has few obstructions so that cold air pockets do not occur. Cold air settles on soils on the lower-lying stream terraces and flood plains, such as Dogue and Toccoa soils, and damages buds and flowers. Other flood plain soils, such as Chewacla soils, have wetness associated with a high water table *(11, 12)*.

Soils on Piedmont divides, such as Cecil, Pacolet, and Madison soils, are commonly used for orchards. Bethlehem soils are also used but they tend to be droughty and their moderate depth to bedrock can limit tree roots. Rion and Grover soils on Piedmont side slopes have good air movement but their steep slopes can limit orchard layout, access road maintenance, and equipment use. Cliffside soils are very stony and can have limitations for tree rooting depth and equipment use.

Soils on mountain divides, such as Hayesville, Evard, and Fannin soils, are suited to apple production. On very steep slopes, these soils are generally unsuited because of equipment limitations. Soils on foot slopes and toe slopes, such as Greenlee and Tate soils, are extremely stony and bouldery and are difficult to manage because of limited equipment use.

Aspect and susceptibility to wind damage are other landform considerations in mountain areas. On southern aspects, bud development may be premature and the risk of freeze damage increased. Cellular damage to tree trunks may also occur on southern aspects during winter. Some soils on the higher mountain ridges, such as Cliffield and Pigeonroost soils, are droughty and have a limited tree rooting depth. Trees and flowers on these soils are commonly exposed to excessive wind and ice damage.

Although most orchards in Rutherford County are managed without irrigation, water is sometimes used to limit freeze damage. Soils that are suited to the construction of water storage facilities are preferred. Table 12 lists the limitations of the soils in Rutherford County for pond reservoir areas.

Layout and maintenance.—Orchard layout and maintenance includes careful tree selection, row spacing, access road planning, erosion control, and a soil fertility program. Tree size and variety can affect the cost of maintenance, tree density, and pollination success. Smaller trees are generally easier to maintain and allow for closer row spacing. Tree variety factors such as fruit marketability, time of bloom, and disease resistance affect maintenance costs and fruit quality *(11, 12)*.

Row spacing and access road planning are affected by slope and equipment use requirements. Adequate row spacing limits damage to trees by equipment used during spraying, pruning, and harvesting operations. Establishing rows on the contour helps to control surface runoff and soil erosion and maximize equipment use. Access roads should be planned to avoid steep grades and switch backs, which can limit equipment use and maintenance. Permanent vegetation should be established and maintained on all access roads and on rows between the trees. Field borders, grassed waterways, and diversions may be needed to control excessive surface runoff and erosion.

Productive orchards require the control of disease, insects, and weeds and a soil fertility program. The use of herbicides and pesticides should be performed with assistance from agricultural specialists. Improper use of these chemicals can lower pollination success and damage nearby water quality. Most herbicides are applied in bands or on a tree-by-tree basis. The texture and organic matter content of the soil surface layer can affect herbicide effectiveness. Table 14 lists the range in organic matter content for the soils in Rutherford County. The surface layer textures are shown in table 13. Specific fertility requirements for orchard crops are best determined by leaf analysis. Permanent vegetation on access roads and between trees should be limed and fertilized and otherwise maintained in good condition. This helps to prevent soil erosion, damage to access roads, and sedimentation of nearby surface waters.

The local office of the Rutherford Soil and Water Conservation District, the Natural Resources Conservation Service, or the North Carolina Cooperative Service can provide additional information about establishing and managing orchard lands in Rutherford County.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. The application rate of nitrogen for corn on soils that have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds per acre. If the yield potential for corn is 100 bushels per acre or less, a rate of 100 to 120 pounds of nitrogen per acre should be used. The application of nitrogen in excess of that required for potential yields generally is not recommended. The excess nitrogen fertilizer that is not utilized by the crop is an unnecessary expense and causes a hazard of water pollution. If corn or cotton is grown after the harvest of soybeans or peanuts, nitrogen rates can be reduced by about 20 to 30 pounds per acre. Because nitrogen can be readily leached from sandy soils, applications may be needed on these soils more than once during the growing season.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland *(22)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numerals 1 through 8. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation.

Class 7 soils have very severe limitations that make them unsuitable for cultivation.

Class 8 soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, 2e. The letter *e* shows that the main hazard is the risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w, s,* or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit component is given in the section “Detailed Soil Map Units” and in table 5.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 8 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 52,899 acres in the survey area, or about 14.5 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are in the Cecil-Pacolet, Madison-Pacolet-Grover, and Chewacla-Toccoa-Buncombe general soil map units, which are described in the section "General Soil Map Units." The crops grown on this land include corn, soybeans, small grains, vegetables, and hay and pasture plants.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed below. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

The map units that meet the requirements for prime farmland are:

ApB	Appling sandy loam, 1 to 6 percent slopes
CaB2	Cecil sandy clay loam, 2 to 8 percent slopes, eroded
ChA	Chewacla loam, 0 to 2 percent slopes, occasionally flooded (where drained)
DoB	Dogue loam, 1 to 6 percent slopes, rarely flooded
HsB2	Hiwassee clay loam, 2 to 8 percent slopes, eroded
IoA	Iotla sandy loam, 0 to 2 percent slopes, occasionally flooded (where drained)
SkB	Skyuka loam, 2 to 6 percent slopes

ToA Toccoa sandy loam, 0 to 3 percent slopes, occasionally flooded

Woodland Management and Productivity

Albert Coffey, Forester, Natural Resources Conservation Service, helped prepare this section.

Owners of forest land in Rutherford County have many objectives. These objectives include producing timber; conserving wildlife, soil, and water; preserving esthetic values; and providing opportunities for recreational activities, such as commercial hunting. Public demand for clean water and recreational areas creates pressures and opportunities for owners of forest land.

The landowner interested in timber production is faced with the challenge of producing greater yields from smaller areas. Meeting this challenge requires intensive management and silvicultural practices. Many modern silvicultural techniques resemble those long practiced in agriculture. They include establishing, weeding, and thinning a desirable young stand; propagating the more productive species and genetic varieties; providing short rotations and complete fiber utilization; and controlling insects, diseases, and weeds. Even though timber crops require decades to grow, the goal of intensive forest management is similar to the goal of intensive agriculture. This goal is to produce the greatest yield of the most valuable crop as quickly as possible.

Commercial forests cover about 267,970 acres, or about 74 percent of the land area of Rutherford County *(19)*. According to the North Carolina Forest Service, private landowners own 186,848 acres; the forest industry and corporations, 80,524 acres; and the State and public, 598 acres. Commercial forest is land that is producing or is capable of producing crops of industrial wood and that has not been withdrawn from timber production. In Rutherford County, foresters encourage landowners to manage for pine instead of hardwoods on sites suited to pine (fig. 18). Quality pine can be produced more rapidly and in greater volume than quality hardwoods. Local markets for pulpwood add to the demand for quality pine. Although loblolly pine does not grow naturally in Rutherford County, it is the most important timber species in the Piedmont part of the county because it grows fast, is adapted to the soil and climate, and is easy to establish and manage. Foresters commonly recommend managing for white pine on suitable mountain soils at elevations above 1,500 feet.

For purposes of forest inventory, the predominant forest types identified in Rutherford County are as described in the following paragraphs *(4, 19)*.

White pine-hemlock. This forest type covers 3,975 acres. It is predominantly eastern white pine. Commonly included trees are hemlock, birch, and maple.

Loblolly-shortleaf. This forest type covers 97,976 acres. It is predominantly loblolly pine, shortleaf pine, or other kinds of southern yellow pine or a combination of these species. Commonly included trees are oak, hickory, and gum.

Oak-pine. This forest type covers 54,881 acres. It is predominantly hardwoods, usually upland oaks. Pine species make up 25 to 50 percent of the stand. Commonly included trees are gum, hickory, and yellow-poplar.

Oak-hickory. This forest type covers 99,211 acres. It is predominantly upland oaks and hickory, individually or in combination. Commonly included trees are yellow-poplar, elm, maple, and black walnut.

Oak-gum-cypress. This forest type covers 3,976 acres. It is bottom-land forest consisting predominantly of yellow-poplar, blackgum, sweetgum, oaks, or a combination of these species. Commonly included trees are cottonwood, willow, ash, elm, hackberry, and maple.

Figure 18.—Rows of loblolly pine on Cecil sandy clay loam, 2 to 8 percent slopes, eroded. Improved loblolly pine is commonly recommended for management on many of the soils in the Piedmont part of Rutherford County.

Elm-ash-cottonwood. This forest type covers 7,951 acres. It is predominantly elm, ash, cottonwood, or a combination of these species. Commonly included trees are willow, sycamore, beech, and maple.

One of the first steps in planning intensive woodland management is to determine the potential productivity of the soil for several alternative tree species. The most productive and valued trees are then selected for each soil type. Site and yield information enables a forest manager to estimate future wood supplies. These estimates are the basis of realistic decisions concerning expenses and profits associated with intensive woodland management, land acquisition, or industrial investments.

The potential productivity of woodland depends on physiography, soil properties, climate, and the effects of past management. Specific soil properties and site characteristics, including soil depth, texture, structure, and depth to the water table, affect forest productivity primarily by influencing available water capacity, aeration, and root development. The net effects of the interaction of these soil properties and site characteristics determine the potential site productivity.

Other site factors are also important. The gradient and length of slopes affect water movement and availability. In mountainous areas, elevation and aspect affect the amount of sunlight a site receives and the rate of evaporation. Sites on south-facing slopes are warmer and drier than those on north-facing slopes. The best sites are generally on north- and east-facing slopes in the lower areas, in sheltered coves, and in gently sloping concave areas. The amount of rainfall and length of growing season influence site productivity.

A knowledge of soils helps to provide a basic understanding of the distribution and growth of tree species on the landscape. For example, yellow-poplar grows well on deep or very deep, moist soils and scarlet oak or pine is common where the rooting depth is restricted or the moisture supply is limited.

Availability of water and nutrients and landscape position largely determine which tree species grow on a particular soil. For example, yellow-poplar and beech grow on soils that have a high moisture content. Chestnut oak grows on soils that have low fertility levels and a low moisture content. Pitch pine grows on soils that have very low fertility levels and a very low moisture content.

Soil serves as a reservoir for moisture, provides an anchor for roots, and supplies most of the available nutrients. These three qualities are directly or indirectly affected by organic matter content, reaction, fertility, drainage, texture, structure, depth, and landscape position. Elevation and aspect are of particular importance in mountainous areas.

The ability of a soil to serve as a reservoir for moisture, as measured by the available water capacity, is primarily influenced by texture, organic matter content, rooting depth, and content of rock fragments. Because of the fairly even and abundant summer rainfall in the survey area, available water capacity is a limitation affecting tree growth mainly in the upland soils that contain large amounts of rock fragments or have bedrock near the surface, such as Cliffield, Cliffside, and Cleveland soils.

The available supply of nutrients for tree growth is affected by several soil properties. Mineral horizons in the soil are important. Mineralization of humus releases nitrogen and other nutrients to plants. Calcium, magnesium, and potassium are held within the humus. Very small amounts of these nutrients are made available by the weathering of clay and silt particles. Most of the soils in the uplands have been leached and contain only small amounts of nutrients below the surface layer.

The living plant community is part of the nutrient reservoir. The decomposition of leaves, stems, and other organic material recycles the nutrients that have accumulated in the forest ecosystem. Fire, excessive trampling by livestock, and erosion can result in the loss of these nutrients. Forest management should include prevention of wildfires and protection from overgrazing.

This soil survey can be used by forest managers planning ways to increase the productivity of forest land. Some soils are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section “Detailed Soil Map Units,” the description of each map unit in the survey area suitable for timber includes information about productivity, limitations in harvesting timber, and management concerns in producing timber. Table 6 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of the major soil limitations to be considered in management.

Table 6 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare per year. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of the slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock, a hardpan, or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a high content of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: R, X, W, D, C, S, and F.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of moderate or severe indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of special equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, and susceptibility of the surface layer to compaction. As slope gradient and length increase, the use of wheeled equipment becomes more difficult. On the steeper slopes, tracked equipment is needed. On the steepest slopes, even tracked equipment cannot be operated and more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are so steep that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep that tracked equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize soil compaction. Ratings of moderate or severe indicate a need to choose the best suited equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of the death of the naturally occurring or properly planted seedlings of good stock in periods of normal rainfall, as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth to a high water table and the length of the period when the water table is high, rock fragments in the surface layer, rooting depth, and the aspect of the slope. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of moderate or severe indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations. Reinforcement planting is often needed if the risk is moderate or severe.

Ratings of *windthrow hazard* indicate the likelihood that trees will be uprooted by the wind. A restricted rooting depth is the main reason for windthrow. The rooting depth can be restricted by a high water table, a fragipan, by bedrock, or by a combination of such factors as soil wetness, texture, structure, and depth. The risk is *slight* if strong winds break trees but do not uproot them; *moderate* if strong winds blow a few trees over and break many trees; and *severe* if moderate or strong winds commonly blow trees over. Ratings of moderate or severe indicate that care is needed in thinning or that the stand should not be thinned at all. Special equipment may be needed to prevent damage to shallow root systems in partial cutting operations. A plan for the periodic removal of windthrown trees and the maintenance of a road and trail system may be needed.

The susceptibility to windthrow, or the uprooting of trees by the wind, is a problem on some soils in the survey area. These soils have a root-limiting layer within a depth of 40 inches or have a seasonal high water table. They include Ashe, Ashlar, Bethlehem, Chestnut, Chewacla, Cleveland, Cliffield, Cliffside, Cowee, Ostin, and Wehadkee soils.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. Plant competition is more severe on the more productive soils, on poorly drained soils, and on soils having a restricted root zone that holds moisture. The risk is *slight* if competition from undesirable plants hinders adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. The risk is *moderate* if competition from undesirable plants hinders natural or artificial reforestation to the extent that intensive site preparation and maintenance are needed. The risk is *severe* if competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and maintained. A moderate or severe rating indicates the need for site preparation to ensure the development of an adequately stocked stand. Managers should plan site preparation measures to ensure timely reforestation.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *volume of wood fiber* number. The predominant common trees are listed in table 6 in the order of their observed occurrence. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

For soils that are commonly used for timber production, the yield is predicted in cubic meters per hectare per year. It is predicted at the point where mean annual increment culminates. The estimates of the productivity of the soils in this survey are based mainly on loblolly pine, shortleaf pine, eastern white pine, and yellow-poplar *(3, 8, 9)*. Productivity is also based on site index data from chestnut oak and Virginia pine *(6, 13, 15)*.

The *site index* is determined by taking height measurements and determining the age of selected dominant or codominant trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years (50 years in this survey). This index applies to fully stocked, even-aged, unmanaged stands. Productivity of a site can be improved through management practices, such as ditching and planting genetically improved species.

The *volume of wood fiber* is the yield likely to be produced by the most important trees, expressed in cubic meters per hectare per year.

Suggested trees to manage are those that can be used for reforestation or, under suitable conditions, natural regeneration. They are suited to the soils and can produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation.

Recreation

Rutherford County offers a wide variety of opportunities for outdoor recreation. Developed facilities are scattered throughout the county and include ball fields, golf courses, parks, swimming pools, and camp sites. There are also numerous areas suitable for hunting, fishing, and horseback riding. The towns of Lake Lure and Chimney Rock in the Hickory Nut Gorge area are popular tourist destinations and offer hiking, boating, and scenic vistas in a mountain setting.

The soils of the survey area are rated in table 7 according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Fred Weisbecker, North Carolina Wildlife Officer, North Carolina Wildlife Resources Commission, helped prepare this section.

The soils of Rutherford County support a wide variety of vegetative communities and wildlife habitat. Existing land use patterns and water bodies support many species, including grouse, dove, quail, crow, peregrine falcon, white-tailed deer, squirrel, fox, raccoon, rabbit, mink, otter, muskrat, opossum, and ground hog. Black bear occasionally are found in the county. Wild turkey and otter have been reintroduced into Rutherford County. The interspersing of cropland, idle fields, utility right-of-ways, and borders of hardwood-pine forest provide abundant edge areas which are important to many wildlife species.

Rutherford County has numerous lakes, ponds, creeks, and rivers, which offer a wide variety of fish, including both warm- and cold-water species such as trout, bass, bluegill, and catfish.

Soils such as Wehadkee and Worsham soils support wetland vegetation and are very important to a wide variety of amphibian, reptile, and mammal species. Management of small wetlands helps to maintain adequate populations of the species which use them.

Wildlife populations in Rutherford County are currently high and should remain so as long as current land use patterns are not drastically altered. Because most of the land in Rutherford County is privately owned, much of the initiative for management and improvement of wildlife habitat depends on private individuals. Additional information about wildlife and assistance in managing wildlife habitat can be obtained through the North Carolina Wildlife Resources Commission.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat. The ratings in table 8 are intended to be used as a guide and are not site specific. Onsite investigation is needed for individual management plans.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are goldenrod, beggarweed, ragweed, and pokeberry.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, yellow-poplar, black cherry, sweetgum, apple, hawthorn, dogwood, and hickory. Examples of fruit-producing shrubs that are suitable for planting on soils rated good are blackberry, blueberry, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, hemlock, and cedar.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the root zone, available water capacity, and soil moisture. Examples of shrubs are mountain laurel, mountainmahogany, snowberry, lowbush blueberry, and highbush blueberry.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, ferns, arrow-arum, wetland grasses, cattail, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are waterfowl feeding areas and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, and areas that are overgrown with grasses, herbs, shrubs, and vines (fig. 19). These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, white-tailed deer, and black bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the “Soil Properties” section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

Figure 19.—A logging road in a clearcut area of Pacolet-Bethlehem complex, 8 to 15 percent slopes, eroded. The establishment and maintenance of perennial and annual grasses on this logging road help to control runoff and erosion and improve the potential for wildlife habitat.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm, dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. Depth to a high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established. Soil tests are essential to determine liming and fertilizer needs. Help in making soil tests or in deciding what soil additive, if any, should be used can be obtained from the office of the Rutherford County Soil and Water Conservation District or the local office of the North Carolina Cooperative Extension Service.

Sanitary Facilities

Table 10 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. The animal waste lagoons commonly used in farming operations are not considered in the ratings. They are generally deeper than the lagoons referred to in the table and rely on anaerobic bacteria to decompose waste materials.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope or bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow pit must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* have more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale, siltstone, and weathered granite saprolite, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow pit.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow pit is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area. Ponds that are less than about 2 acres in size are not shown on the maps because of the scale of mapping.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, and mica. Depth to a high water table affects the amount of usable material. It also affects trafficability.

Soils that have a high content of mica, such as Fannin, Grover, and Madison soils, are poorly suited to use in the construction of embankments. The problems resulting from the high content of mica include difficulty in compaction, poor trafficability, susceptibility to erosion, and low shear strength. Also, piping commonly is a problem if the soil material is used to impound water.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table and permeability of the aquifer. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity. Availability of drainage outlets is not considered in the ratings.

Drainage may be a major management consideration in some areas. Management of drainage in conformance with regulations influencing wetlands may require special permits and extra planning. The local office of the Natural Resources Conservation Service should be contacted for identification of hydric soils and potential wetlands.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the availability of suitable irrigation water, the depth of the root zone, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed *(21)*. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading “Soil Series and Their Morphology.”

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages, by weight, of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. “Loam,” for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, by volume, an appropriate modifier is added, for example, “gravelly.” Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical and Chemical Properties

Tables 14 and 15 show estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 14, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. This term has traditionally been used in soil surveys to indicate saturated hydraulic conductivity (Ksat). The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time. It is the difference between the amount of soil water at field moisture capacity and the amount at wilting point.

Linear extensibility, expressed as a percent, is the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state ($^1/_3$- or $^1/_{10}$-bar water content to oven dryness). The volume change is reported as percent change for the whole soil. Linear extensibility is used to determine shrink-swell potential classes for soils. If the soil has a linear extensibility of less than 3 percent, the shrink-swell potential is low; 3 to 6 percent, the shrink-swell potential is moderate; 6 to 9 percent, the shrink-swell potential is high; and more than 9 percent, the shrink-swell potential is very high.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. The soils assigned to group 1 are the most susceptible to soil blowing, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to soil blowing because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility to soil blowing, or the tons per acre per year than can be expected to be lost to soil blowing. There is a close correlation between soil blowing and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence soil blowing.

In table 15, *cation-exchange capacity* is the total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low ion-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. Soils having a high cation-exchange capacity can retain cations. The ability to retain cations helps to prevent the pollution of ground water.

Effective cation-exchange capacity is the sum of extractable bases plus aluminum and is used for soils that have pH of less than 5.5. It is a measure of cation-exchange capacity that is particularly useful for soils whose ion-exchange capacity is largely a result of variable charge components, such as allophane, kaolinite, hydrous iron and aluminum oxides, and organic matter. In these soils, the cation-exchange capacity is not a fixed number but a function of pH.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the fraction of the soil less than 2 millimeters in size. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization.

Soil and Water Features

Table 16 and 17 give estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. In table 16, soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep or very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to very deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Water table (high) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in table 16 are the upper and lower limits of the high water table for each month. A water table that is seasonally high for less than 1 month is not indicated in table 16.

Two numbers in the column showing the upper limit of the high water table indicate the normal range in depth to a saturated zone. Numbers in the column showing the lower limit indicate the depth to the base of the water table. Depth is given to the nearest half foot. The first numeral in the range in the column showing the upper limit indicates the highest water level. A plus sign preceding the range in depth in this column indicates that the water table is above the surface of the soil. “More than 5.0” in this column indicates that the water table is below a depth of 5 feet or that it is within a depth of 5 feet for less than a month. “More than 5.0” in the column showing the lower limit indicates that the base of the water table is below a depth of 5 feet.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 16 gives the frequency and duration of flooding for each month. Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable; *rare* that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); and *frequent* that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

In table 17, a *restrictive layer* is described if it occurs within a depth of 5 feet. The depth of the layer is based on many soil borings and on observations during soil mapping. If the restrictive layer is rock, the rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either dessication and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 17 shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors. Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate*, or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low, moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(23)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 18 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol.* An example is Ultisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid climate, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizon development, plus *udult*, the suborder of the Ultisols that occurs in humid climates).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, micaceous, thermic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the underlying material within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The location of the typical pedon is described, and coordinates generally are identified by longitude and latitude. The detailed description of each soil horizon follows standards in the “Soil Survey Manual” *(24)*. Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” *(23)* and in “Keys to Soil Taxonomy” *(25)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section “Detailed Soil Map Units.”

Appling Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum that weathered mainly from high-grade metamorphic rock, such as biotite gneiss
Landscape: Piedmont
Landform: Divides
Landform position: Summits, side slopes, and foot slopes
Slope range: 1 to 12 percent
Taxonomic class: Fine, kaolinitic, thermic Typic Kanhapludults

Associated Soils

- Cecil soils on summits
- Pacolet soils on summits and side slopes
- Helena and Worsham soils on adjacent foot slopes

Typical Pedon

Appling sandy loam, 1 to 6 percent slopes; about 1.5 miles southeast of Ellenboro on U.S. Highway 74, about 50 feet south of the highway, in cropland; at an elevation of 955 feet; USGS Boiling Springs, NC topographic quadrangle; lat. 35 degrees 18 minutes 24 seconds N. and long. 81 degrees 48 minutes 34 seconds W.

Ap—0 to 10 inches; brown (10YR 4/3) sandy loam; weak medium granular structure; very friable; few fine roots; slightly acid; clear smooth boundary.
Bt1—10 to 35 inches; yellowish brown (10YR 5/8) clay; moderate medium subangular blocky structure; firm; sticky, plastic; few distinct clay films on faces of peds; moderately acid; gradual wavy boundary.
Bt2—35 to 48 inches; yellowish brown (10YR 5/8) clay; few coarse prominent yellowish red (5YR 5/8) and red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; sticky, plastic; few distinct clay films on faces of peds; few fine flakes of mica; moderately acid; gradual wavy boundary.
BC—48 to 65 inches; yellowish red (5YR 5/6), yellowish brown (10YR 5/8), and red (2.5YR 4/8) clay loam; few pockets of sandy clay loam saprolite; weak medium subangular blocky structure; friable; sticky, plastic; few fine flakes of mica; strongly acid.

Range in Characteristics

Thickness of solum: 40 to more than 72 inches
Depth to bedrock: More than 60 inches

Content and size of rock fragments: 0 to 15 percent, by volume, in the A horizon and 0 to 10 percent in the lower horizons; dominantly gravel
Reaction: Strongly acid or very strongly acid; ranging to slightly acid in the upper part of limed soils

Ap horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 6
Texture—sandy loam

BA horizon (if it occurs):
Color—hue of 5YR to 10YR, value of 5 or 6, and chroma of 3 to 8
Texture—sandy clay loam

Bt horizon:
Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8
Mottles—few to many in shades of red, yellow, or brown
Texture—clay, sandy clay, or clay loam

BC horizon:
Color—horizon is similar in color to the Bt horizon or is mottled
Mottles—common or many in shades of red, yellow, or brown
Texture—clay loam or sandy clay loam

C horizon (if it occurs):
Color—horizon is similar in color to the BC horizon or is multicolored
Texture—saprolite having loamy textures

Ashe Series

Depth class: Moderately deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Parent material: Residuum and soil creep that weathered mainly from intrusive and high-grade metamorphic rock, such as biotite gneiss and granitic gneiss
Landscape: Mountains
Landform: Rocky escarpments
Landform position: Side slopes and summits away from areas of Rock outcrop
Slope range: 15 to 30 percent and 50 to 95 percent
Taxonomic class: Coarse-loamy, mixed, semiactive, mesic Typic Dystrochrepts

Associated Soils

- Cleveland, Edneyville, Chestnut, Evard, and Cowee soils on summits and side slopes
- Tate, Greenlee, and Toecane soils on adjacent foot slopes and toe slopes

Typical Pedon

Ashe gravelly sandy loam in an area of Ashe-Cleveland-Rock outcrop complex, 50 to 95 percent slopes; 12.3 miles west of Rutherfordton on U.S. Highway 64, about 4.5 miles north on Secondary Road 1008, about 4.0 miles northwest on Secondary Road 1312, about 1.0 mile east on an access road, 150 feet west of the road, in woodland; at an elevation of 1,760 feet; USGS Moffitt Hill, NC topographic quadrangle; lat. 35 degrees 30 minutes 10 seconds N. and long. 82 degrees 09 minutes 11 seconds W.

Oi—3 inches to 1 inch; slightly decomposed deciduous litter.
Oe—1 inch to 0; moderately decomposed deciduous litter.

A—0 to 5 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam; weak medium granular structure; very friable; many fine, medium, and coarse roots; 20 percent, by volume, gravel, 5 percent cobbles, and 5 percent stones; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bw—5 to 22 inches; dark yellowish brown (10YR 4/4) gravelly coarse sandy loam; weak medium subangular blocky structure; very friable; common fine, medium, and coarse roots; 20 percent, by volume, gravel and 10 percent cobbles; few fine flakes of mica; strongly acid; gradual wavy boundary.

C—22 to 28 inches; brown (10YR 5/3) gravelly loamy coarse sand; massive; very friable; few fine and medium roots; 25 percent, by volume, gravel; few fine flakes of mica; strongly acid; abrupt smooth boundary.

R—28 inches; hard granitic gneiss bedrock.

Range in Characteristics

Thickness of solum: 14 to 40 inches

Depth to bedrock: 20 to 40 inches to hard bedrock (fig. 20)

Content and size of rock fragments: 15 to 50 percent, by volume, in the A horizon and 5 to 35 percent in the lower horizons; dominantly ranging from gravel to stones

Figure 20.—A profile of Ashe soils. These moderately deep soils weathered mostly from high-grade metamorphic rock. The bedrock is at a depth of about 2 feet.

Reaction: Moderately acid to very strongly acid

A horizon:
Color—hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 to 6
Texture—gravelly sandy loam

Bw horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8
Texture—loam, fine sandy loam, sandy loam, or coarse sandy loam in the fine-earth fraction

C horizon:
Color—horizon is similar in color to the Bw horizon or is multicolored
Texture—saprolite having variable textures that range from sandy loam to loamy coarse sand in the fine-earth fraction

Cr horizon (if it occurs):
Texture—soft, weathered gneiss or granitic gneiss bedrock that can be dug with difficulty using hand tools

R layer:
Texture—hard, high-grade metamorphic rock, such as biotite gneiss or granitic gneiss bedrock, that cannot be dug using hand tools

Ashlar Series

Depth class: Moderately deep
Drainage class: Excessively drained
Permeability: Moderately rapid
Parent material: Residuum and soil creep that weathered mainly from intrusive and high-grade metamorphic rock, such as granitic gneiss and biotite gneiss
Landscape: Piedmont
Landform: Divides
Landform position: Summits and side slopes adjacent to areas of Rock outcrop
Slope range: 2 to 15 percent and 45 to 70 percent
Taxonomic class: Coarse-loamy, mixed, semiactive, thermic Typic Dystrochrepts

Associated Soils

- Rion and Grover soils on side slopes
- Pacolet and Madison soils on summits and side slopes

Typical Pedon

Ashlar gravelly sandy loam in an area of Rion-Ashlar-Rock outcrop complex, 45 to 70 percent slopes; about 8.9 miles east of Chimney Rock on U.S. Highway 64, about 50 feet north of the road, in woodland; at an elevation of 842 feet; USGS Lake Lure, NC topographic quadrangle; lat. 35 degrees 25 minutes 11 seconds N. and long. 82 degrees 07 minutes 45 seconds W.

Oi—2 inches to 0; slightly decomposed deciduous and coniferous litter.
A—0 to 5 inches; brown (10YR 4/3) gravelly sandy loam; weak fine granular structure; very friable; many fine and medium and common coarse roots; 15 percent, by volume, gravel and 5 percent stones; few fine flakes of mica; very strongly acid; clear smooth boundary.
Bw1—5 to 17 inches; dark yellowish brown (10YR 4/6) sandy loam; weak fine subangular blocky structure; very friable; common fine, medium, and coarse roots; 10 percent, by volume, gravel; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bw2—17 to 27 inches; yellowish brown (10YR 5/6) gravelly sandy loam; weak medium subangular blocky structure; friable; common fine, medium, and coarse roots; 25 percent, by volume, gravel; few fine flakes of mica; strongly acid; clear wavy boundary.
Cr—27 to 32 inches; soft, weathered biotite gneiss bedrock; clear wavy boundary.
R—32 inches; hard biotite gneiss bedrock.

Range in Characteristics

Thickness of solum: 10 to 38 inches
Depth to bedrock: 20 to 40 inches to hard bedrock
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 0 to 30 percent in the lower horizons; dominantly gravel
Reaction: Moderately acid to very strongly acid in the A and E horizons; strongly acid to extremely acid in the B and C horizons

A horizon:
Color—hue of 10YR to 2.5Y, value of 3 to 6, and chroma of 2 to 4
Texture—gravelly sandy loam

Bw horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—sandy loam or fine sandy loam in the fine-earth fraction

C horizon (if it occurs):
Color—horizon is similar in color to the Bw horizon or is multicolored
Texture—saprolite having loamy textures in the fine-earth fraction

Cr horizon:
Texture—soft, weathered gneiss or granitic gneiss bedrock that can be dug with difficulty using hand tools

R layer:
Texture—hard, high-grade metamorphic rock, such as gneiss or granitic gneiss bedrock, that cannot be dug using hand tools

Bandana Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately rapid in the upper part; rapid or very rapid in the lower part
Parent material: Recent alluvium from mixed geologic sources
Landscape: Mountains
Landform: Narrow flood plains along streams that flow from mountain coves
Landform position: Planar to slightly concave slopes away from the stream channel
Slope range: 0 to 3 percent
Taxonomic class: Coarse-loamy, mixed, active, nonacid, mesic Aeric Fluvaquents

Associated Soils

- Ostin soils on flood plains
- Tate and Greenlee soils on adjacent foot slopes and toe slopes

Typical Pedon

Bandana sandy loam in an area of Bandana-Ostin complex, 0 to 3 percent slopes, occasionally flooded; about 11.8 miles northeast of Ruth on U.S. Highway 64, about 4.8 miles east on Secondary Road 1700, about 2.7 miles southeast on N.C. Highway 226, about 1.0 mile northeast on Secondary Road 1733, about 3.4 miles northeast on

Secondary Road 1732, about 250 feet east of the road, in woodland; at an elevation of 1,420 feet; USGS Benn Knob, NC topographic quadrangle; lat. 35 degrees 33 minutes 49 seconds N. and long. 81 degrees 43 minutes 07 seconds W.

Oi—2 inches to 0; slightly decomposed deciduous leaf litter.

Ap—0 to 6 inches; brown (10YR 4/3) sandy loam; moderate medium granular structure; very friable; common fine and medium roots; few fine flakes of mica; 5 percent, by volume, gravel; strongly acid; clear smooth boundary.

Bw1—6 to 9 inches; brown (10YR 5/3) sandy loam; weak fine subangular blocky structure; very friable; few fine roots; common fine flakes of mica; 5 percent, by volume, gravel; many medium and coarse distinct brown (7.5YR 5/4) masses of iron accumulation and common medium faint grayish brown (10YR 5/2) iron depletions; strongly acid; clear smooth boundary.

Bw2—9 to 17 inches; light olive brown (2.5Y 5/4) sandy loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; 5 percent, by volume, gravel and 5 percent cobbles; many medium and coarse prominent brown (7.5YR 5/4) masses of iron accumulation; strongly acid; clear smooth boundary.

Cg—17 to 24 inches; light olive gray (5Y 6/2) loamy sand; single grained; loose; common fine flakes of mica; 5 percent, by volume, gravel; common fine distinct yellowish brown (10YR 5/6) and common medium and coarse distinct brown (7.5YR 5/4) masses of iron accumulation; strongly acid; clear smooth boundary.

C—24 to 60 inches; very gravelly coarse sand that is multicolored in shades of brown, olive, yellow, and gray; single grained; loose; common fine flakes of mica; 45 percent, by volume, gravel and 10 percent cobbles; strongly acid.

Range in Characteristics

Thickness of solum: 10 to 30 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 0 to 34 percent, by volume, in the A, Bw, and Cg horizons and more than 35 percent in the C horizon; mostly gravel and cobbles
Depth to layers with 35 percent or more rock fragments: 20 to 40 inches
Reaction: Slightly acid to strongly acid

A horizon:
Color—hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 3 to 6
Texture—sandy loam

Bw horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8
Texture—sandy loam, coarse sandy loam, loamy coarse sand, loamy sand, loamy fine sand, fine sandy loam, or loam in the fine-earth fraction
Redoximorphic features—iron depletions within a depth of 20 inches and in shades of gray or brown and masses of iron accumulation in shades of red, yellow, olive, or brown

Cg horizon:
Color—horizon has hue of 7.5YR to 5Y, value of 4 or 7, and chroma of 1 or 2 or is neutral in hue and has value of 3 to 8
Texture—similar to the Bw horizon
Redoximorphic features—iron depletions in shades of gray and masses of iron accumulation in shades of red, yellow, olive, or brown

C horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8
Texture—coarse sand, sand, fine sand, loamy coarse sand, loamy sand, or loamy fine sand in the fine-earth fraction

Bethlehem Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum that weathered mainly from high-grade metamorphic rock, such as sillimanite schist and mica schist
Landscape: Piedmont
Landform: Divides
Landform position: Convex summits and side slopes
Slope range: 2 to 25 percent
Taxonomic class: Fine, kaolinitic, thermic Typic Kanhapludults

Associated Soils

- Pacolet and Saw soils on summits and side slopes
- Rion and Cliffside soils on side slopes

Typical Pedon

Bethlehem gravelly sandy clay loam in an area of Pacolet-Bethlehem complex, 8 to 15 percent slopes, eroded; about 2.8 miles southeast of Hollis on Secondary Road 1753, about 0.7 mile west on Secondary Road 1757, about 200 feet north, in woodland; at an elevation of 1,120 feet; USGS Polkville, NC topographic quadrangle; lat. 35 degrees 24 minutes 25 seconds N. and long. 81 degrees 42 minutes 42 seconds W.

Ap—0 to 7 inches; brown (7.5YR 4/4) gravelly sandy clay loam; weak medium granular structure; friable; few fine flakes of mica; few fine roots; 23 percent, by volume, gravel; very strongly acid; clear smooth boundary.
Bt—7 to 24 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; sticky, plastic; few fine roots; common distinct clay films on faces of peds; 10 percent, by volume, gravel; common fine flakes of mica; very strongly acid; gradual wavy boundary.
BC—24 to 33 inches; yellowish red (2.5YR 4/6) gravelly sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; few fine roots; 20 percent, by volume, gravel; common fine and medium flakes of mica; very strongly acid; abrupt wavy boundary.
Cr—33 to 60 inches; soft, weathered sillimanite schist or mica schist; few thin interlayers of hard bedrock; few tongues and thin coatings of material from Bt horizon in fractures.

Range in Characteristics

Thickness of solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches to soft, weathered bedrock; 40 inches or more to hard bedrock (fig. 21)
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 0 to 35 percent in the lower horizons; dominantly gravel or cobbles
Reaction: Strongly acid or very strongly acid; ranging to slightly acid in the upper part of limed soils

Ap horizon:
Color—hue of 5YR to 7.5YR, value of 3 to 5, and chroma of 4 or 6
Texture—gravelly sandy clay loam

BA horizon (if it occurs):
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 6 to 8

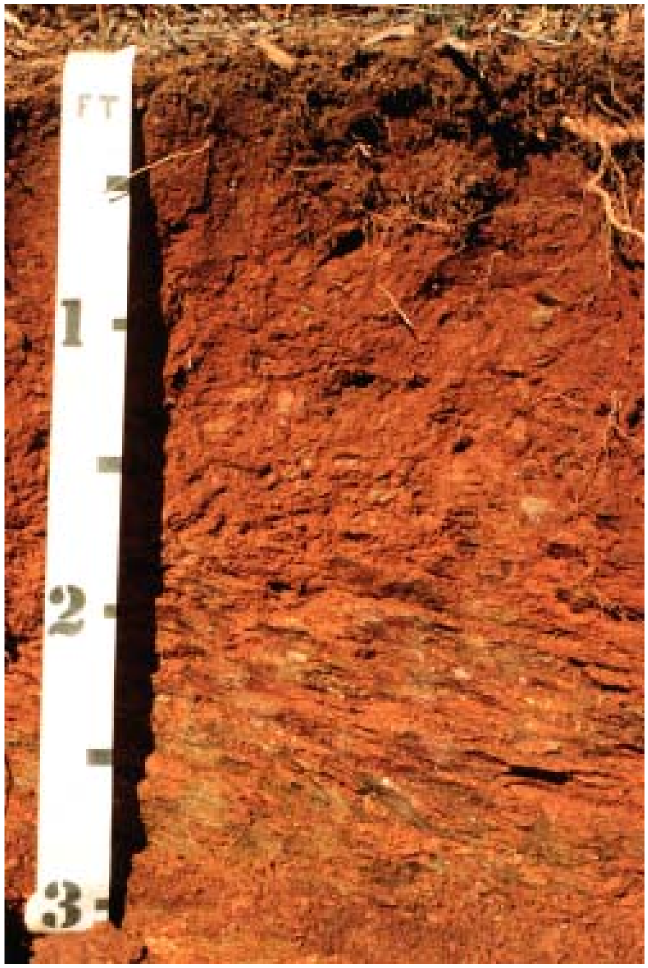

Figure 21.—A profile of Bethlehem soils. These soils have soft weathered sillimanite schist bedrock at a depth of 20 to 40 inches. The rock can be dug by hand tools. Its hardness generally increases as depth increases.

Texture—sandy clay loam or clay loam in the fine-earth fraction

Bt horizon:

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8
Texture—clay or clay loam in the fine-earth fraction

BC horizon:

Color—hue of 2.5YR to 5YR, value of 4 or 5, and chroma of 6 or 8
Texture—clay loam or sandy clay loam in the fine-earth fraction

C horizon (if it occurs):

Color—horizon is similar in color to the BC horizon or is multicolored
Texture—saprolite having loamy textures in the fine-earth fraction

Cr horizon:

Texture—soft, weathered sillimanite schist and mica schist bedrock that can be dug with difficulty using hand tools

Buncombe Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Rapid or very rapid
Parent material: Recent alluvium from mixed geologic sources (fig. 22)
Landscape: Piedmont
Landform: Flood plains
Landform position: Planar to slightly convex slopes
Slope range: 0 to 5 percent
Taxonomic class: Mixed, thermic Typic Udipsamments

Associated Soils

- Chewacla, Toccoa, and Wehadkee soils on flood plains
- Skyuka and Dogue soils on adjacent low stream terraces

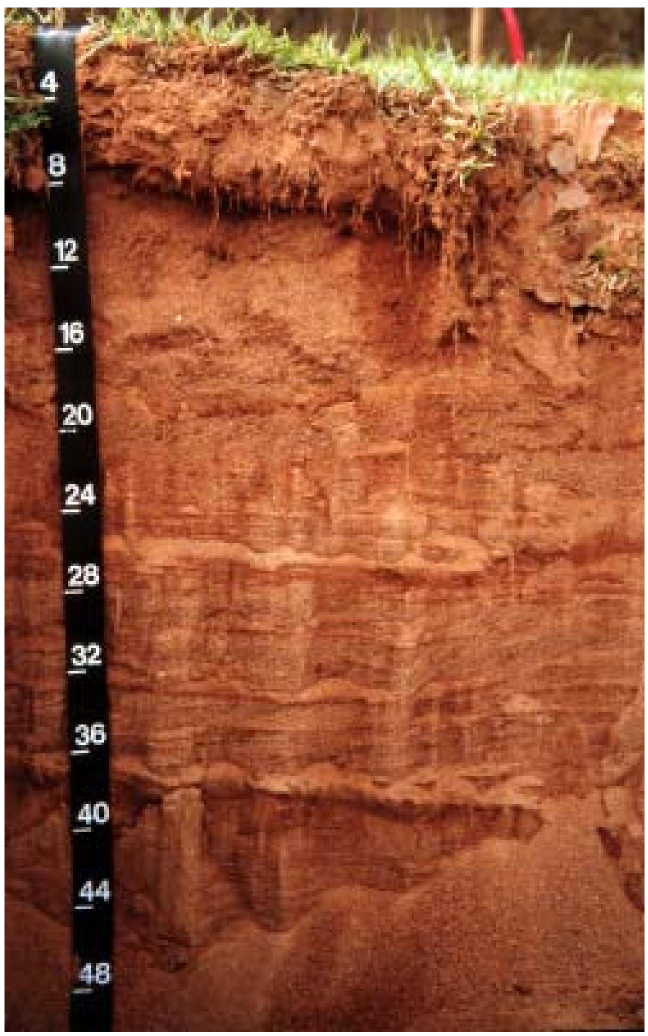

Figure 22.—A profile of Buncombe soils. These soils are sandy and very deep. They formed in layers of recently deposited alluvium. These layers are clearly visible below a depth of 24 inches.

Typical Pedon

Buncombe loamy sand, 0 to 5 percent slopes, occasionally flooded; about 3.6 miles west of Rutherfordton on Secondary Road 1178, about 0.4 mile west on Secondary Road 1167, about 0.6 mile south on Secondary Road 1159, about 3,400 feet southwest, in a cultivated field; at an elevation of 780 feet; USGS Pea Ridge, NC topographic quadrangle; lat. 35 degrees 21 minutes 01 second N. and long. 82 degrees 01 minute 33 seconds W.

Ap—0 to 9 inches; dark yellowish brown (10YR 4/6) loamy sand; weak fine granular structure; very friable; few fine and medium roots; common fine flakes of mica; very strongly acid; clear smooth boundary.

C1—9 to 15 inches; yellowish brown (10YR 5/6) sand; single grained; loose; few fine roots; common fine flakes of mica; strongly acid; clear smooth boundary.

C2—15 to 46 inches; light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/8) sand; single grained; loose; common fine flakes of mica; moderately acid; clear smooth boundary.

C3—46 to 62 inches; dark yellowish brown (10YR 4/6) sandy loam; massive; very friable; common fine flakes of mica; very strongly acid.

Range in Characteristics

Depth to bedrock: More than 120 inches
Content and size of rock fragments: 0 to 5 percent, by volume, throughout the profile; dominantly gravel
Reaction: Slightly acid to very strongly acid

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 3 or 5, and chroma of 2 to 6
Texture—loamy sand

C horizon:
Color—hue of 5YR to 2.5Y and value and chroma of 3 to 8
Texture—sand, loamy sand, or loamy fine sand; stratified loamy and sandy material typically occurs below a depth of 40 inches
Redoximorphic features (if they occur)—few and random iron depletions in shades of gray below a depth of 40 inches

Cecil Series

Depth class: Very deep (fig. 23)
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum that weathered mainly from high-grade metamorphic rock, such as biotite gneiss and migmatitic gneiss
Landscape: Piedmont
Landform: Divides
Landform position: Summits
Slope range: 2 to 8 percent
Taxonomic class: Fine, kaolinitic, thermic Typic Kanhapludults

Associated Soils

- Appling, Pacolet, and Madison soils on summits and side slopes
- Helena soils on adjacent foot slopes and toe slopes

Figure 23.—A profile of Cecil soils. These soils formed in high-grade metamorphic rock. They are very deep and clayey and have a red subsoil.

Typical Pedon

Cecil sandy clay loam, 2 to 8 percent slopes, eroded; about 0.5 mile southeast of Ellenboro on U.S. Highway 74, about 0.4 mile south of the highway, in cropland; at an elevation of 944 feet; USGS Boiling Springs, NC topographic quadrangle; lat. 35 degrees 18 minutes 33 seconds N. and long. 81 degrees 44 minutes 40 seconds W.

Ap—0 to 8 inches; reddish brown (5YR 4/4) sandy clay loam; moderate medium granular structure; friable; few fine and medium roots; slightly acid; clear smooth boundary.

Bt1—8 to 18 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm; sticky, plastic; common distinct clay films on faces of peds; few fine flakes of mica; few fine roots; slightly acid; gradual wavy boundary.

Bt2—18 to 39 inches; red (2.5YR 4/8) clay; few prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; sticky, plastic; few distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt3—39 to 52 inches; red (2.5YR 4/8) clay loam; few fine distinct yellowish red (5YR 5/6) mottles; moderate medium subangular blocky structure; firm; sticky, plastic; few faint clay films on faces of peds; strongly acid; gradual wavy boundary.

BC—52 to 68 inches; red (2.5YR 4/8) clay loam; few distinct pockets of reddish yellow (5YR 6/6) sandy clay loam saprolite; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; common fine flakes of mica; very strongly acid.

Range in Characteristics

Thickness of solum: 46 to more than 78 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 0 to 15 percent, by volume, in the A horizon and 0 to 10 percent in the lower horizons; dominantly gravel
Reaction: Strongly acid or very strongly acid; ranging to slightly acid in the upper part of limed soils

Ap horizon:
Color—hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 4 to 8
Texture—sandy clay loam

Bt horizon:
Color—hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8
Mottles (if they occur)—few and random; in shades of yellow or brown
Texture—clay or clay loam

BC horizon:
Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 4 to 8
Mottles (if they occur)—few and random; in shades of yellow or brown
Texture—clay loam or sandy clay loam

C horizon (if it occurs):
Color—horizon is similar in color to the BC horizon or is multicolored
Texture—saprolite having loamy textures

Chestnut Series

Depth class: Moderately deep (fig. 24)
Drainage class: Well drained
Permeability: Moderately rapid
Parent material: Residuum and soil creep that weathered mainly from intrusive rock, such as biotite gneiss and granitic gneiss
Landscape: Mountains
Landform: Divides
Landform position: Convex summits and side slopes
Slope range: 15 to 85 percent
Taxonomic class: Coarse-loamy, mixed, active, mesic Typic Dystrochrepts

Associated Soils

- Edneyville, Evard, Cowee, Ashe, and Cleveland soils on summits and side slopes
- Tate, Greenlee, and Toecane soils on adjacent foot slopes and toe slopes

Typical Pedon

Chestnut gravelly sandy loam in an area of Edneyville-Chestnut complex, 15 to 30 percent slopes, very stony; about 12.3 miles west of Rutherfordton on U.S. Highway 64, about 4.5 miles northeast on Secondary Road 1312, about 1.5 miles southwest on Secondary Road 1314, about 2.8 miles west on a logging road to Mount Pleasant

Figure 24.—A profile of Chestnut soils. These moderately deep soils formed in high-grade metamorphic rock. The subsoil is brown and loamy.

Cemetery on the Buncombe County line, 2,500 feet northeast on the logging road, 2 feet north of the road, in woodland; at an elevation of 2,760 feet; USGS Moffitt Hill, NC topographic quadrangle; lat. 35 degrees 30 minutes 36 seconds N. and long. 82 degrees 12 minutes 53 seconds W.

Oi—2 inches to 0; slightly decomposed deciduous litter.

A—0 to 3 inches; dark brown (10YR 3/3) gravelly sandy loam; weak medium granular structure; very friable; many fine, medium, and coarse roots; 20 percent, by volume, gravel, 5 percent cobbles, and 5 percent stones; few fine flakes of mica; strongly acid; clear smooth boundary.

Bw—3 to 17 inches; strong brown (7.5YR 4/6) gravelly sandy loam; weak medium subangular blocky structure; very friable; many fine and medium and common coarse roots; 20 percent, by volume, gravel and 5 percent cobbles; few fine and medium flakes of mica; strongly acid; gradual wavy boundary.

BC—17 to 23 inches; brown (7.5YR 5/4) gravelly sandy loam; weak medium subangular blocky structure; very friable; common fine and medium and few coarse roots; 20 percent, by volume, gravel and 5 percent cobbles; few fine and medium flakes of mica; strongly acid; gradual wavy boundary.

C—23 to 28 inches; gravelly loamy sand saprolite that is multicolored in shades of brown, yellow, and gray; massive; very friable; few fine and medium and few coarse roots; 20 percent, by volume, gravel; few fine and medium flakes of mica; strongly acid; gradual wavy boundary.
Cr—28 to 42 inches; soft, weathered granitic gneiss bedrock.
R—42 inches; hard granitic gneiss bedrock.

Range in Characteristics

Thickness of solum: 15 to 39 inches
Depth to bedrock: 20 to 40 inches to soft, weathered bedrock; typically 40 to 60 inches to hard bedrock
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 5 to 35 percent in the lower horizons; dominantly gravel and cobbles
Reaction: Moderately acid to extremely acid

A horizon:
Color—hue of 7.5YR to 2.5Y and value and chroma of 2 to 6; where horizon has value and chroma of 2 or 3, it is less than 7 inches thick
Texture—gravelly sandy loam

Bw horizon:
Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8
Texture—sandy loam, loam, or fine sandy loam in the fine-earth fraction

C horizon:
Color—horizon is similar in color to the Bw horizon or is multicolored
Texture—saprolite having variable textures that range from loam to loamy sand in the fine-earth fraction

Cr horizon:
Texture—soft, weathered biotite gneiss or granitic gneiss bedrock that can be dug with difficulty using hand tools

R layer:
Texture—hard, high-grade metamorphic rock, such as biotite gneiss or granitic gneiss bedrock, that cannot be dug using hand tools

Chewacla Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Parent material: Recent alluvium from mixed geologic sources
Landscape: Piedmont
Landform: Flood plains
Landform position: Planar to slightly concave slopes
Slope range: 0 to 2 percent
Taxonomic class: Fine-loamy, mixed, semiactive, thermic Fluvaquentic Dystrochrepts

Associated Soils

- Toccoa, Buncombe, and Wehadkee soils on flood plains
- Skyuka soils on adjacent low terraces and foot slopes
- Dogue soils on adjacent low stream terraces and toe slopes

Typical Pedon

Chewacla loam, 0 to 2 percent slopes, occasionally flooded; about 6.7 miles northeast of Ruth on U.S. Highway 64, about 0.9 mile southeast on Secondary Road 1007, about 100 feet southwest of the road, in cropland; at an elevation of 870 feet; USGS Rutherfordton North, NC topographic quadrangle; lat. 35 degrees 26 minutes 33 seconds N. and long. 81 degrees 52 minutes 45 seconds W.

Ap—0 to 8 inches; brown (7.5YR 4/4) loam; moderate medium granular structure; very friable; few fine and medium roots; common fine flakes of mica; slightly acid; clear smooth boundary.

Bw1—8 to 16 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable; few fine roots; common fine flakes of mica; common fine distinct brown (10YR 5/3) iron depletions; slightly acid; clear smooth boundary.

Bw2—16 to 21 inches; brown (7.5YR 4/4) clay loam; few thin lenses of yellowish red (5YR 4/6) sandy loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; few fine roots; common fine flakes of mica; common fine distinct brown (10YR 5/3) iron depletions; slightly acid; gradual wavy boundary.

Bw3—21 to 34 inches; strong brown (7.5YR 4/6) clay loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; common fine flakes of mica; common medium distinct grayish brown (10YR 5/2) iron depletions; slightly acid; gradual wavy boundary.

BC—34 to 48 inches; brown (10YR 5/3) loam; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; common fine flakes of mica; common coarse distinct grayish brown (10YR 5/2) iron depletions and few fine prominent yellowish red (5YR 5/6) masses of iron accumulation; moderately acid; gradual wavy boundary.

Cg—48 to 61 inches; gray (10YR 5/1) loam; massive; friable; common fine flakes of mica; few coarse distinct strong brown (7.5YR 5/6) masses of iron accumulation; moderately acid.

Range in Characteristics

Thickness of solum: 15 to 70 inches

Depth to bedrock: More than 60 inches

Content and size of rock fragments: 0 to 5 percent, by volume, in the A and B horizons, 0 to 15 percent in the C horizon to a depth of 40 inches, and 0 to 65 percent in horizons below a depth of 40 inches; dominantly gravel

Reaction: Slightly acid to very strongly acid within a depth of 40 inches; mildly alkaline to very strongly acid below a depth of 40 inches

A horizon:

Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 to 4

Texture—loam

Bw horizon:

Color—hue of 5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8

Texture—loam, sandy clay loam, sandy loam, fine sandy loam, clay loam, silt loam, or silty clay loam

Redoximorphic features—few or common iron depletions within a depth of 24 inches and in shades of gray or brown; masses of iron accumulation in shades of brown, yellow, or red

Bg horizon (if it occurs):

Color—horizon has hue of 10YR or 2.5Y or is neutral in hue, has value of 4 to 7, and has chroma of 0 or 2

Texture—similar to the Bw horizon

BC horizon:
Color—similar to the Bw horizon
Texture—similar to the Bw horizon

BCg horizon (if it occurs):
Color—similar to the Bg horizon
Texture—similar to the Bg horizon

Ab horizon (if it occurs):
Color—horizon has hue of 7.5YR to 2.5Y or is neutral in hue, has value of 3 or 4, and has chroma of 0 or 2
Texture—loam, sandy loam, fine sandy loam, or silt loam

Cg or C horizon:
Color—similar to the Bw and Bg horizons
Texture—loamy to a depth of 40 inches; variable below a depth of 40 inches; ranging from sand to clay in the fine-earth fraction

Cleveland Series

Depth class: Shallow
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid
Parent material: Residuum and soil creep that weathered mainly from high-grade metamorphic and intrusive rock, such as biotite gneiss and granitic gneiss
Landscape: Mountains
Landform: Rocky escarpments
Landform position: Summits adjacent to areas of Rock outcrop
Slope range: 15 to 95 percent
Taxonomic class: Loamy, mixed, subactive, mesic Lithic Dystrochrepts

Associated Soils

- Ashe, Edneyville, Chestnut, Evard, Fannin, Cowee, and Cliffield soils on summits and side slopes
- Tate, Greenlee, and Toecane soils on adjacent foot slopes and toe slopes

Typical Pedon

Cleveland gravelly sandy loam in an area of Ashe-Cleveland-Rock outcrop complex, 50 to 95 percent slopes; about 12.3 miles west of Rutherfordton on U.S. Highway 64, about 4.5 miles north on Secondary Road 1008, about 4.0 miles northwest on Secondary Road 1312, about 1.0 mile east on an access road, 70 feet west of the road, in woodland; at an elevation of 1,750 feet; USGS Moffitt Hill, NC topographic quadrangle; lat. 35 degrees 30 minutes 13 seconds N. and long. 82 degrees 09 minutes 08 seconds W.

Oe—1 inch to 0; moderately decomposed deciduous litter.
A—0 to 3 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam; weak medium granular structure; very friable; many fine, medium, and coarse roots; 15 percent, by volume, gravel, 5 percent cobbles, and 5 percent stones; few fine flakes of mica; strongly acid; clear smooth boundary.
Bw—3 to 13 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak fine subangular blocky structure; very friable; many fine and medium and common coarse roots; 15 percent, by volume, gravel and 5 percent cobbles; few fine flakes of mica; strongly acid; abrupt smooth boundary.
R—13 inches; hard biotite gneiss bedrock.

Range in Characteristics

Thickness of solum: 10 to 20 inches
Depth to bedrock: 10 to 20 inches to hard bedrock
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 5 to 35 percent in the lower horizons; dominantly ranging from gravel to stones
Reaction: Moderately acid to very strongly acid

A horizon:
Color—hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 1 to 4
Texture—gravelly sandy loam

Bw horizon:
Color—hue of 7.5YR or 10YR, value of 4 or 6, and chroma of 3 to 8
Texture—sandy loam, loam, or fine sandy loam in the fine-earth fraction

C horizon (if it occurs):
Color—horizon is similar in color to the Bw horizon or is multicolored
Texture—saprolite having loamy textures in the fine-earth fraction

R layer:
Texture—hard, high-grade metamorphic rock, such as biotite gneiss or granitic gneiss bedrock, that cannot be dug using hand tools

Cliffield Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum and soil creep that weathered mainly from high-grade metamorphic rock, such as sillimanite schist and mica schist
Landscape: Mountains
Landform: Divides
Landform position: Convex summits, side slopes, and areas adjacent to Rock outcrop
Slope range: 15 to 95 percent
Taxonomic class: Loamy-skeletal, mixed, subactive, mesic Typic Hapludults

Associated Soils

- Evard, Cowee, and Pigeonroost soils on summits and side slopes

Typical Pedon

Cliffield cobbly sandy loam in an area of Cliffield-Pigeonroost complex, 15 to 30 percent slopes, very stony; about 5.9 miles northeast of Sunshine on Secondary Road 1006, about 3.7 miles northeast on Secondary Road 1732, about 1.5 miles northeast on a dirt road to Woods Gap, 2.1 miles southeast on the dirt road, 1,000 feet south of the road, in woodland; at an elevation of 2,530 feet; USGS Benn Knob, NC topographic quadrangle; lat. 35 degrees 34 minutes 37 seconds N. and long. 81 degrees 41 minutes 43 seconds W.

A—0 to 3 inches; dark yellowish brown (10YR 4/6) very cobbly sandy loam; weak fine granular structure; very friable; many fine and medium and common coarse roots; 20 percent, by volume, gravel, 15 percent cobbles, and 10 percent stones; few fine flakes of mica; very strongly acid; clear smooth boundary.
Bt—3 to 25 inches; brown (7.5YR 4/4) very cobbly sandy clay loam; weak fine subangular blocky structure; very friable; many fine and medium and common coarse roots; 25 percent, by volume, gravel, 20 percent cobbles, and 15 percent stones; few fine flakes of mica; very strongly acid; clear irregular boundary.

R—25 inches; hard, fractured sillimanite schist or mica schist; few thin interlayers of soft, weathered bedrock.

Range in Characteristics

Thickness of solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches to hard bedrock
Content and size of rock fragments: 35 to 70 percent, by volume, in the A horizon and 15 to 70 percent in the lower horizons; averaging more than 35 percent in the Bt horizon; dominantly ranging from gravel to stones (fig. 25)
Reaction: Strongly acid to extremely acid

A horizon:
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 6
Texture—cobbly sandy loam

E, BA, or BE horizon (if it occurs):
Color—hue of 5YR to 10YR and value and chroma of 4 to 6
Texture—loam, fine sandy loam, or sandy loam in the fine-earth fraction

Figure 25.—A profile of Cliffield soils. These soils are characterized by a high content of rock fragments and a moderate depth to soft weathered sillimanite schist bedrock.

Bt horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—clay loam, loam, sandy clay loam, or sandy loam in the fine-earth fraction

C horizon (if it occurs):
Color—horizon is similar in color to the Bt horizon or is multicolored
Texture—saprolite having sandy loam or loamy sand in the fine-earth fraction

Cr horizon (if it occurs):
Texture—soft, weathered sillimanite schist or mica schist bedrock that can be dug with difficulty using hand tools

R layer:
Texture—hard, fractured, high-grade metamorphic rock, such as sillimanite schist or mica schist bedrock, that cannot be dug using hand tools but in most areas can be ripped using heavy equipment

Cliffside Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum and soil creep that weathered mainly from high-grade metamorphic rock, such as sillimanite schist and mica schist
Landscape: Piedmont
Landform: Divides
Landform position: Side slopes
Slope range: 25 to 60 percent
Taxonomic class: Loamy-skeletal, mixed, semiactive, thermic Typic Hapludults

Associated Soils

- Pacolet and Bethlehem soils on summits and side slopes
- Rion soils on side slopes

Typical Pedon

Cliffside cobbly sandy loam in an area of Rion-Cliffside complex, 25 to 60 percent slopes, very stony; about 1.7 miles northeast from the Polk County line on Secondary Road 1167, about 0.4 mile northwest on Secondary Road 1179, about 0.6 mile west on a gravel road, in woodland; at an elevation of 880 feet; USGS Shingle Hollow, NC topographic quadrangle; lat. 35 degrees 22 minutes 39 seconds N. and long. 82 degrees 04 minutes 53 seconds W.

A1—0 to 3 inches; dark brown (10YR 3/3) cobbly sandy loam; weak fine granular structure; very friable; many fine and medium and few coarse roots; 20 percent, by volume, gravel and 15 percent cobbles; common fine flakes of mica; very strongly acid; clear smooth boundary.

A2—3 to 7 inches; brown (10YR 4/3) cobbly sandy loam; weak fine granular structure; very friable; common fine and medium and few coarse roots; 20 percent, by volume, gravel and 15 percent cobbles; common fine flakes of mica; very strongly acid; clear smooth boundary.

Bt1—7 to 11 inches; dark yellowish brown (10YR 4/4) very gravelly sandy clay loam; weak fine subangular blocky structure; friable; few fine and medium roots; 35 percent, by volume, gravel and 10 percent cobbles; common fine and medium flakes of mica; strongly acid; gradual wavy boundary.

Bt2—11 to 27 inches; dark yellowish brown (10YR 4/4) very cobbly sandy clay loam; weak fine subangular blocky structure; friable; few fine and medium roots; 35 percent, by volume, gravel and 25 percent cobbles; common fine and medium flakes of mica; strongly acid; abrupt smooth boundary.

R—27 inches; hard, fractured sillimanite schist or mica schist; few thin interlayers of soft, weathered bedrock.

Range in Characteristics

Thickness of solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches to hard bedrock
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 25 to 70 percent in the lower horizons; averaging more than 35 percent in the Bt horizon; dominantly ranging from gravel to stones
Reaction: Strongly acid or very strongly acid

A horizon:
Color—hue of 2.5Y to 10YR, value of 3 to 6, and chroma of 2 to 6
Texture—cobbly sandy loam

BA or BE horizon (if it occurs):
Color—hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 3 to 6
Texture—sandy loam or loam in the fine-earth fraction

Bt horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—sandy clay loam, clay loam, or loam in the fine-earth fraction

Cr horizon (if it occurs):
Texture—soft, weathered sillimanite schist or mica schist bedrock that can be dug with difficulty using hand tools

R layer:
Texture—hard, fractured, high-grade metamorphic rock, such as sillimanite schist or mica schist bedrock, that cannot be dug using hand tools but in most places can be ripped using heavy equipment

Cowee Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum and soil creep that weathered mainly from high-grade metamorphic rock, such as sillimanite schist, mica schist, biotite gneiss, and migmatitic gneiss
Landscape: Mountains
Landform: Divides
Landform position: Convex summits and side slopes
Slope range: 15 to 85 percent
Taxonomic class: Fine-loamy, parasesquic, mesic Typic Hapludults

Associated Soils

- Evard, Cliffield, Ashe, Cleveland, and Hayesville soils on summits and side slopes
- Tate and Greenlee soils on adjacent foot slopes and toe slopes

Typical Pedon

Cowee gravelly sandy loam in area of Evard-Cowee complex, 30 to 50 percent slopes, stony; about 11.8 miles northeast of Ruth on U.S. Highway 64, about 4.8 miles east on Secondary Road 1700, about 2.7 miles southeast on N.C. Highway 226, about 1.0 mile northeast on Secondary Road 1733, about 1.5 miles northeast on Secondary Road 1732, about 150 feet west of the road, in woodland; at an elevation of 1,320 feet; USGS Benn Knob, NC topographic quadrangle; lat. 35 degrees 32 minutes 36 seconds N. and long. 81 degrees 44 minutes 32 seconds W.

A1—0 to 5 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak medium granular structure; very friable; many fine and medium and few coarse roots; 15 percent, by volume, gravel; few fine flakes of mica; strongly acid; clear smooth boundary.

A2—5 to 10 inches; brown (7.5YR 4/4) gravelly sandy loam; weak medium granular structure; very friable; many fine and medium and few coarse roots; 15 percent, by volume, gravel; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt1—10 to 21 inches; brown (7.5YR 5/4) gravelly sandy clay loam; weak medium subangular blocky structure; friable; common fine and medium and few coarse roots; 15 percent, by volume, gravel; common fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt2—21 to 34 inches; yellowish red (5YR 5/6) gravelly clay loam; common medium distinct red (2.5YR 4/8) and reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; few faint clay films on faces of peds; common fine and medium roots; 25 percent, by volume, gravel; common fine flakes of mica; very strongly acid; clear smooth boundary.

Cr—34 to 42 inches; soft, weathered sillimanite schist or mica schist bedrock.

R—42 inches; hard sillimanite schist or mica schist bedrock.

Range in Characteristics

Thickness of solum: 15 to 39 inches

Depth to bedrock: 20 to 40 inches to soft bedrock; typically 40 to 60 inches to hard bedrock

Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 5 to 35 percent in the lower horizons; dominantly gravel

Reaction: Moderately acid to extremely acid

A horizon:
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 8
Texture—gravelly sandy loam

BA or BE horizon (if it occurs):
Color—hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8
Texture—loam, sandy loam, or fine sandy loam in the fine-earth fraction

Bt horizon:
Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8; subhorizons have hue of 7.5YR
Texture—sandy clay loam, clay loam, sandy loam, fine sandy loam, or loam in the fine-earth fraction

BC horizon (if it occurs):
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8
Texture—sandy clay loam, sandy loam, fine sandy loam, or loam in the fine-earth fraction

C horizon (if it occurs):

Color—horizon is similar in color to the BC horizon or is multicolored

Texture—saprolite having loamy textures in the fine-earth fraction

Cr horizon:

Texture—soft, weathered sillimanite schist or mica schist or gneiss bedrock that can be dug with difficulty using hand tools

R layer:

Texture—hard, high-grade metamorphic rock, such as sillimanite schist, mica schist, and biotite gneiss, that cannot be dug using hand tools

Dogue Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Parent material: Old alluvium from mixed geologic sources
Landscape: Piedmont
Landform: Low stream terraces
Landform position: Planar to slightly concave toe slopes
Slope range: 1 to 6 percent
Taxonomic class: Fine, mixed, semiactive, thermic Aquic Hapludults

Associated Soils

- Skyuka soils on low stream terraces and foot slopes
- Chewacla, Toccoa, and Wehadkee soils on adjacent flood plains

Typical Pedon

Dogue loam, 1 to 6 percent slopes, rarely flooded; about 8.6 miles north of Rutherfordton on U.S. Highway 221, about 1.5 miles east on Secondary Road 1510, about 0.4 mile east on Secondary Road 1504, about 800 feet north, in pasture; at an elevation of 930 feet; USGS Rutherfordton North, NC topographic quadrangle; lat. 35 degrees 29 minutes 02 seconds N. and long. 81 degrees 57 minutes 15 seconds W.

Ap—0 to 11 inches; brown (10YR 4/3) loam; weak fine granular structure; very friable; many fine and medium roots; slightly acid; clear smooth boundary.

BA—11 to 16 inches; dark yellowish brown (10YR 4/6) clay loam; weak fine subangular blocky structure; friable; few fine and medium roots; strongly acid; clear smooth boundary.

Bt1—16 to 27 inches; strong brown (7.5YR 5/6) clay; moderate medium subangular blocky structure; firm; sticky, plastic; common distinct clay films on faces of peds; few fine roots; few fine flakes of mica; few fine prominent yellowish red (5YR 5/8) masses of iron accumulation; strongly acid; gradual wavy boundary.

Bt2—27 to 43 inches; strong brown (7.5YR 5/6) clay; moderate medium subangular blocky structure; firm; sticky, plastic; common distinct clay films on faces of peds; few fine flakes of mica; common medium prominent red (2.5YR 4/6) masses of iron accumulation and common medium distinct light gray (7.5YR 7/0) iron depletions; strongly acid; gradual wavy boundary.

BC—43 to 55 inches; brownish yellow (10YR 6/6) clay loam; weak medium subangular blocky structure; friable; 5 percent, by volume, gravel; common fine flakes of mica; common coarse distinct light gray (10YR 7/1) iron depletions and few coarse distinct strong brown (7.5YR 4/6) masses of iron accumulation; very strongly acid; clear smooth boundary.

Cg—55 to 62 inches; light gray (10YR 7/1) gravelly sandy clay loam; massive; very friable; 15 percent, by volume, gravel; common fine flakes of mica; very strongly acid.

Range in Characteristics

Thickness of solum: 40 to more than 60 inches
Depth to bedrock: More than 72 inches
Content and size of rock fragments: 0 to 15 percent, by volume, in the A and B horizons and 0 to 25 percent in the C horizon; dominantly gravel
Reaction: Strongly acid to extremely acid; ranging to slightly acid in the upper part of limed soils

Ap horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4
Texture—loam

BA horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 4 to 8
Texture—clay loam, sandy clay loam, or loam

Bt horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8
Texture—clay, clay loam, sandy clay loam, or sandy clay
Redoximorphic features—iron depletions in shades of brown, gray, or yellow and masses of iron accumulation in shades of red

Btg horizon (if it occurs):
Color—horizon has hue of 7.5YR or 2.5Y or is neutral in hue, has value of 4 to 7, and has chroma of 0 or 2
Texture—similar to the Bt horizon
Redoximorphic features—masses of iron accumulation in shades of brown or yellow

BCg horizon (if it occurs):
Color—similar to the Btg horizon
Texture—sandy clay, clay loam, sandy clay loam, or sandy loam

Cg horizon:
Color—similar the Btg horizon
Texture—similar the Btg horizon; stratified sandy and loamy textures commonly occur in the fine-earth fraction

Edneyville Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Parent material: Residuum and soil creep that weathered mainly from intrusive rock, such as granitic gneiss
Landscape: Mountains
Landform: Divides
Landform position: Concave summits and side slopes
Slope range: 15 to 50 percent
Taxonomic class: Coarse-loamy, mixed, active, mesic Typic Dystrochrepts

Associated Soils

- Ashe, Cleveland, Chestnut, Evard, and Cowee soils on summits and side slopes
- Tate, Greenlee, and Toecane soils on adjacent foot slopes and toe slopes

Typical Pedon

Edneyville sandy loam in an area of Edneyville-Chestnut complex, 30 to 50 percent slopes, very stony; about 12.3 miles west of Rutherfordton on U.S. Highway 64, about 4.5 miles northeast on Secondary Road 1312, about 1.5 miles southwest on Secondary Road 1314, about 2.8 miles west on a logging road to Mount Pleasant Cemetery on the Buncombe County line, 1,000 feet southeast on the logging road, 50 feet northeast of the road, in woodland; at an elevation of 2,800 feet; USGS Moffitt Hill, NC topographic quadrangle; lat. 35 degrees 30 minutes 12 seconds N. and long. 82 degrees 13 minutes 15 seconds W.

Oi—2 inches to 0; slightly decomposed deciduous litter.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) sandy loam; weak medium granular structure; very friable; many fine and medium and common coarse roots; 5 percent, by volume, gravel, 5 percent cobbles, and 5 percent stones; few fine flakes of mica; moderately acid; clear smooth boundary.

A2—4 to 8 inches; brown (10YR 4/3) sandy loam; weak medium granular structure; very friable; many fine and medium and common coarse roots; 5 percent, by volume, gravel, 5 percent cobbles, and 5 percent stones; few fine flakes of mica; moderately acid; clear smooth boundary.

Bw1—8 to 14 inches; dark yellowish brown (10YR 4/6) sandy loam; weak medium subangular blocky structure; very friable; common fine and medium and few coarse roots; 5 percent, by volume, gravel and 5 percent cobbles; few fine and medium flakes of mica; strongly acid; gradual wavy boundary.

Bw2—14 to 26 inches; yellowish brown (10YR 5/4) sandy loam; weak fine subangular blocky structure; very friable; common fine and medium and few coarse roots; 5 percent, by volume, gravel and 5 percent cobbles; few fine and medium flakes of mica; strongly acid; gradual wavy boundary.

C1—26 to 53 inches; gravelly sandy loam saprolite that is multicolored in shades of brown, yellow, and gray; massive; loose; few fine and medium roots; 10 percent, by volume, gravel and 5 percent cobbles; few fine and medium flakes of mica; strongly acid; clear wavy boundary.

C2—53 to 65 inches; sandy loam saprolite that is multicolored in shades of brown, gray, and white; massive; loose; 5 percent, by volume, gravel; few fine and medium flakes of mica; very strongly acid.

Range in Characteristics

Thickness of solum: 20 to 55 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 0 to 15 percent, by volume, in the A horizon and 0 to 35 percent in the lower horizons; dominantly gravel
Reaction: Moderately acid to very strongly acid

A horizon:
Color—hue of 7.5YR to 2.5Y, value of 2 to 5, and chroma of 1 to 4
Texture—sandy loam

Bw horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8
Texture—sandy loam, fine sandy loam, or loam in the fine-earth fraction

BC horizon (if it occurs):
Color—similar to the Bw horizon
Texture—similar to the Bw horizon

C horizon:
Color—horizon is similar in color to the Bw horizon or is multicolored
Texture—saprolite having variable textures that range from loamy sand to loam in the fine-earth fraction

Evard Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum and soil creep that weathered mainly from high-grade metamorphic rock, such as biotite gneiss
Landscape: Mountains
Landform: Divides
Landform position: Concave summits and side slopes
Slope range: 15 to 85 percent
Taxonomic class: Fine-loamy, oxidic, mesic Typic Hapludults

Associated Soils

- Hayesville, Cowee, Cliffield, Pigeonroost, Ashe, and Cleveland soils on summits and side slopes
- Tate and Greenlee soils on adjacent foot slopes and toe slopes

Typical Pedon

Evard sandy loam in an area of Evard-Cowee complex, 30 to 50 percent slopes, stony; about 11.8 miles northeast of Ruth on U.S. Highway 64, about 4.8 miles east on Secondary Road 1700, about 2.7 miles southeast on N.C. Highway 226, about 1.0 mile northeast on Secondary Road 1733, about 2.7 miles northeast on Secondary Road 1732, about 150 feet east of the road, in woodland; at an elevation of 1,640 feet; USGS Benn Knob, NC topographic quadrangle; lat. 35 degrees 33 minutes 44 seconds N. and long. 81 degrees 43 minutes 57 seconds W.

A1—0 to 3 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; many fine and medium and few coarse roots; 10 percent, by volume, gravel; few fine flakes of mica; very strongly acid; clear smooth boundary.
A2—3 to 6 inches; dark yellowish brown (10YR 4/6) sandy loam; weak medium granular structure; very friable; common fine and medium roots; 5 percent, by volume, gravel; few fine flakes of mica; very strongly acid; clear smooth boundary.
Bt1—6 to 12 inches; strong brown (7.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; few fine and medium roots; 5 percent, by volume, gravel and 5 percent cobbles; common fine flakes of mica; very strongly acid; gradual wavy boundary.
Bt2—12 to 30 inches; yellowish red (5YR 5/6) clay loam; moderate medium subangular blocky structure; friable; few faint clay films on faces of peds; few fine and medium roots; 5 percent, by volume, gravel and 5 percent cobbles; common fine flakes of mica; very strongly acid; gradual wavy boundary.
BC—30 to 37 inches; strong brown (7.5YR 5/6) sandy clay loam; weak fine subangular blocky structure; friable; few fine and medium roots; 5 percent, by volume, gravel; common fine flakes of mica; very strongly acid; gradual wavy boundary.

C1—37 to 56 inches; brownish yellow (10YR 6/6) fine sandy loam saprolite; massive; very friable; 5 percent, by volume, gravel; common fine flakes of mica; strongly acid; gradual wavy boundary.

C2—56 to 65 inches; light yellowish brown (10YR 6/4) sandy loam saprolite; many medium distinct mottles in shades of gray and brown; massive; very friable; 5 percent, by volume, gravel; common fine flakes of mica; very strongly acid.

Range in Characteristics

Thickness of solum: 20 to more than 40 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 0 to 15 percent, by volume, throughout the profile; dominantly gravel
Reaction: Moderately acid to very strongly acid

A horizon:
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6
Texture—sandy loam

BA horizon (if it occurs):
Color—hue of 5YR to 10YR and value and chroma of 4 to 8
Texture—sandy clay loam, loam, fine sandy loam, sandy loam, or clay loam

Bt horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8; subhorizons have hue of 7.5YR
Texture—clay loam, sandy clay loam, or loam

BC horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 or 8
Mottles (if they occur)—few or common in shades of red, brown, or yellow
Texture—sandy clay loam, fine sandy loam, loam, sandy loam, or clay loam

C horizon:
Color—horizon is similar in color to the BC horizon or is multicolored
Texture—saprolite having variable textures that range from loam to loamy sand

Fannin Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum and soil creep that weathered mainly from high-grade metamorphic rock having a high content of mica, such as migmatitic gneiss
Landscape: Mountains
Landform: Divides
Landform position: Summits and side slopes
Slope range: 15 to 85 percent
Taxonomic class: Fine-loamy, micaceous, mesic Typic Hapludults

Associated Soils

- Ashe, Cleveland, and Hayesville soils on summits and side slopes

Typical Pedon

Fannin fine sandy loam, 30 to 50 percent slopes, stony; about 11.8 miles northeast of Ruth on U.S. Highway 64, about 4.8 miles east on Secondary Road 1700, about 2.5 miles northwest on N.C. Highway 226, about 150 feet north of the road, in woodland;

at an elevation of 1,500 feet; USGS Dysartsville, NC topographic quadrangle; lat. 35 degrees 33 minutes 35 seconds N. and long. 81 degrees 49 minutes 25 seconds W.

Oi—1 inch to 0; slightly decomposed deciduous litter.

A—0 to 3 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine granular structure; very friable; many fine and medium and few coarse roots; common fine flakes of mica; moderately acid; clear smooth boundary.

BA—3 to 6 inches; strong brown (7.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; common fine and medium roots; common fine flakes of mica; moderately acid; gradual wavy boundary.

Bt—6 to 17 inches; yellowish red (5YR 5/6) clay loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; few faint clay films on faces of peds; few fine and medium roots; many fine flakes of mica; strongly acid; gradual wavy boundary.

BC—17 to 24 inches; yellowish red (5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine and medium roots; many fine flakes of mica; strongly acid; gradual wavy boundary.

C1—24 to 34 inches; strong brown (7.5YR 5/6) loam saprolite; massive; very friable; many fine flakes of mica; moderately acid; gradual wavy boundary.

C2—34 to 60 inches; loam saprolite that is multicolored in shades of brown, yellow, and black; massive; very friable; many fine flakes of mica; very strongly acid.

Range in Characteristics

Thickness of solum: 20 to 45 inches
Depth to bedrock: More than 72 inches
Content and size of rock fragments: 0 to 15 percent, by volume, throughout the profile; dominantly gravel
Reaction: Slightly acid to very strongly acid

A horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4
Texture—fine sandy loam

BA horizon:
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6
Texture—loam or fine sandy loam

Bt horizon:
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8
Texture—clay loam, sandy clay loam, or loam

BC horizon:
Color—similar to the Bt horizon
Texture—sandy clay loam, loam, fine sandy loam, or sandy loam

C horizon:
Color—horizon is similar in color to the BC horizon or is multicolored
Texture—saprolite having loamy textures and a high content of mica

Fluvaquents

Depth class: Very deep to shallow
Drainage class: Somewhat poorly drained or poorly drained
Permeability: Very slow to moderately rapid
Parent material: Recent alluvium from mixed geologic sources
Landscape: Mountains and Piedmont

Landform: Areas where the natural soil properties and qualities have been greatly altered by excavation or intensive grading or areas covered by earthy fill material
Landform position: Planar to slightly concave slopes away from the stream channel
Slope range: 0 to 2 percent

Associated Soils

- Udifluvents

Typical Pedon

A typical pedon is not given for these soils because of their variability. Fluvaquents are typically loamy in the upper part and consist of sand or a mixture of sand, gravel, and cobbles in the lower part.

Range in Characteristics

Thickness of solum: Variable
Depth to bedrock: More than 72 inches
Content and size of rock fragments: 0 to 35 percent, by volume, throughout the profile; dominantly gravel
Reaction: Extremely acid to neutral

Greenlee Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Parent material: Colluvium derived from felsic, high-grade metamorphic or igneous rock
Landscape: Mountains
Landform: Colluvial fans
Landform position: Foot slopes and toe slopes
Slope range: 6 to 70 percent
Taxonomic class: Loamy-skeletal, mixed, semiactive, mesic Typic Dystrochrepts

Associated Soils

- Tate soils on foot slopes and toe slopes
- Ostin and Bandana soils on adjacent flood plains
- Evard, Cowee, Ashe, and Cleveland soils on adjacent summits and side slopes

Typical Pedon

Greenlee very cobbly sandy loam in an area of Greenlee-Tate complex, 15 to 30 percent slopes, extremely bouldery; about 12.3 miles west of Rutherfordton on U.S. Highway 64, about 1.8 miles north on Secondary Road 1008, about 2.5 miles west on Secondary Road 1306, about 0.8 mile north on an access road through a golf course, 0.3 mile north on Winesap Road to its end, 500 feet north, in woodland; at an elevation of 1,360 feet; USGS Lake Lure, NC topographic quadrangle; lat. 35 degrees 28 minutes 01 second N. and long. 82 degrees 09 minutes 31 seconds W.

Oe—1 inch to 0; moderately decomposed deciduous litter.
A—0 to 5 inches; dark brown (10YR 3/3) very cobbly sandy loam; moderate medium granular structure; very friable; many fine and medium and common coarse roots; 25 percent, by volume, gravel, 15 percent cobbles, and 10 percent stones; few fine flakes of mica; strongly acid; clear smooth boundary.
Bw1—5 to 21 inches; dark yellowish brown (10YR 4/6) very cobbly sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; 25

percent, by volume, gravel, 15 percent cobbles, and 10 percent stones; few fine flakes of mica; moderately acid; clear wavy boundary.

Bw2—21 to 61 inches; dark yellowish brown (10YR 4/4) very cobbly sandy loam; weak medium subangular blocky structure; very friable; few fine and medium roots; 30 percent, by volume, gravel, 20 percent cobbles, and 10 percent stones; few fine flakes of mica; moderately acid.

Range in Characteristics

Thickness of solum: 20 to more than 60 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 35 to 60 percent, by volume, throughout the profile; dominantly ranging from gravel to stones and including some boulders
Reaction: Moderately acid to extremely acid

A horizon:
Color—hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 1 to 4
Texture—very cobbly sandy loam

BA horizon (if it occurs):
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6
Texture—sandy loam, loam, or sandy clay loam in the fine-earth fraction

Bw horizon:
Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8
Texture—sandy loam, loam, or sandy clay loam in the fine-earth fraction

BC horizon (if it occurs):
Color—hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 3 to 6
Texture—sandy loam, loamy sand, or loamy fine sand in the fine-earth fraction

C horizon (if it occurs):
Color—similar to the BC horizon
Texture—loamy to sandy in the fine-earth fraction

Grover Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum and soil creep that weathered mainly from high-grade metamorphic rock having a high content of mica, such as migmatitic gneiss
Landscape: Piedmont
Landform: Divides
Landform position: Side slopes
Slope range: 25 to 45 percent
Taxonomic class: Fine-loamy, micaceous, thermic Typic Hapludults

Associated Soils

- Madison, Pacolet, Rion, and Ashlar soils on side slopes

Typical Pedon

Grover loam, 25 to 45 percent slopes; about 4.2 miles west of Rutherfordton on N.C. Highway 108, about 0.9 mile northwest on Secondary Road 1149, about 3,000 feet southwest, in woodland; at an elevation of 850 feet; USGS Pea Ridge, NC topographic quadrangle; lat. 35 degrees 20 minutes 38 seconds N. and long. 82 degrees 01 minute 42 seconds W.

Oi—1 inch to 0; slightly decomposed deciduous litter.
A—0 to 5 inches; brown (10YR 4/3) loam; weak medium granular structure; very friable; many fine and few medium roots; common fine flakes of mica; strongly acid; clear smooth boundary.
Bt—5 to 19 inches; strong brown (7.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; common fine and medium roots; many fine flakes of mica; very strongly acid; gradual wavy boundary.
BC—19 to 24 inches; strong brown (7.5YR 5/8) loam; weak medium subangular blocky structure; very friable; few fine roots; many fine flakes of mica; very strongly acid; gradual wavy boundary.
C—24 to 62 inches; strong brown (7.5YR 5/8) sandy loam saprolite; massive; very friable; few dark brown (7.5YR 3/2) streaks; few fine roots; many fine and medium flakes of mica; very strongly acid.

Range in Characteristics

Thickness of solum: 20 to 40 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 0 to 10 percent, by volume, in the A and B horizons and 0 to 15 percent in the C horizon; dominantly gravel
Reaction: Moderately acid to very strongly acid

A horizon:
Color—hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 6
Texture—loam

E horizon (if it occurs):
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8
Texture—loam, sandy loam, or fine sandy loam

BA or BE horizon (if it occurs):
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—loam, fine sandy loam, sandy loam, or sandy clay loam

Bt horizon:
Color—hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—loam, sandy clay loam, or clay loam

BC horizon:
Color—similar to the Bt horizon
Texture—loam, fine sandy loam, sandy loam, or sandy clay loam

C horizon:
Color—horizon is similar in color to the BC horizon or is multicolored
Texture—saprolite having loamy textures and a high content of mica

Hayesville Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum that weathered mainly from high-grade metamorphic rock, such as biotite gneiss
Landscape: Mountains
Landform: Divides
Landform position: Summits and side slopes

Slope range: 8 to 35 percent
Taxonomic class: Fine, kaolinitic, mesic Typic Kanhapludults

Associated Soils

- Evard, Cowee, and Fannin soils on summits and side slopes

Typical Pedon

Hayesville sandy clay loam, 15 to 30 percent slopes, eroded; about 12.2 miles north of Rutherfordton on U.S. Highway 64, about 4.8 miles east on Secondary Road 1700, about 0.2 mile southwest on N.C. Highway 226, about 0.6 mile north on a private driveway, 250 feet east, in woodland; at an elevation of 1,250 feet; USGS Dysartsville, NC topographic quadrangle; lat. 35 degrees 32 minutes 39 seconds N. and long. 81 degrees 47 minutes 36 seconds W.

Ap—0 to 5 inches; dark reddish brown (5YR 3/4) sandy clay loam; moderate medium granular structure; friable; many fine and medium and few coarse roots; few fine flakes of mica; very strongly acid; clear smooth boundary.
Bt—5 to 26 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm; sticky, plastic; few faint clay films on faces of peds; few fine and medium roots; few fine flakes of mica; very strongly acid; gradual wavy boundary.
BC—26 to 35 inches; red (2.5YR 5/6) clay loam; weak medium subangular blocky structure; friable; common fine flakes of mica; extremely acid; gradual wavy boundary.
C1—35 to 45 inches; yellowish red (5YR 5/6) loam saprolite; massive; friable; many fine flakes of mica; extremely acid; gradual wavy boundary.
C2—45 to 62 inches; sandy loam saprolite that is multicolored in shades of red, yellow, and brown; massive; very friable; many fine flakes of mica; extremely acid.

Range in Characteristics

Thickness of solum: 30 to 60 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 0 to 15 percent, by volume, throughout the profile; dominantly gravel
Reaction: Moderately acid to extremely acid; ranging to slightly acid in the upper part of limed soils

A horizon:
Color—hue of 5YR to 10YR, value of 3 to 6, and chroma of 2 to 6
Texture—sandy clay loam

BA horizon (if it occurs):
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—clay loam, loam, or sandy clay loam

Bt horizon:
Color—hue of 10R to 5YR, value of 4 or 5, and chroma of 6 or 8
Mottles (if they occur)—few or common in shades of red, yellow, or brown
Texture—clay or clay loam

BC horizon:
Color—hue of 10R to 7.5YR, value of 4 to 6, and chroma of 6 or 8
Mottles (if they occur)—in shades of red, yellow, or brown
Texture—clay loam, sandy clay loam, or loam

C horizon:
Color—horizon is similar in color to the BC horizon or is multicolored
Texture—saprolite having loamy textures

Helena Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Parent material: Colluvium and local alluvium or residuum
Landscape: Piedmont
Landform: Heads of drainageways
Landform position: Planar to slightly convex foot slopes
Slope range: 1 to 6 percent
Taxonomic class: Fine, mixed, semiactive, thermic Aquic Hapludults

Associated Soils

- Cecil, Pacolet, and Appling soils on adjacent summits and side slopes
- Worsham soils on adjacent foot slopes
- Chewacla and Wehadkee soils on adjacent flood plains

Typical Pedon

Helena sandy loam in an area of Helena-Worsham complex, 1 to 6 percent slopes; about 3.4 miles south of Harris on Secondary Road 1111, about 7.3 miles west on Secondary Road 1112, about 2.1 miles southwest on Secondary Road 1104, about 1,500 feet southeast of the road, in woodland; at an elevation of 912 feet; USGS Fingerville, SC-NC topographic quadrangle; lat. 35 degrees 11 minutes 32 seconds N. and long. 81 degrees 57 minutes 53 seconds W.

A1—0 to 5 inches; brown (10YR 4/3) sandy loam; weak medium granular structure; very friable; common fine and medium and few coarse roots; few fine flakes of mica; moderately acid; clear smooth boundary.

A2—5 to 10 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium granular structure; very friable; common fine and medium and few coarse roots; few fine flakes of mica; moderately acid; clear smooth boundary.

BA—10 to 15 inches; yellowish brown (10YR 5/4) sandy clay loam; weak medium subangular blocky structure; friable; common fine and medium and few coarse roots; few fine flakes of mica; moderately acid; gradual wavy boundary.

Bt1—15 to 29 inches; yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; firm; sticky, plastic; common distinct clay films on faces of peds; common fine and medium roots; few fine prominent red (2.5YR 4/6) and many fine distinct strong brown (7.5YR 5/6) masses of iron accumulation; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt2—29 to 36 inches; light yellowish brown (2.5Y 6/4) clay; moderate medium subangular blocky structure; firm; sticky, plastic; common distinct clay films on faces of peds; common fine and medium roots; common medium distinct light brownish gray (2.5Y 6/2) iron depletions and few coarse prominent yellowish red (5YR 4/6) masses of iron accumulation; few fine flakes of mica; strongly acid; gradual wavy boundary.

Btg—36 to 53 inches; light brownish gray (2.5Y 6/2) clay; moderate medium subangular blocky structure; firm; sticky, plastic; few distinct clay films on faces of peds; common medium distinct yellowish brown (10YR 5/6) masses of iron accumulation; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BCg—53 to 63 inches; light gray (N 7/0) clay loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; common fine prominent olive yellow (2.5Y 6/6) masses of iron accumulation; few fine flakes of mica; very strongly acid.

Range in Characteristics

Thickness of solum: 40 to more than 60 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 0 to 15 percent, by volume, in the A and E horizons and 0 to 35 percent in the lower horizons; dominantly gravel
Reaction: Strongly acid to extremely acid; less acid in the upper part of limed soils

A horizon:
Color—hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 to 4
Texture—sandy loam

E horizon (if it occurs):
Color—hue of 10YR to 5Y, value of 5 to 8, and chroma of 2 to 4
Texture—similar to the Ap horizon

BA or BE horizon (if it occurs):
Color—hue of 7.5YR to 5Y, value of 5 to 8, and chroma of 3 to 8
Texture—sandy clay loam or clay loam

Bt horizon:
Color—hue of 7.5YR to 5Y, value of 5 to 8, and chroma of 3 to 8
Texture—clay, clay loam, sandy clay loam, or sandy clay in the fine-earth fraction
Redoximorphic features—few to many iron and clay depletions in the upper 24 inches of the horizon and in shades of gray or brown

Btg horizon:
Color—hue of 10YR to 2.5Y, value of 4 to 7, and chroma of 1 or 2
Texture—similar to the Bt horizon
Redoximorphic features—few to many masses of iron accumulation in shades of brown or yellow

BCg horizon:
Color—similar to the Btg horizon
Texture—sandy loam, clay loam, sandy clay loam, loam, or fine sandy loam in the fine-earth fraction

Cg horizon (if it occurs):
Color—hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2
Texture—sandy loam, fine sandy loam, sandy clay loam, or loam in the fine-earth fraction; bodies or seams of clay loam or clay occur in some pedons

Hiwassee Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Old alluvium or residuum that weathered mainly from gneiss bedrock
Landscape: Piedmont
Landform: High stream terraces
Landform position: Planar to slightly concave foot slopes
Slope range: 2 to 15 percent
Taxonomic class: Fine, kaolinitic, thermic Rhodic Kanhapludults

Associated Soils

- Madison and Pacolet soils on summits and side slopes
- Skyuka soils on adjacent low stream terraces

Typical Pedon

Hiwassee clay loam, 8 to 15 percent slopes, eroded; about 7.3 miles west of Rutherfordton on U.S. Highway 64/74, about 0.8 mile south on Secondary Road 1178, about 600 feet northwest of a private driveway, in pasture; at an elevation of 900 feet; USGS Shingle Hollow, NC topographic quadrangle; lat. 35 degrees 24 minutes 02 seconds N. and long. 82 degrees 03 minutes 01 second W.

Ap—0 to 6 inches; dusky red (2.5YR 3/2) clay loam; weak medium subangular blocky structure; friable; many fine and medium and few coarse roots; neutral; clear smooth boundary.

BA—6 to 10 inches; dark reddish brown (2.5YR 3/4) clay loam; moderate medium subangular blocky structure; firm; few fine flakes of mica; slightly acid; gradual wavy boundary.

Bt1—10 to 25 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm; sticky, plastic; few faint clay films on faces of peds; few fine, medium, and coarse roots; few fine flakes of mica; slightly acid; gradual wavy boundary.

Bt2—25 to 45 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; sticky, plastic; few faint clay films on faces of peds; few fine and medium roots; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—45 to 62 inches; red (2.5YR 4/8) clay loam; weak medium subangular blocky structure; friable; common fine flakes of mica; very strongly acid.

Range in Characteristics

Thickness of solum: 40 to more than 60 inches
Depth to bedrock: More than 60 inches
Clay content: 35 to 60 percent in the subsoil; averaging 35 percent or more in the control section
Content and size of rock fragments: 0 to 15 percent, by volume, in the A horizon and 0 to 10 percent in the lower horizons; dominantly gravel
Reaction: Slightly acid to very strongly acid; less acid in the upper part of limed soils

Ap horizon:
Color—hue of 10R to 5YR, value of 2.5 or 3, and chroma of 2 to 4
Texture—clay loam

Bt horizon:
Color—hue of 10R or 2.5YR, value of 3 in the upper part and value of 3 or 4 in the middle and lower parts, and chroma of 4 to 8
Mottles (if they occur)—few and random; in shades of yellow or brown
Texture—clay or clay loam

BC horizon:
Color—hue of 10R or 2.5YR, value of 4 or 5, and chroma of 4 to 8
Mottles (if they occur)—few and random; in shades of yellow or brown
Texture—clay loam or loam

C horizon (if it occurs):
Color—horizon is similar in color to the BC horizon or is multicolored
Texture—saprolite having loamy textures

The Hiwassee soils of Rutherford County are considered taxadjuncts to the series because they do not have color value of 3 throughout the upper meter, which would classify them as Typic Rhodudults. This difference, however, does not significantly affect the use and management of the soils.

Iotla Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately rapid
Parent material: Recent alluvium from mixed geologic sources
Landscape: Mountains
Landform: Flood plains
Landform position: Planar to slightly concave slopes
Slope range: 0 to 2 percent
Taxonomic class: Coarse-loamy, mixed, active, nonacid, mesic Aquic Udifluvents

Associated Soils

- Evard, Cowee, and Hayesville soils on adjacent summits and side slopes

Typical Pedon

Iotla sandy loam, 0 to 2 percent slopes, occasionally flooded; in McDowell County, North Carolina, about 3.9 miles northwest of Sugar Hill on Secondary Road 1135, about 0.25 mile north on Secondary Road 1242, about 300 feet west of the road, 50 feet west of Haw Branch, in pasture; at an elevation of 1,470 feet; USGS Sugar Hill, NC topographic quadrangle; lat. 35 degrees 36 minutes 49 seconds N. and long. 82 degrees 06 minutes 05 seconds W.

Ap—0 to 12 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; very friable; many fine roots; common fine flakes of mica; slightly acid; clear smooth boundary.

C—12 to 21 inches; dark yellowish brown (10YR 4/4) loam; massive; very friable; common fine roots; common medium distinct dark grayish brown (10YR 4/2) iron depletions; common fine flakes of mica; moderately acid; clear smooth boundary.

Cg1—21 to 26 inches; dark grayish brown (10YR 4/2) fine sandy loam; massive; friable; common fine prominent yellowish brown (10YR 5/6) concentrations and few fine faint dark gray (10YR 4/1) iron depletions; common fine flakes of mica; moderately acid; abrupt smooth boundary.

Cg2—26 to 30 inches; multicolored light brownish gray (10YR 6/2), dark gray (10YR 4/1), and light yellowish brown (10YR 6/4) sand; single grained; loose; common fine flakes of mica; moderately acid; abrupt smooth boundary.

Ab—30 to 50 inches; very dark gray (10YR 3/1) loam; massive; friable; common fine flakes of mica; moderately acid; abrupt smooth boundary.

Cg´—50 to 60 inches; light brownish gray (10YR 6/2) gravelly sand; single grained; loose; 30 percent, by volume, gravel; common fine flakes of mica; moderately acid.

Range in Characteristics

Thickness of solum: 40 to more than 60 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 0 to 10 percent, by volume, within the 10- to 40-inch particle-size control section and variable below a depth of 40 inches; mainly gravel
Reaction: Strongly acid to neutral

A horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 1 to 4
Texture—sandy loam

Bw horizon:
Color—hue of 7.5YR to 2.5Y and value and chroma of 3 to 6
Texture—loam, fine sandy loam, or sandy loam
Redoximorphic features—few or common throughout most of the Bw and C horizons; iron depletions in shades of gray or brown and masses of iron accumulation in shades of brown, yellow, or red

C horizon:
Color—hue of 7.5YR to 2.5Y and value and chroma of 3 to 6
Texture—loam, fine sandy loam, or sandy loam to a depth of 40 inches; variable below a depth of 40 inches and including stratified sandy, loamy, or gravelly layers
Redoximorphic features—few or common throughout most of the Bw and C horizons; iron depletions in shades of gray or brown and masses of iron accumulation in shades of brown, yellow, or red

Ab horizon (if it occurs):
Color—similar to the A horizon
Texture—similar to the A horizon

Cg horizon (if it occurs):
Color—hue of 10YR or 2.5Y, value of 3 to 7, and chroma of 0 to 2
Texture—similar to the C horizon

Madison Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum that weathered mainly from high-grade metamorphic rock having a high content of mica, such as migmatitic gneiss
Landscape: Piedmont
Landform: Divides
Landform position: Summits and side slopes
Slope range: 8 to 25 percent
Taxonomic class: Fine, kaolinitic, thermic Typic Kanhapludults

Associated Soils

- Pacolet and Grover soils on side slopes
- Cecil soils on summits
- Hiwassee soils on adjacent stream terraces

Typical Pedon

Madison clay loam, 8 to 15 percent slopes, eroded; about 4.2 miles west of Rutherfordton on N.C. Highway 108, about 0.9 mile northwest on Secondary Road 1149, about 400 feet southwest, in woodland; at an elevation of 866 feet; USGS Pea Ridge, NC topographic quadrangle; lat. 35 degrees 20 minutes 43 seconds N. and long. 82 degrees 01 minute 33 seconds W.

Oi—1 inch to 0; slightly decomposed deciduous and coniferous litter.
Ap—0 to 7 inches; yellowish red (5YR 4/6) clay loam; moderate medium granular structure; friable; common fine and medium roots; few fine flakes of mica; strongly acid; clear smooth boundary.
Bt1—7 to 19 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; sticky, plastic; few distinct clay films on faces of peds; few fine and medium roots; common fine flakes of mica; strongly acid; gradual wavy boundary.

Bt2—19 to 30 inches; red (2.5YR 5/6) clay loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; few faint clay films on faces of peds; many fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—30 to 46 inches; yellowish red (5YR 5/6) loam; weak medium subangular blocky structure; very friable; many fine flakes of mica; very strongly acid; gradual wavy boundary.

C—46 to 62 inches; yellowish red (5YR 5/6) and reddish brown (5YR 4/4) loam saprolite; massive; very friable; many fine flakes of mica; very strongly acid.

Range in Characteristics

Thickness of solum: 20 to 50 inches
Depth to bedrock: More than 72 inches
Content and size of rock fragments: 0 to 15 percent, by volume, throughout the profile; dominantly gravel
Reaction: Moderately acid to very strongly acid; ranging to slightly acid in the upper part of limed soils

Ap horizon:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 8
Texture—clay loam

Bt horizon:
Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 3 to 8
Texture—clay, clay loam, or sandy clay

BC horizon:
Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 3 to 8
Mottles (if they occur)—few and random; in shades of yellow or brown
Texture—clay loam, sandy clay loam, loam, or sandy loam

C horizon:
Color—horizon is similar in color to the BC horizon or is multicolored
Texture—saprolite having loamy textures and a high content of mica

Ostin Series

Depth class: Very deep
Drainage class: Moderately well drained or well drained
Permeability: Rapid or very rapid
Parent material: Recent alluvium from mixed geologic sources
Landscape: Mountains
Landform: Narrow flood plains along streams that flow from mountain colluvial fans
Landform position: Planar to slightly convex slopes adjacent to the stream channel
Slope range: 0 to 3 percent
Taxonomic class: Sandy-skeletal, mixed, semiactive, mesic Typic Udifluvents

Associated Soils

- Bandana soils on flood plains
- Tate and Greenlee soils on adjacent foot slopes and toe slopes

Typical Pedon

Ostin cobbly sandy loam in an area of Bandana-Ostin complex, 0 to 3 percent slopes, occasionally flooded; about 12.3 miles west of Rutherfordton on U.S. Highway 64, about 4.5 miles north on Secondary Road 1008, about 4.7 miles northwest on Secondary Road 1312, about 100 feet east of the road, in woodland; at an elevation of

1,170 feet; USGS Moffitt Hill, NC topographic quadrangle; lat. 35 degrees 30 minutes 44 seconds N. and long. 82 degrees 09 minutes 30 seconds W.

A—0 to 4 inches; dark brown (10YR 3/3) cobbly sandy loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; 10 percent, by volume, gravel, 10 percent cobbles, and 5 percent stones; common fine flakes of mica; very strongly acid; clear smooth boundary.

C1—4 to 20 inches; yellowish brown (10YR 5/4) very cobbly coarse sand; single grained; loose; common fine and medium roots; 25 percent, by volume, gravel and 35 percent cobbles; common fine flakes of mica; very strongly acid; clear smooth boundary.

C2—20 to 29 inches; brown (10YR 4/3) extremely gravelly coarse sand; few thin lenses of loamy sand; single grained; loose; few fine roots; 55 percent, by volume, gravel and 25 percent cobbles; common fine flakes of mica; very strongly acid; clear smooth boundary.

C3—29 to 41 inches; dark yellowish brown (10YR 4/6) gravelly loamy sand; single grained; loose; 20 percent, by volume, gravel; few fine distinct grayish brown (10YR 5/2) iron depletions and brown (7.5YR 4/4) masses of iron accumulation; common fine and medium flakes of mica; very strongly acid; clear smooth boundary.

Ab—41 to 48 inches; very dark gray (10YR 3/1) loamy sand; massive; very friable; 10 percent, by volume, gravel; common fine flakes of mica; moderately acid; clear smooth boundary.

Cg—48 to 63 inches; dark gray (10YR 4/1) extremely gravelly coarse sand; single grained; loose; 30 percent, by volume, gravel and 5 percent cobbles; common fine and medium flakes of mica; moderately acid.

Range in Characteristics

Depth to bedrock: More than 60 inches

Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 5 to 80 percent in the C horizon; averaging more than 35 percent in the C horizon; dominantly gravel or cobbles

Reaction: Neutral to very strongly acid throughout the profile

A horizon:

Color—hue of 10YR, value of 3 or 5, and chroma of 1 to 6; where horizon has value of 3 and chroma of 1 to 3, it is less than 7 inches thick

Texture—cobbly sandy loam

C horizon:

Color—horizon has hue of 10YR or 7.5YR, value of 4 or 6, and chroma of 3 to 8 or is multicolored

Texture—loamy sand, sand, or coarse sand in the fine-earth fraction

Redoximorphic features—iron depletions in shades of gray below a depth of 20 inches

Ab horizon (below a depth of 40 inches):

Color—horizon has hue of 7.5YR to 2.5Y or is neutral in hue, has value of 2 to 4, and has chroma of 0 to 2

Texture—loam, sandy loam, loamy sand, or sand in the fine-earth fraction

Cg horizon (below a depth of 40 inches):

Color—horizon has hue of 7.5YR to 2.5Y or is neutral in hue, has value of 2 to 6, and has chroma of 0 to 2

Texture—sandy loam, loamy sand, sand, or coarse sand in the fine-earth fraction

Redoximorphic features—masses of iron accumulation in shades brown

Pacolet Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum that weathered mainly from intrusive and high-grade metamorphic rock, such as granitic gneiss, migmatitic gneiss, biotite gneiss, sillimanite schist, and mica schist
Landscape: Piedmont
Landform: Divides
Landform position: Side slopes and summits
Slope range: 2 to 25 percent
Taxonomic class: Fine, kaolinitic, thermic Typic Kanhapludults

Associated Soils

- Madison, Bethlehem, Cecil, Saw, and Rion soils on summits and side slopes

Typical Pedon

Pacolet sandy clay loam, 8 to 15 percent slopes, eroded; about 0.8 mile north of Ellenboro on Secondary Road 1007, about 0.3 mile northwest on Secondary Road 1569, about 900 feet northeast of Secondary Road 1569, about 150 feet southwest of railroad tracks, in pasture; at an elevation of 1,020 feet; USGS Forest City, NC topographic quadrangle; lat. 35 degrees 21 minutes 39 seconds N. and long. 81 degrees 46 minutes 05 seconds W.

Ap—0 to 5 inches; dark reddish brown (5YR 3/4) sandy clay loam; moderate medium granular structure; friable; many fine roots; 5 percent, by volume, gravel; few fine flakes of mica; slightly acid; clear smooth boundary.
Bt—5 to 26 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; sticky, plastic; common distinct clay films on faces of peds; few fine and medium roots; few fine flakes of mica; moderately acid; gradual wavy boundary.
BC—26 to 37 inches; red (2.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine flakes of mica; moderately acid; gradual wavy boundary.
C1—37 to 52 inches; red (2.5YR 4/6) sandy loam saprolite; massive; friable; few fine flakes of mica; very strongly acid.
C2—52 to 62 inches; yellowish red (5YR 5/6) sandy loam saprolite; massive; friable; common fine flakes of mica; very strongly acid.

Range in Characteristics

Thickness of solum: 20 to 50 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 0 to 15 percent, by volume, throughout the profile; dominantly gravel
Reaction: Moderately acid to very strongly acid; ranging to slightly acid in the upper part of limed soils

Ap horizon:
Color—hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 4 to 8
Texture—sandy clay loam

BA horizon (if it occurs):
Color—hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 3 to 8

Texture—clay loam, sandy clay loam, or loam

Bt horizon:

Color—hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8
Mottles (if they occur)—few and random; in shades of yellow or brown
Texture—clay, clay loam, or sandy clay (fig. 26)

BC horizon:

Color—hue of 10R to 5YR, value of 4 or 5, and chroma of 6 or 8
Mottles (if they occur)—few and random; in shades of yellow or brown
Texture—clay loam, sandy clay loam, or sandy loam

C horizon:

Color—horizon is similar in color to the BC horizon or is multicolored
Texture—saprolite having loamy textures

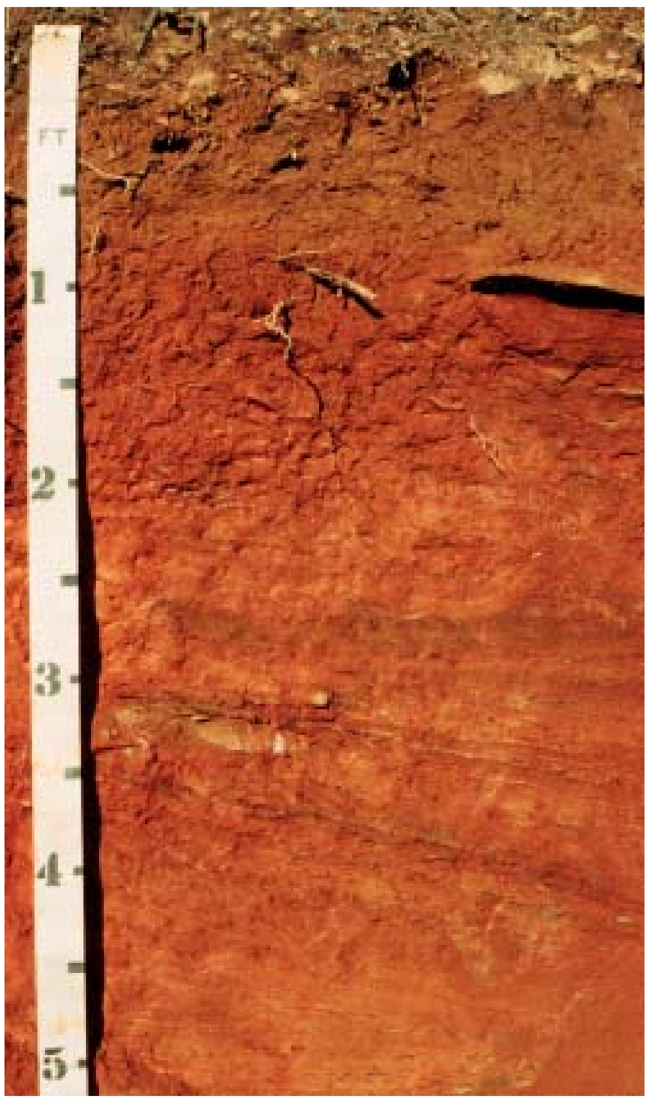

Figure 26.—A profile of Pacolet soils. These soils are very deep and red and have a clayey subsoil. The clayey part of the Bt horizon extends to a depth of less than 30 inches.

Pigeonroost Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum and soil creep that weathered mainly from high-grade metamorphic rock, such as sillimanite schist and mica schist
Landscape: Mountains
Landform: Divides
Landform position: Summits and side slopes
Slope range: 15 to 50 percent
Taxonomic class: Fine-loamy, mixed, active, mesic Typic Hapludults

Associated Soils

- Cliffield, Evard, and Cowee soils on summits and side slopes
- Tate and Greenlee soils on adjacent foot slopes and toe slopes

Typical Pedon

Pigeonroost gravelly sandy loam in an area of Cliffield-Pigeonroost complex, 30 to 50 percent slopes, very stony; about 5.9 miles northeast of Sunshine on Secondary Road 1006, about 3.7 miles northeast on Secondary Road 1732, about 1.5 miles northeast on a dirt road to Woods Gap, 2.1 miles southeast on the dirt road, 700 feet southeast of the road, in woodland; at an elevation of 2,480 feet; USGS Benn Knob, NC topographic quadrangle; lat. 35 degrees 34 minutes 41 seconds N. and long. 81 degrees 41 minutes 37 seconds W.

Oi—1 inch to 0; slightly decomposed deciduous litter.
A—0 to 3 inches; brown (10YR 4/3) gravelly sandy loam; weak fine granular structure; very friable; many fine and medium and few coarse roots; 15 percent, by volume, gravel, 5 percent cobbles, and 5 percent stones; few fine flakes of mica; very strongly acid; clear smooth boundary.
Bt1—3 to 12 inches; dark yellowish brown (10YR 4/6) gravelly sandy clay loam; weak fine subangular blocky structure; friable; slightly sticky, slightly plastic; common fine and medium and few coarse roots; 10 percent, by volume, gravel and 5 percent cobbles; few fine flakes of mica; very strongly acid; gradual wavy boundary.
Bt2—12 to 26 inches; strong brown (7.5YR 4/6) gravelly sandy clay loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; common fine and medium roots; 20 percent, by volume, gravel and 5 percent cobbles; few fine flakes of mica; very strongly acid; clear wavy boundary.
Cr—26 to 61 inches; soft, weathered sillimanite schist or mica schist bedrock.

Range in Characteristics

Thickness of solum: 15 to 40 inches
Depth to bedrock: 20 to 40 inches to soft bedrock; 40 inches or more to hard bedrock
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 5 to 35 percent in the lower horizons; dominantly gravel
Reaction: Moderately acid to extremely acid

A horizon:
Color—hue of 10YR, value of 3 to 5, and chroma of 2 to 4
Texture—gravelly sandy loam

BA or BE horizon (if it occurs):
Color—hue of 10YR or 7.5YR and value and chroma of 3 to 6
Texture—loam, sandy loam, or sandy clay loam in the fine-earth fraction

Bt horizon:
Color—hue of 10YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8
Texture—sandy clay loam, clay loam, or loam in the fine-earth fraction

BC or CB horizon (if it occurs):
Color—hue of 10YR to 7.5YR, value of 4 to 8, and chroma of 3 to 8
Texture—clay loam, sandy loam, fine sandy loam, or loam in the fine-earth fraction

C horizon (if it occurs):
Color—horizon is similar in color to the BC horizon or is multicolored
Texture—saprolite having loamy textures in the fine-earth fraction

Cr horizon:
Texture—soft, weathered sillimanite schist and mica schist that can be dug with difficulty using hand tools

Rion Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum and soil creep that weathered mainly from high-grade metamorphic rock, such as biotite gneiss and migmatitic gneiss
Landscape: Piedmont
Landform: Divides
Landform position: Side slopes
Slope range: 25 to 60 percent
Taxonomic class: Fine-loamy, mixed, semiactive, thermic Typic Hapludults

Associated Soils

- Pacolet, Bethlehem, Cliffside, and Ashlar soils on side slopes

Typical Pedon

Rion sandy loam, 25 to 45 percent slopes; about 8.3 miles west of Rutherfordton on U.S. Highway 64, about 2.4 miles northwest on Secondary Road 1340, about 0.6 mile east on Secondary Road 1337, about 400 feet southeast, in cutover woodland; at an elevation of 1,020 feet; USGS Shingle Hollow, NC topographic quadrangle; lat. 35 degrees 27 minutes 05 seconds N. and long. 82 degrees 05 minutes 51 seconds W.

A—0 to 5 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium granular structure; very friable; many fine and medium and few coarse roots; 5 percent, by volume, gravel; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt1—5 to 17 inches; strong brown (7.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; few very faint clay films on faces of peds; common fine and medium roots; 5 percent, by volume, gravel; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt2—17 to 25 inches; yellowish red (5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; slightly sticky, slightly plastic; few faint clay films on faces of peds; few fine and medium roots; common fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—25 to 38 inches; yellowish red (5YR 4/8) and red (2.5YR 4/8) sandy clay loam; few pockets of sandy loam saprolite; weak fine subangular blocky structure; friable; few fine and medium roots; common fine flakes of mica; very strongly acid; gradual wavy boundary.

C—38 to 62 inches; yellowish red (5YR 4/8) sandy loam saprolite; massive; very friable; common fine flakes of mica; very strongly acid.

Range in Characteristics

Thickness of solum: 20 to 40 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 0 to 15 percent, by volume, throughout the profile; dominantly gravel
Reaction: Slightly acid to very strongly acid

A horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 6
Texture—sandy loam

Bt horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 8
Texture—sandy clay loam or clay loam

BC horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8
Mottles (if they occur)—few or common; in shades of red, yellow, or brown
Texture—sandy clay loam, clay loam, loam, fine sandy loam, or sandy loam

C horizon:
Color—horizon is similar in color to the BC horizon or is multicolored
Texture—saprolite having variable textures that range from sandy clay loam to loamy sand

Saw Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Residuum that weathered mainly from intrusive rock, such as granitic gneiss
Landscape: Piedmont
Landform: Divides
Landform position: Summits and side slopes
Slope range: 2 to 25 percent
Taxonomic class: Fine, kaolinitic, thermic Typic Kanhapludults

Associated Soils

- Pacolet, Bethlehem, and Ashlar soils on summits and side slopes

Typical Pedon

Saw sandy loam in an area of Pacolet-Saw complex, 2 to 8 percent slopes, eroded; about 3.0 miles east of Harris on Secondary Road 2125, about 0.2 mile south of Secondary Road 2125 on a gravel road, 1,300 feet southeast along a power line, in pasture; at an elevation of 839 feet; USGS Chesnee, SC-NC topographic quadrangle;

lat. 35 degrees 14 minutes 55 seconds N. and long. 81 degrees 48 minutes 30 seconds W.

Ap—0 to 7 inches; strong brown (7.5YR 4/6) sandy loam; weak medium granular structure; friable; common fine and medium roots; 5 percent, by volume, gravel; few fine flakes of mica; slightly acid; clear smooth boundary.
Bt1—7 to 19 inches; yellowish red (5YR 4/6) sandy clay; moderate medium subangular blocky structure; firm; sticky, plastic; few distinct clay films on faces of peds; few fine roots; 5 percent, by volume, gravel; common fine flakes of mica; moderately acid; gradual wavy boundary.
Bt2—19 to 25 inches; strong brown (7.5YR 5/6) sandy clay; common medium distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; 10 percent, by volume, gravel; common fine flakes of mica; strongly acid; gradual wavy boundary.
C—25 to 28 inches; multicolored gravelly sandy loam saprolite; massive; very friable; 15 percent, by volume, gravel; common fine flakes of mica; strongly acid; clear wavy boundary.
R—28 inches; hard granitic gneiss bedrock.

Range in Characteristics

Thickness of solum: 19 to 33 inches
Depth to bedrock: 20 to 40 inches
Content and size of rock fragments: 0 to 35 percent, by volume, in the A and C horizons and 0 to 15 percent in the B horizon; dominantly gravel
Reaction: Moderately acid to very strongly acid; ranging to neutral in the upper part of limed soils

Ap horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 6
Texture—sandy loam

BA horizon (if it occurs):
Color—hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—sandy clay loam or clay loam

Bt horizon:
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 or 8
Texture—clay loam, sandy clay, or clay in the fine-earth fraction

BC horizon (if it occurs):
Color—hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 6 or 8
Texture—sandy loam, clay loam, or sandy clay loam

C horizon:
Color—horizon is similar in color to the BC horizon or is multicolored
Texture—saprolite having sandy loam textures in the fine-earth fraction

Cr horizon (if it occurs):
Texture—soft, weathered granitic gneiss bedrock that can be dug with difficulty using hand tools

R layer:
Texture—hard granitic gneiss bedrock that cannot be dug using hand tools

Skyuka Series

Depth class: Very deep
Drainage class: Well drained

Permeability: Moderate
Parent material: Old alluvium from mixed geologic sources
Landscape: Piedmont
Landform: Low stream terraces
Landform position: Planar to slightly concave foot slopes
Slope range: 2 to 6 percent
Taxonomic class: Fine, mixed, semiactive, thermic Ultic Hapludalfs

Associated Soils

- Dogue soils on adjacent low stream terraces and toe slopes
- Hiwassee soils on adjacent high stream terraces
- Chewacla, Buncombe, and Toccoa soils on adjacent flood plains

Typical Pedon

Skyuka loam, 2 to 6 percent slopes; about 4.3 miles south of Harris on Secondary Road 1111 to an industrial facility access road, 1.0 mile southeast on the access road, 0.2 mile south of the road, 0.2 mile east of the Broad River, in cropland; at an elevation of 705 feet; USGS Fingerville, SC-NC topographic quadrangle; lat. 35 degrees 12 minutes 12 seconds N. and long. 81 degrees 52 minutes 59 seconds W.

Ap—0 to 6 inches; brown (10YR 4/3) loam; moderate medium granular structure; very friable; few fine and medium roots; few fine flakes of mica; slightly alkaline; clear smooth boundary.

BA—6 to 11 inches; brown (7.5YR 4/4) clay loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; few faint clay films on faces of peds; few fine roots; few fine soft irregular masses of iron and manganese; few fine flakes of mica; neutral; gradual wavy boundary.

Bt1—11 to 21 inches; strong brown (7.5YR 4/6) clay; moderate medium subangular blocky structure; firm; sticky, plastic; common faint clay films on faces of peds; common fine and medium soft irregular masses of iron and manganese; few fine flakes of mica; neutral; gradual wavy boundary.

Bt2—21 to 33 inches; strong brown (7.5YR 5/6) clay; few fine distinct reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; firm; sticky, plastic; few faint clay films on faces of peds; common fine and medium soft irregular masses of iron and manganese; few fine flakes of mica; neutral; gradual wavy boundary.

Bt3—33 to 52 inches; strong brown (7.5YR 5/6) clay; few fine prominent yellowish red (5YR 4/6) and common medium faint strong brown (7.5YR 4/6) mottles; moderate medium subangular blocky structure; firm; sticky, plastic; few faint clay films on faces of peds; many fine and medium soft irregular masses of iron and manganese; few fine flakes of mica; neutral; clear smooth boundary.

BC—52 to 65 inches; yellowish red (5YR 5/6) clay loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; few fine soft irregular masses of iron and manganese and few medium distinct grayish brown (10YR 5/2) iron depletions; few fine flakes of mica; slightly acid.

Range in Characteristics

Thickness of solum: 48 to more than 60 inches
Depth to bedrock: More than 72 inches
Content of rock fragments: 0 to 15 percent, by volume, throughout the profile
Reaction: Slightly acid to strongly acid; less acid in the upper part of limed soils

Ap horizon:
Color—hue of 5YR or 10YR and value and chroma of 2 to 4
Texture—loam

BA horizon:
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 4 to 6
Texture—loam, sandy clay loam, or clay loam

Bt horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8
Mottles—few to many in shades of red, yellow, or brown
Texture—clay loam, clay, or sandy clay
Redoximorphic features (below a depth of 48 inches)—iron depletions in shades of brown or gray and masses of iron accumulation in shades of brown or yellow

BC horizon:
Color—similar to the Bt horizon
Texture—sandy clay loam, clay loam, or loam
Redoximorphic features—iron depletions in shades of brown or gray and masses of iron accumulation in shades of yellow, brown, or red

BCc horizon (if it occurs):
Color—similar to the BC horizon
Texture—similar to the BC horizon; horizon has many hard iron and manganese concretions that are gravel sized

C horizon (if it occurs):
Color—hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 8
Mottles—horizon has few to many mottles in shades of red, yellow, gray, or brown or is multicolored
Texture—loam, fine sandy loam, sandy loam, clay loam, sandy clay loam, or silty clay loam; thin strata of loamy sand or sandy clay occur in some pedons

Tate Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Colluvium derived from felsic, high-grade metamorphic rock
Landscape: Mountains
Landform: Colluvial fans
Landform position: Foot slopes and toe slopes
Slope range: 2 to 50 percent
Taxonomic class: Fine-loamy, mixed, semiactive, mesic Typic Hapludults

Associated Soils

- Greenlee and Toecane soils on adjacent foot slopes and toe slopes
- Ostin and Bandana soils on adjacent flood plains
- Evard, Cowee, Ashe, and Cleveland soils on adjacent side slopes

Typical Pedon

Tate cobbly sandy loam in an area of Greenlee-Tate complex, 15 to 30 percent slopes, extremely bouldery; about 12.3 miles west of Rutherfordton on U.S. Highway 64, about 1.8 miles north on Secondary Road 1008, about 2.5 miles west on Secondary Road 1306, about 0.8 mile north on an access road through a golf course, 0.3 mile north on Winesap Road to its end, 500 feet north and 100 feet west, in woodland; at an elevation of 1,360 feet; USGS Lake Lure, NC topographic quadrangle; lat. 35 degrees 28 minutes 01 second N. and long. 82 degrees 09 minutes 28 seconds W.

Oi—1 inch to 0; slightly decomposed deciduous and coniferous litter.

A—0 to 5 inches; dark brown (10YR 3/3) cobbly sandy loam; weak medium granular structure; very friable; many fine and medium and common coarse roots; 10 percent, by volume, gravel, 10 percent cobbles, and 5 percent stones; few fine flakes of mica; very strongly acid; clear smooth boundary.

E—5 to 10 inches; dark yellowish brown (10YR 4/6) cobbly sandy loam; weak medium granular structure; very friable; many fine and medium and common coarse roots; 10 percent, by volume, gravel, 10 percent cobbles, and 5 percent stones; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BE—10 to 22 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; 10 percent, by volume, gravel, 5 percent cobbles, and 5 percent stones; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt—22 to 51 inches; strong brown (7.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky, slightly plastic; few faint clay films on faces of peds; few fine and medium roots; 5 percent, by volume, gravel and 5 percent cobbles; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—51 to 61 inches; strong brown (7.5YR 5/8) sandy loam; common medium pockets of sandy clay loam; common coarse distinct yellowish red (5YR 5/8) and few fine prominent red (2.5YR 4/8) mottles; weak medium subangular blocky structure; friable; few fine roots; 5 percent, by volume, gravel and 5 percent cobbles; few fine flakes of mica; very strongly acid.

Range in Characteristics

Thickness of solum: 24 to more than 60 inches

Depth to bedrock: More than 60 inches

Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 5 to 35 percent in the lower horizons; dominantly ranging from gravel to stones

Reaction: Slightly acid to very strongly acid

A horizon:

Color—hue of 10YR, value of 3 to 6, and chroma of 2 to 4

Texture—cobbly sandy loam or sandy loam

E horizon:

Color—hue of 10YR, value of 4 to 6, and chroma of 3 to 6

Texture—sandy loam, loam, or fine sandy loam in the fine-earth fraction

BE horizon:

Color—hue of 7.5YR to 10YR, value of 4 or 5, and chroma of 3 to 6

Texture—sandy loam, sandy clay loam, or loam in the fine-earth fraction

Bt horizon:

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8

Mottles (if they occur)—few or common in shades of red or yellow

Texture—sandy clay loam, clay loam, or loam in the fine-earth fraction

Redoximorphic features (if they occur)—iron depletions in shades of gray below a depth of 24 inches

BC horizon (if it occurs):

Color—similar to the Bt horizon

Texture—sandy clay loam, clay loam, loam, fine sandy loam, or sandy loam in the fine-earth fraction

C horizon:
Color—variable
Texture—loamy or sandy; sandy textures restricted to horizons below a depth of 40 inches

Toccoa Series

Depth class: Very deep
Drainage class: Moderately well drained or well drained
Permeability: Moderately rapid
Parent material: Recent alluvium from mixed geologic sources (fig. 27)
Landscape: Piedmont
Landform: Flood plains
Landform position: Planar to slightly convex slopes
Slope range: 0 to 3 percent
Taxonomic class: Coarse-loamy, mixed, semiactive, nonacid, thermic Typic Udifluvents

Associated Soils

- Chewacla, Buncombe, and Wehadkee soils on flood plains
- Skyuka and Dogue soils on low stream terraces

Typical Pedon

Toccoa sandy loam, 0 to 3 percent slopes, occasionally flooded; about 6.3 miles southwest of Rutherfordton on N.C. Highway 108, about 1,400 feet south, in pasture; at an elevation of 760 feet; USGS Pea Ridge, NC topographic quadrangle; lat. 35 degrees 19 minutes 32 seconds N. and long. 82 degrees 01 minute 42 seconds W.

Ap—0 to 12 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium granular structure; very friable; many fine and few medium roots; common fine flakes of mica; slightly acid; clear smooth boundary.
C1—12 to 22 inches; dark yellowish brown (10YR 4/6) loam; massive; very friable; few fine and medium roots; common fine flakes of mica; moderately acid; clear smooth boundary.
C2—22 to 35 inches; yellowish brown (10YR 5/4) loam; massive; very friable; common fine flakes of mica; moderately acid; clear smooth boundary.
C3—35 to 50 inches; dark yellowish brown (10YR 4/4) loam; massive; very friable; common fine flakes of mica; moderately acid; clear smooth boundary.
C4—50 to 62 inches; dark yellowish brown (10YR 4/6) loamy sand; single grained; loose; common fine flakes of mica; moderately acid.

Range in Characteristics

Depth to bedrock: More than 60 inches
Content and size of rock fragments: 0 to 5 percent, by volume, in the control section; dominantly gravel
Reaction: Slightly acid to strongly acid; less acid in the upper part of limed soils

Ap horizon:
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 6
Texture—sandy loam

C horizon:
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—fine sandy loam or sandy loam; stratified sandy and loamy textures commonly occur below a depth of 40 inches

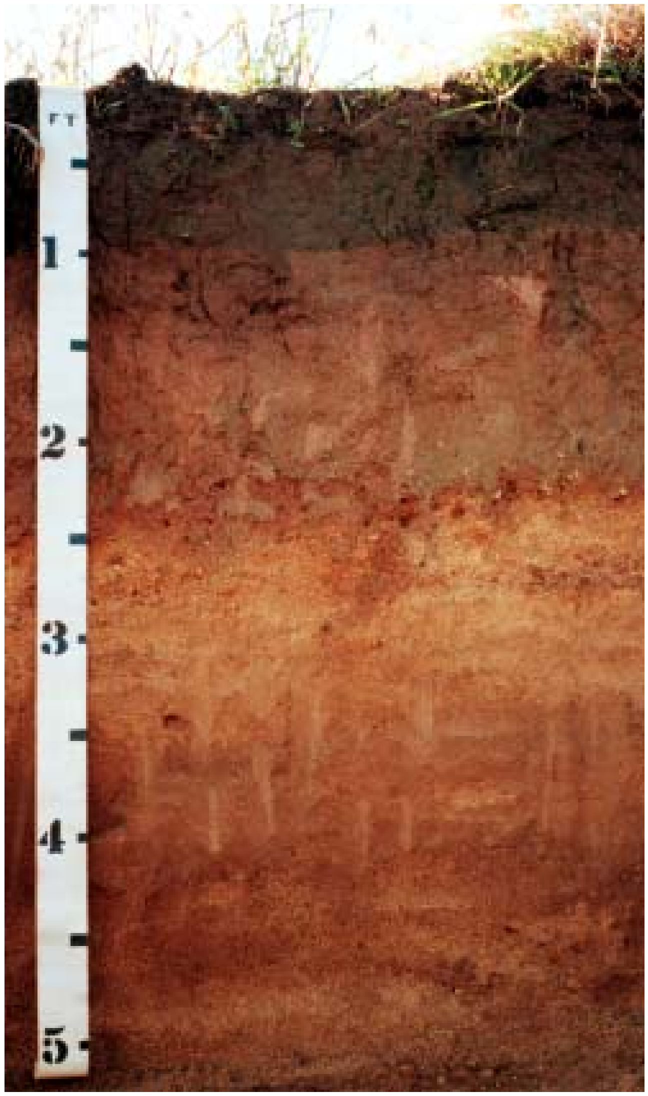

Figure 27.—A profile of Toccoa soils. These moderately well drained or well drained, very deep soils are on flood plains. They formed in recent alluvium from mixed geologic sources. Depth to bedrock is more than 60 inches.

Redoximorphic features (if they occur)—iron or clay depletions in shades of gray below a depth of 20 inches

Ab horizon (if it occurs), below a depth of 24 inches:
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4
Texture—similar to the Ap horizon

C´ horizon (if it occurs):
Color—similar to the C horizon
Texture—similar to the C horizon

Toecane Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Parent material: Colluvium from mixed geologic sources
Landscape: Mountains
Landform: Colluvial fans
Landform position: Foot slopes and toe slopes
Slope range: 15 to 30 percent
Taxonomic class: Loamy-skeletal, mixed, mesic Humic Hapludults

Associated Soils

- Tate soils on adjacent foot slopes and toe slopes
- Edneyville, Chestnut, Ashe, and Cleveland soils on adjacent side slopes

Typical Pedon

Toecane cobbly loam in an area of Toecane-Tusquitee complex, 15 to 30 percent slopes, very stony; in Buncombe County, North Carolina, 13.1 miles north from Asheville on U.S. Highway 19/23 to Barnardsville exit, 13.7 miles east on N.C. Highway 197, about 15 feet northeast of the road, in woodland near an intermittent drainageway, 0.6 mile northeast of Cane River Gap; USGS Mount Mitchell, NC topographic quadrangle; lat. 35 degrees 48 minutes 43 seconds N. and long. 82 degrees 21 minutes 24 seconds W.

Oi—2 inches to 0; slightly decomposed leaf litter.

A—0 to 4 inches; very dark brown (10YR 2/2) cobbly loam; weak fine granular structure; very friable; many very fine and fine and few medium roots; few fine and medium pores; few very fine flakes of mica; 5 percent, by volume, pebbles and 10 percent cobbles; extremely acid; gradual wavy boundary.

AE—4 to 8 inches; dark brown (10YR 3/3) cobbly loam; weak fine granular structure; very friable; many very fine and fine roots; few very fine and fine pores; few very fine and fine flakes of mica; 10 percent, by volume, pebbles and 10 percent cobbles; strongly acid; gradual wavy boundary.

Bt1—8 to 17 inches; yellowish brown (10YR 5/6) cobbly loam; weak medium subangular blocky structure; friable; common very fine and fine roots; few fine pores; few very fine and fine flakes of mica; 10 percent, by volume, pebbles and 15 percent cobbles; strongly acid; gradual wavy boundary.

Bt2—17 to 31 inches; yellowish brown (10YR 5/4) very cobbly sandy clay loam; weak medium subangular blocky structure; friable; common very fine and fine roots; few very fine and fine flakes of mica; 15 percent, by volume, pebbles, 20 percent cobbles, and 5 percent stones; very strongly acid; gradual wavy boundary.

BC—31 to 38 inches; strong brown (7.5YR 5/6) very cobbly sandy loam; weak medium subangular blocky structure; very friable; few fine roots; few very fine and fine flakes of mica; 15 percent, by volume, pebbles, 20 percent cobbles, and 10 percent stones; strongly acid; gradual wavy boundary.

C—38 to 62 inches; dark yellowish brown (10YR 4/4) extremely cobbly loamy sand; massive; few fine roots; common very fine and fine flakes of mica; 20 percent, by volume, pebbles, 30 percent cobbles, and 20 percent stones; moderately acid.

Range in Characteristics

Thickness of solum: 30 to more than 60 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 15 to 60 percent, by volume, in the A and B horizons and 15 to 80 percent in the C horizon; averaging more than 35 percent in

the 10- to 40-inch particle-size control section; dominantly ranging from gravel to stones and including some boulders
Reaction: Moderately acid to extremely acid

A horizon:
Color—hue of 7.5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 3
Texture—sandy loam, fine sandy loam, sandy clay loam, or loam

E or Eb horizon (if it occurs):
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 6
Texture—loamy coarse sand, loamy sand, loamy fine sand, fine sandy loam, or loam in the fine-earth fraction

Bt horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8
Texture—sandy loam, fine sandy loam, loam, or sandy clay loam in the fine-earth fraction

BC horizon (if it occurs):
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8
Texture—similar to the Bw horizon in the fine-earth fraction

C horizon:
Color—similar to the BC horizon
Texture—loamy to sandy in the fine-earth fraction

Tusquitee Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Parent material: Colluvium derived primarily from high-grade metamorphic or igneous rock
Landscape: Mountains
Landform: Colluvial fans
Landform position: Foot slopes and toe slopes
Slope range: 15 to 30 percent
Taxonomic class: Coarse-loamy, isotic, mesic Umbric Dystrochrepts

Associated Soils

- Edneyville, Chestnut, Ashe, and Cleveland soils on adjacent side slopes

Typical Pedon

Tusquitee loam in an area of Toecane-Tusquitee complex, 30 to 50 percent slopes, very bouldery; in Buncombe County, North Carolina, 13.1 miles north from Asheville on U.S. Highway 19/23 to Barnardsville exit, 13.6 miles east on N.C. Highway 197, about 50 feet southwest on U.S. Forest Service Road 5553, about 5 feet north, in a road cut in woodland, 0.7 mile northwest of Cane River Gap; at an elevation of 4 feet; USGS Mount Mitchell, NC topographic quadrangle; lat. 35 degrees 21 minutes 29 seconds N. and long. 82 degrees 21 minutes 29 seconds W.

Oi—1 inch to 0; partly decayed organic matter.
A1—0 to 6 inches; very dark brown (10YR 2/2) fine sandy loam; moderate medium granular structure; very friable; many very fine and fine roots; few fine flakes of mica; 2 percent, by volume, pebbles; strongly acid; clear wavy boundary.
A2—6 to 9 inches; dark brown (10YR 3/3) fine sandy loam; moderate medium granular structure; very friable; many very fine and common fine roots; few fine

flakes of mica; 5 percent, by volume, pebbles; moderately acid; clear irregular boundary.

Bw1—9 to 22 inches; strong brown (7.5YR 4/6) fine sandy loam; weak medium subangular blocky structure; very friable; common very fine and fine roots; few fine flakes of mica; 2 percent, by volume, pebbles and 4 percent cobbles; strongly acid; gradual wavy boundary.

Bw2—22 to 31 inches; brown (7.5YR 4/4) loam; weak medium subangular blocky structure; very friable; common very fine and fine roots; few fine flakes of mica; 4 percent, by volume, pebbles and 6 percent cobbles; strongly acid; diffuse wavy boundary.

Bw3—31 to 42 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; very friable; few very fine and common fine roots; few fine and medium flakes of mica; 4 percent, by volume, pebbles and 6 percent cobbles; strongly acid; diffuse wavy boundary.

Bw4—42 to 71 inches; yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure; very friable; few very fine and fine roots; few fine and medium flakes of mica; 10 percent, by volume, pebbles and 3 percent cobbles; strongly acid; gradual wavy boundary.

Bw5—71 to 86 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few very fine roots; common fine flakes of mica; 10 percent, by volume, pebbles and 3 percent cobbles; strongly acid.

Range in Characteristics

Thickness of solum: 40 to more than 60 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 0 to 35 percent in the B and C horizons; 0 to 60 percent below a depth of 40 inches; dominantly ranging from gravel to stones and including some boulders
Reaction: Slightly acid to very strongly acid in the surface layer, except in limed areas; moderately acid to very strongly acid in the lower horizons

A horizon:
Color—hue of 7.5YR to 10YR, value of 2 or 3, and chroma of 1 to 4
Texture—fine sandy loam, sandy loam, loam, or sandy clay loam in the fine-earth fraction

Bw horizon:
Color—hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 3 to 8
Texture—sandy loam or loam in the fine-earth fraction

BC horizon (if it occurs):
Color—similar to the Bw horizon
Texture—similar to the Bw horizon in the fine-earth fraction

C horizon (if it occurs):
Color—similar to the Bw horizon
Texture—fine sandy loam, sandy loam, loam, or loamy fine sand in the fine-earth fraction

Udifluvents

Depth class: Very deep to shallow
Drainage class: Moderately well drained or well drained
Permeability: Moderately rapid to very rapid
Parent material: Recent alluvium from mixed geologic sources
Landscape: Mountains and Piedmont

Landform: Areas where the natural soil properties and qualities have been greatly altered by excavation or intensive grading or areas covered by earthy fill material
Landform position: Planar to slightly concave slopes away from the stream channel
Slope range: 0 to 2 percent

Associated Soils

- Fluvaquents

Typical Pedon

A typical pedon is not given for these soils because of their variability. Udifluvents commonly are sandy in the upper part and consist of sand, gravel, and cobbles in the lower part, or they have sand, gravel, and cobbles throughout.

Range in Characteristics

Thickness of solum: Variable
Depth to bedrock: More than 72 inches
Content and size of rock fragments: 0 to 35 percent, by volume, throughout the profile; dominantly gravel
Reaction: Extremely acid to neutral

Udorthents

Depth class: Very deep to shallow
Drainage class: Somewhat excessively drained to somewhat poorly drained
Permeability: Very slow to moderately rapid
Parent material: Fill areas—mixtures of natural soil material; excavated areas—variable, depending on the type of underlying bedrock
Landscape: Mountains and Piedmont
Landform: Areas where the natural soil properties and qualities have been greatly altered by excavation or intensive grading or areas covered by earthy fill material
Slope range: 0 to 95 percent; dominantly 0 to 15 percent

Typical Pedon

A typical pedon is not given for these soils because of their variability. The excavated areas are mainly borrow pits from which the soil material has been removed and used as a foundation for roads or buildings or as topsoil. The fill areas are sites where at least 20 inches of loamy, earthy fill material covers borrow pits, landfills, natural drainageways, or flood plains.

Udorthents have colors in shades of red, brown, yellow, and gray. The texture is variable but typically loamy. Landfills have layers of material other than soil that are covered with loamy soil material.

Range in Characteristics

Depth to bedrock: 10 to more than 60 inches
Content and size of rock fragments: Variable; averaging 0 to 35 percent, by volume, to a depth of 40 inches; dominantly ranging from gravel to stones
Reaction: Slightly acid to extremely acid

Wehadkee Series

Depth class: Very deep
Drainage class: Poorly drained

Permeability: Moderate
Parent material: Recent alluvium from mixed geologic sources
Landscape: Piedmont
Landform: Flood plains
Landform position: Slightly concave slopes
Slope range: 0 to 2 percent
Taxonomic class: Fine-loamy, mixed, semiactive, nonacid, thermic Typic Fluvaquents

Associated Soils

- Chewacla soils on flood plains
- Skyuka, Dogue, and Worsham soils on adjacent stream terraces

Typical Pedon

Wehadkee silt loam, 0 to 2 percent slopes, frequently flooded; about 5 miles south of Rutherfordton on U.S. Highway 221 to Secondary Road 2171, about 1 mile east to Secondary Road 2169, about 0.4 mile south to a woodland trail, 0.3 mile west to a flood plain; at an elevation of 930 feet; USGS Rutherfordton South, NC topographic quadrangle; lat. 35 degrees 18 minutes 21 seconds N. and long. 82 degrees 54 minutes 49 seconds W.

A—0 to 6 inches; dark grayish brown (2.5Y 4/2) silt loam; weak medium granular structure; very friable; common fine and medium roots; few fine flakes of mica; slightly acid; clear smooth boundary.
Bg—6 to 20 inches; dark gray (5Y 4/1) silty clay loam; weak medium subangular blocky structure; friable; sticky, slightly plastic; few fine and medium roots; common medium distinct olive brown (2.5Y 4/4) masses of iron accumulation; few fine flakes of mica; moderately acid; clear smooth boundary.
Cg1—20 to 48 inches; dark gray (5Y 4/1) sandy loam; weak medium subangular blocky structure; friable; 5 percent, by volume, gravel; few fine flakes of mica; moderately acid; clear smooth boundary.
Cg2—48 to 62 inches; gray (10YR 5/1) sandy loam; massive; very friable; 10 percent, by volume, gravel; few fine flakes of mica; moderately acid.

Range in Characteristics

Thickness of solum: 20 to more than 60 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: Less than 5 percent, by volume, in horizons within a depth of 40 inches and 0 to 35 percent in horizons below a depth of 40 inches; dominantly gravel
Reaction: Slightly acid to very strongly acid throughout the profile; neutral to moderately acid in some part between depths of 10 and 40 inches

A horizon:
Color—horizon has hue of 10YR or 2.5Y or is neutral in hue, has value of 4 to 6, and has chroma of 0 to 4
Mottles (if they occur)—few or common; in shades of brown
Texture—silt loam

Bg horizon:
Color—horizon has hue of 10YR to 5Y or is neutral in hue, has value of 4 to 6, and has chroma of 0 to 2
Texture—silt loam, silty clay loam, sandy clay loam, loam, or clay loam
Redoximorphic features—masses of iron accumulation in shades of red, yellow, or brown

Cg horizon:

Color—horizon has hue of 10YR to 5Y or is neutral in hue, has value of 4 to 7, and has chroma of 0 to 2

Texture—horizon is loam or sandy loam or is stratified with layers of silty clay loam, loamy sand, sandy clay loam, clay loam, sand, or gravel

Redoximorphic features (if they occur)—masses of iron accumulation in shades of red, yellow, or brown

Worsham Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow or very slow
Parent material: Colluvium and local alluvium or residuum
Landscape: Piedmont
Landform: Heads of drainageways
Landform position: Planar to slightly concave foot slopes
Slope range: 1 to 6 percent; dominantly 1 to 3 percent
Taxonomic class: Fine, mixed, active, thermic Typic Endoaquults

Associated Soils

- Helena soils on adjacent foot slopes
- Chewacla and Wehadkee soils on adjacent flood plains
- Cecil, Pacolet, and Appling soils on adjacent summits and side slopes

Typical Pedon

Worsham loam in an area of Helena-Worsham complex, 1 to 6 percent slopes; about 3.4 miles south of Harris on Secondary Road 1111, about 7.3 miles west on Secondary Road 1112, about 2.1 miles southwest on Secondary Road 1104, about 1,450 feet southeast of the road, in woodland; at an elevation of 908 feet; USGS Fingerville, SC-NC topographic quadrangle; lat. 35 degrees 11 minutes 32 seconds N. and long. 81 degrees 57 minutes 53 seconds W.

A—0 to 3 inches; dark grayish brown (2.5Y 4/2) loam; moderate medium granular structure; friable; common fine and medium and few coarse roots; few fine flakes of mica; strongly acid; clear smooth boundary.

BEg—3 to 11 inches; grayish brown (2.5Y 5/2) clay loam; moderate medium subangular blocky structure; friable; common fine and medium and few coarse roots; few fine flakes of mica; strongly acid; gradual wavy boundary.

Btg1—11 to 28 inches; gray (10YR 5/1) clay; moderate medium subangular blocky structure; firm; sticky, plastic; common distinct clay films on faces of peds; common fine and medium roots; common medium distinct yellowish brown (10YR 5/6) and few fine prominent yellowish red (5YR 5/6) masses of iron accumulation; few fine flakes of mica; strongly acid; gradual wavy boundary.

Btg2—28 to 37 inches; gray (10YR 6/1) clay; moderate medium subangular blocky structure; firm; sticky, plastic; common distinct clay films on faces of peds; common fine and medium roots; 10 percent, by volume, gravel; few fine prominent yellowish red (5YR 5/6) masses of iron accumulation; few fine flakes of mica; strongly acid; gradual wavy boundary.

BCg—37 to 45 inches; gray (10YR 5/1) sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky; few distinct clay films on faces of peds; 10 percent, by volume, gravel; common fine flakes of mica; strongly acid; gradual wavy boundary.

Cg1—45 to 58 inches; very dark gray (10YR 3/1) sandy clay loam that is stratified with lenses of sandy loam and clay loam; massive; very friable; slightly sticky; 10 percent, by volume, gravel; common fine flakes of mica; very strongly acid; gradual wavy boundary.

Cg2—58 to 65 inches; light brownish gray (2.5Y 6/2) sandy loam saprolite; very friable; 5 percent, by volume, gravel; many fine flakes of mica; very strongly acid.

Range in Characteristics

Thickness of solum: 40 to more than 60 inches
Depth to bedrock: More than 60 inches
Content and size of rock fragments: 0 to 10 percent, by volume; dominantly gravel
Reaction: Strongly acid or very strongly acid; ranging to slightly acid in the upper part of limed soils

A horizon:
Color—hue of 10YR to 5Y, value of 2 to 6, and chroma of 0 to 3
Texture—loam

BEg or EBg horizon:
Color—hue of 10YR to 5Y, value of 5 or 6, and chroma of 0 to 2
Texture—sandy clay loam or clay loam

Btg horizon:
Color—hue of 10YR to 5Y, value of 5 or 6, and chroma of 0 to 2
Texture—sandy clay, clay loam, or clay
Redoximorphic features—masses of iron accumulation in shades of red or brown

BCg horizon:
Color—hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 0 to 2
Texture—sandy clay loam or clay loam
Redoximorphic features (if they occur)—masses of iron accumulation in shades of red or brown

Cg horizon:
Color—hue of 10YR to 5Y, value of 4 to 7, and chroma of 0 to 2
Texture—sandy loam, sandy clay loam, or clay loam

Formation of the Soils

This section describes the factors of soil formation and relates them to the soils in the survey area. It also discusses the processes of horizon development.

More specific information on parent material and landscape position for individual soils is provided in the sections “Classification of the Soils” and “Detailed Soil Map Units.” The soils in Rutherford County have been grouped according to parent material, landform position, and some important soil properties.

Factors of Soil Formation

Soils are formed by processes of the environment acting upon geologic agents, such as metamorphic, igneous, and sedimentary rocks and fluvial stream sediments. In Rutherford County the major geologic materials are high-grade metamorphic rock, such as sillimanite schist and biotite gneiss, and slightly granitic gneiss. Flood plain and terrace soils formed in alluvial material from a mixture of these sources. The characteristics of a soil are determined by the combined influence of parent material, climate, organisms, topography, and time. These five factors of soil formation are responsible for the profile development and chemical properties that differentiate soils (*5*).

Parent Material

Parent material is the unconsolidated mass from which a soil forms. The soils of Rutherford County formed in parent material that has either slowly accumulated from the weathering of consolidated bedrock or that has been transported and deposited by the forces of water and gravity.

Parent material is largely responsible for the chemical and mineralogical composition of soils and for the major differences among the soils of the county (figs. 28 and 29). Major differences in parent material, such as differences in texture, can be

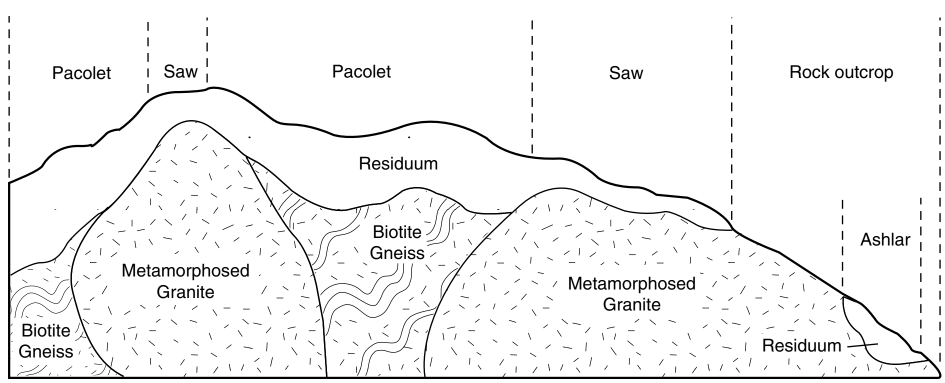

Figure 28.—A cross section of the major soils of the Pacolet-Saw general soil map unit. Areas of metamorphosed granite are more resistant to weathering. Soils in these areas are shallower to bedrock than soils in other areas.

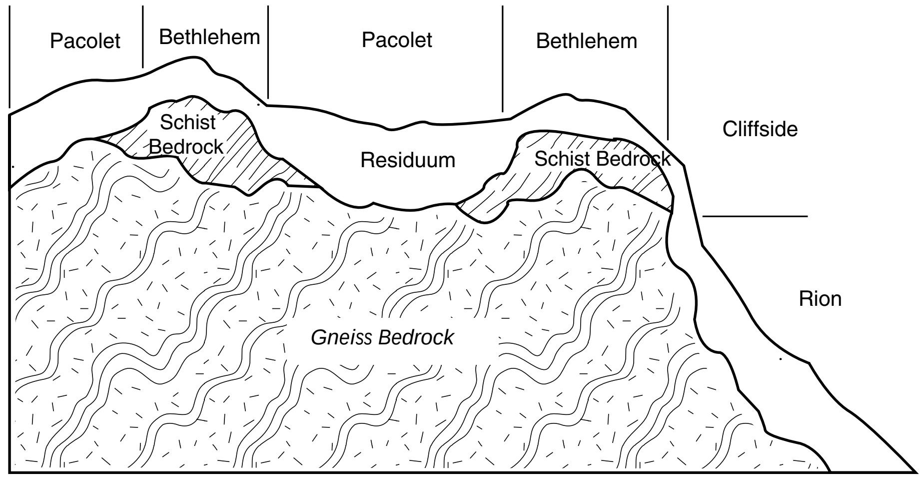

Figure 29.—A cross section of the major soils of the Pacolet-Bethlehem general soil map unit. Areas of schist are more resistant to weathering. Soils in these areas are shallower to bedrock than soils in other areas.

observed in the field. Less distinct differences, such as differences in mineralogical composition, can be determined only by careful laboratory analysis. Three main parent material groupings occur in Rutherford County. They are residuum, colluvium, and alluvium.

Residuum is unconsolidated mineral material that slowly accumulates on uplands. It forms as consolidated bedrock weathers and disintegrates in place. The kind and thickness of the accumulated residuum is, in part, related to the mineral composition of the consolidated bedrock and to the bedrock's degree of resistance to weathering. Upland soils in Rutherford County formed mainly in residuum that weathered from high-grade metamorphic rocks, such as gneiss and schist.

Generally, schist bedrock resists weathering and the formation and accumulation of residuum. As a result, many of the soils that formed in schist residuum are moderately deep to bedrock and contain numerous rock fragments. Gneiss bedrock weathers to produce a thicker residual mass than schist. Soils that formed in gneiss residuum typically are very deep to bedrock and contain few rock fragments.

Colluvium is soil material, rock fragments, or both that has moved from higher landforms and accumulated on lower slopes. The combined forces of gravity and water are responsible for the transport and deposition of colluvium. The transport and deposition can occur slowly or by sudden, swift mass movements (fig. 30). In Rutherford County, most of the soils in mountain coves and on foot slopes formed in colluvium.

The larger mountain coves are the result of sudden, swift mass movements called debris avalanches. Drastic climatic changes in ancient times may have contributed to these events. Debris avalanches produce extremely stony and bouldery colluvium. Smaller cove and foot slope landscapes are scattered throughout the mountains. The colluvium in these areas contains fewer rock fragments and was deposited slower than other types of alluvium by a process called soil creep. On uplands, soils that have steep and very steep slopes typically formed from a combination of residuum and soil creep material.

Alluvium is soil material or rock fragments, or both, that have been deposited on land by moving water. Soils that formed in recent alluvium are on active flood plains adjacent to major creeks and rivers (fig. 31). Soils that formed in old alluvium occur on the higher stream terraces and on some hill slopes, which are typically adjacent to

Figure 30.—Large boulders resulting from ancient debris avalanches are common on Greenlee-Tate complex, 15 to 30 percent slopes, extremely bouldery.

flood plains. Stream terraces are the remnants of ancient, higher flood plain levels, and most are no longer subject to deposition by recent alluvium.

Soils that formed in recent alluvium can be coarse textured or fine textured, depending upon their location on the flood plain. Coarse-textured soils commonly occur adjacent to the stream channel and on the upper reaches of flood plains, near the base of the mountains. These soils do not have a high degree of profile development and consist mainly of sand or sand and gravel. Fine-textured alluvium is deposited on the main part of the flood plain and in backwater areas adjacent to uplands. Soils that formed in fine-textured alluvium have moderate profile development and predominantly loamy textures.

Soils on stream terraces and foot slopes that formed in old alluvium have well developed profiles and horizons. They have a loamy or clayey subsoil, depending upon the geologic time period in which the alluvium was deposited. Soils that have a clayey subsoil formed in the most ancient alluvial deposits. Loamy soils formed in less ancient alluvium.

In Rutherford County, the parent material is a major factor in determining what kind of soil forms and can be correlated to some degree to geologic formations. The general soil map can serve as an approximate guide to the geology of the county.

Climate

Climate, particularly precipitation and temperature, affects the physical, chemical, and biological relationships in the soil. It influences the rate at which rocks weather and organic matter decomposes. The amount of leaching in a soil is related to the amount of rainfall and the movement of water through the soil. The effects of climate also control the kinds of plants and animals living in and on the soil. Temperature

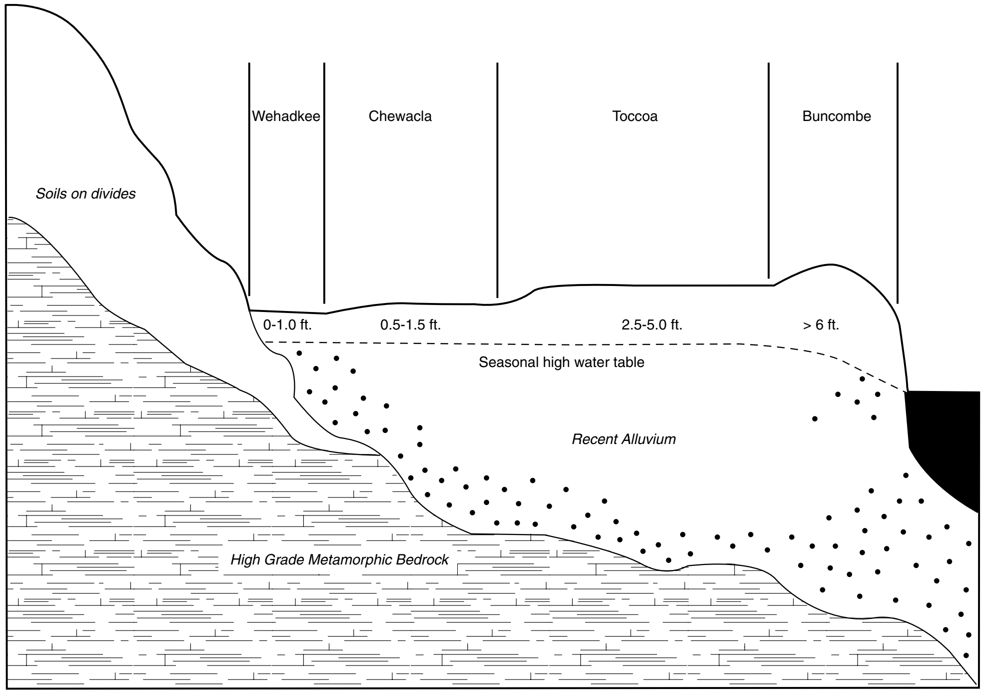

Figure 31.—A cross section showing the relationship between flood plain soils and a seasonal high water table.

influences the kind and growth of organisms and the speed of chemical and physical reactions in the soil.

The climate of Rutherford County is warm and humid. Summers are long and hot; winters are short and mild. Precipitation is distributed fairly evenly throughout the year. Local differences in climate are caused by variations in topography and elevation. At the higher elevations, mountain areas are cooler and receive more rainfall than Piedmont areas. Steep, north-facing hill slopes receive less direct sunlight, are generally cooler, and have more moisture than less sloping landscapes.

The effects of climate are reflected in the soils of Rutherford County. The present climate of warm temperatures and ample rainfall favors such physical and chemical processes as leaching, eluviation, illuviation, and oxidation. The resulting soils are generally low in organic matter and soluble bases and have an increase in clay content below the surface.

Older, dramatically different climates have had an effect on some soils. That is, some soil features probably developed under a much different climate than the present one. For example, some parent material types, such as extremely thick colluvial or alluvial deposits, would be unlikely to have formed under present climate conditions and vegetative cover. Also, the survey area has some landforms that are very old. For example, there are high stream terraces that were formerly flood plains of ancient rivers which were larger than the present-day rivers in the survey area.

Plant and Animal Life

Plants and animals influence the formation and differentiation of horizons. The type and number of organisms in and on the soil are determined in part by climate and in part by the nature of the soil material, relief, and the age of the soil. Bacteria, fungi, and other microorganisms aid in the weathering of rocks and in the decomposition of organic matter. The plants and animals that live on a soil are the primary source of organic material.

Plants largely determine the kinds and amounts of organic matter that go into a soil under normal conditions and the way in which the organic matter is added. They also are important for the changes of base status and for the leaching process of a soil.

Animals convert complex compounds into simpler forms, add organic matter to the soil, and modify certain chemical and physical properties of soil. In Rutherford County most of the organic material accumulates on the surface. It is acted upon by microorganisms, fungi, earthworms, and other forms of life and by direct chemical reaction. It is mixed with the uppermost mineral part of the soil by the activities of earthworms and other small invertebrates.

Under the native forest of this county, not enough bases are brought to the surface by plants to counteract the effects of leaching. Generally, the soils of the county developed under a hardwood forest. Trees took up elements from the subsoil and added organic matter to the soil by depositing leaves, roots, twigs, and other plant remains on the surface. The material deposited on the surface was acted upon by organisms and underwent chemical reaction.

Organic material decomposes rapidly in Rutherford County because of the moderate temperatures, the abundant moisture supply, and the character of the organic material. It decays so rapidly that little of it accumulates in the soil.

Topography

The topography of Rutherford County is a result of a combination of geomorphic processes, including uplift, slope retreat, and the dissection of the original land surface by surface waters. The processes of slope retreat and dissection of the land surface are in turn largely affected by the degree to which bedrock is resistant to weathering and by past and present climatic conditions. Topography involves features such as slope, landform position, elevation, and aspect. It influences soil formation by its effects on subsurface drainage, surface water runoff, geologic erosion, and climate.

Landform position and slope determine subsurface drainage. Soils on ridges and hill slopes in the uplands are generally convex and well drained, but some steep and very steep soils range to somewhat excessively drained. Soils on nearly level flood plains and stream terraces may have higher water tables than the upland soils. In concave areas, these soils are typically somewhat poorly drained or poorly drained. Soils on convex flood plains and stream terraces range from moderately well drained to excessively drained, depending on their specific location within these landscapes. Soil subsurface drainage affects plant and animal activity and other soil properties, including organic matter content, color, chemical properties, and the rate at which chemical reactions take place in the soil.

The greater the slope, the greater the rates of surface water runoff and geologic erosion. Water and gravity transport soil material from the steeper to the less sloping landscapes, including coves and hill slopes. As a result, most soils on the steeper landscapes have thinner profiles than soils in the lower areas, in coves and on hill slopes.

Elevation and aspect influence soil formation through their effects on climate and soil temperature. At the higher, cooler elevations and aspects, chemical weathering and biological activity take place at a slower rate than at the lower elevations in Piedmont areas. Warmer temperatures and gentler slopes in the Piedmont have contributed to the formation of many soils that have a deep, highly weathered, clayey subsoil.

Time

Time is necessary for soil formation. The length of time that soil-forming factors have acted on parent material influences the degree of soil profile development. As soils age and profile development takes place, the influence of parent material on the physical and chemical properties of a soil generally becomes less apparent. The soils in Rutherford County vary considerably in age and their degree of profile development.

Old soils generally have well developed profiles and genetically related horizons. The influence of parent material on their physical and chemical characteristics is less apparent. In Rutherford County, the oldest soils are on the less sloping upland and stream terrace landscapes. Typically, these soils have thick profiles and clayey subsoil horizons. On the steeper uplands, geologic erosion removes soil material at a rate that limits the degree of profile development. Consequently, younger soils on steep and very steep slopes have thinner profiles and less clayey subsoil horizons and the parent material shows a greater degree of influence on their properties.

The youngest soils in Rutherford County formed in recent alluvium deposited on flood plains. On these landscapes parent material is continually being added or removed by floods. Flood plain soils typically do not have well developed profiles and have many physical and chemical properties that are similar to those of their parent material.

Processes of Horizon Differentiation

One or more soil-forming processes are involved in the formation of soil horizons. These processes are the accumulation of organic matter; the leaching of carbonates and other soluble material; the chemical weathering, mainly by hydrolysis, of primary minerals into silicate clay minerals; the translocation of silicate clay and some silt-sized particles from one horizon to another; and the reduction and transfer of iron.

These processes have been active in the formation of most of the soils in Rutherford County. The interaction of the first four processes is indicated by the strongly expressed horizons in Skyuka soils. All five processes have probably been active in the formation of the moderately well drained Dogue soils.

Some organic matter has accumulated in all of the soils in the survey area. Most of the soils contain moderate amounts of organic matter in the surface layer. The content of organic matter ranges from low, as in Appling soils, to high, as in Wehadkee soils.

Most of the soils in the survey area are acid in the upper layers, unless the surface has been limed. Most of the soils formed in material that has a low content of bases, and most of the bases released by weathering have been leached out of the soils.

The translocation of clay minerals is an important process in the development of many soils in the survey area. As clay minerals are removed from the surface horizon, they accumulate as clay films on the faces of peds, in pores, and in root channels in the subsoil.

As silicate clay forms from primary minerals, some iron is commonly released as hydrated oxides. These oxides are generally red. Even if they occur in small amounts, they give the soil material a brownish color. They are largely responsible for the red to brown colors that are dominant in the subsoil of many soils in the survey area.

The reduction and transfer of iron has occurred in all of the soils that are not characterized by good natural drainage. This process, known as gleying, is evidenced by a gray matrix color and by iron or clay depletions. Some of the iron may be reoxidized and segregated and thus form yellow, brown, red, or other brightly colored masses of iron accumulation in an essentially gray matrix in the subsoil. Nodules or concretions of iron or manganese also commonly form as a result of this process. Soil features associated with chemically reduced iron are referred to as redoximorphic features *(27)*.

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Glossary

Access road. A road constructed to facilitate the use and management of the land. Access roads are designed for limited traffic and typically consist of a cut slope, a roadbed, and a fill outslope.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction in which a slope faces. Generally, cool aspects are north- to east-facing and warm aspects are south- to west-facing.

Atterberg limits. Atterberg limits are measured for soil materials passing the No. 40 sieve. They include the liquid limit (LL), which is the moisture content at which the soil passes from a plastic to a liquid state, and the plasticity index (PI), which is the water content corresponding to an arbitrary limit between the plastic and semisolid states of consistency of a soil.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Biotite. A common rock-forming mineral consisting primarily of ferromagnesian silicate minerals. Color ranges from dark brown to green in thin section. Biotite is commonly referred to as “black mica” because of the natural black color.

Borrow pits. A small area (usually less than 3 acres) where soil materials have been removed. These areas support few or no plants without major reclamation.

Borrow pit. An open excavation from which the soil and underlying material have been removed, generally for use in road construction. Borrow pits support few or no plants without major reclamation. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are reeled in while one end is lifted or the entire log is suspended.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clayey. A general textural term that includes sandy clay, silty clay, and clay. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) containing 35 percent or more clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Clod. See Aggregate, soil.

CMAI (cumulative mean annual increment). The age or rotation at which growing stock of a forest produces the greatest annual growth (for that time period). It is the age at which periodic annual growth and mean annual growth are equal.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse-loamy. According to family level criteria in the soil taxonomic system, soil containing less than 18 percent, by weight, clay and 15 percent or more fine sand or coarser material.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material is 35 to 60 percent of these rock fragments, and extremely cobbly soil material is more than 60 percent.

Colluvial fan. A fan-shaped area of soils deposited by mass-wasting (direct gravitational action) and local unconcentrated runoff on and at the base of steeper hill slopes.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane that typically takes the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the “Soil Survey Manual.”

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cove. The steep or very steep, concave colluvial area at the head of drainageways in Piedmont and mountainous areas. These areas commonly have higher tree site indexes than surrounding slopes.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Crust. A thin, hard layer of soil material that forms on the surface of cultivated areas as the result of fine soil material settling out of ponding.

Cumulative mean annual increment (CMAI). The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dbh (diameter at breast height). The diameter of a tree at 4.5 feet above the ground level on the uphill side.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Delineation. The process of drawing or plotting features on a map with lines and symbols.

Depression (depressional area). A portion of land surrounded on all sides by higher land. These areas generally do not have outlets for drainage.

Depth class. Refers to the depth to a root-restricting layer. Unless otherwise stated, this layer is understood to be consolidated bedrock. The depth classes in this survey are:

Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. A narrow, gently sloping to very steep, concave colluvial area along an intermittent or perennial stream.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Engineering index test data. Laboratory test and mechanical analysis of selected soils in the county.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Eroded (soil phase). Because of erosion, these soils have lost an average of 25 to 75 percent of the original A horizon or the uppermost 2 to 6 inches if the original A horizon was less than 8 inches thick.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Erosion classes. Classes based on estimates of past erosion. The classes are as follows:

Class 1.—Soils that have lost some of the original A horizon but on the average less than 25 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most of the area, the thickness of the surface layer is within the normal range of variability of the uneroded soil. Class 1 erosion typically is not designated in the name of the map unit or in the map symbol.

Class 2.—Soils that have lost an average of 25 to 75 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most cultivated areas of class 2 erosion, the surface layer consists of a mixture of the original A horizon and material from below. Some areas may have intricate patterns ranging from uneroded spots to spots where all of the original A horizon has been removed.

Class 3.—Soils that have lost an average of 75 percent or more of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). In most cultivated areas of class 3 erosion, material that was below the original A horizon is exposed. The plow layer consists entirely or largely of this material.

Class 4.—Soils that have lost all of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick) plus some or all of the deeper horizons throughout most of the area. The original soil can be identified only in spots. Some areas may be smooth, but most have an intricate pattern of gullies.

Erosion hazard. Terms describing the potential for future erosion, inherent in the soil itself, in inadequately protected areas. The following definitions are based on estimated annual soil loss in metric tons per hectare (values determined by the Universal Soil Loss Equation assuming bare soil conditions and using rainfall and climate factors for North Carolina):

0 tons per hectare	none
Less than 2.5 tons per hectare	slight
2.5 to 10 tons per hectare	moderate
10 to 25 tons per hectare	severe
More than 25 tons per hectare	very severe

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Evapotranspiration. The combined loss of water from a given area through surface evaporation and through transpiration by plants during a specified period.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field border. A strip of perennial vegetation (trees, shrubs, or herbaceous plants) established on the edge of a field to control erosion, provide travel lanes for farm machinery, control competition from adjacent woodland, or provide food and cover for wildlife.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine-loamy. According to family level criteria in the soil taxonomic system, soil containing 18 to 35 percent, by weight, clay and 15 percent or more fine sand or coarser material.

Fine textured soil. Sandy clay, silty clay, or clay.

Flooding. The temporary covering of the soil surface by flowing water from any source, such as overflowing streams, runoff from adjacent or surrounding slopes, and inflow from high tides. The frequency of flooding generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). The duration of flooding is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month).

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

General texture class. A broad textural grouping that describes the dominant fine-earth fraction (particles less than 2 millimeters in size) of the subsoil or layers beneath the surface layer to a depth of about 1 meter or to bedrock if the soil is shallower than 1 meter.

Clayey.—A general texture term that includes sandy clay, silty clay, or clay.

Loamy.—A general texture term that includes very coarse sandy loam, coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, sandy clay loam, and clay loam.

Sandy.—A general texture term that includes coarse sand, sand, fine sand, very fine sand, loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand.

Silty.—A general texture term that includes silt, silt loam, and silty clay loam.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Gneiss. A coarse-grained metamorphic rock in which bands rich in granular minerals alternate with bands in which schistose minerals predominate.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Gravelly spot. An area where the content of rock fragments that are mostly less than 3 inches in diameter is more than 15 percent, by volume, in the surface layer in a map unit in which the surface layer of the dominant soil or soils has less than 15 percent gravel. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A very small channel with steep sides cut by running water and through which water ordinarily runs only after rainfall, icemelt, or snowmelt. A gully generally is an obstacle to wheeled vehicles and is too deep to be obliterated by ordinary tillage. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

High-grade metamorphic rocks. Highly metamorphosed rocks, such as gneiss and schist.

High stream terrace. A terrace, commonly 20 feet or higher in elevation than the adjacent flood plain, that is no longer subject to flooding.

High water table. The highest level of a saturated zone (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the “Soil Survey Manual.” The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hornblende. A rock-forming ferromagnesian silicate mineral of the amphibole group.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation used in Rutherford County are:

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Kaolinite. An aluminosilicate clay mineral with a 1:1 layer structure; that is, a silicon tetrahedral sheet alternating with an aluminum octahedral sheet. Little or no expansion occurs when water mixes with the clay.

Landfill. An area of accumulated waste products from human activities. Landfill areas can be above or below the natural ground level. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Landform. The description of a given terrain based on position and configuration. Examples are flood plain, stream terrace, fan, mountain slope, and ridge.

Landform position. A particular place within a landform. Examples are summit of a ridge, shoulder of a ridge, nose slope, side slope, back slope, and foot slope.

Landscape. A collection of related, natural landforms; usually the land surface which can be seen in a single view.

Land shaping. The practice of scraping higher convex areas into lower concave areas to make the field nearly level and reduce ponding.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Levees. Small dikes, generally less than 50 feet wide and several hundred feet in length, used to hold back water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy. A general textural term that includes coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of loamy very fine sand or finer textured material that contains less than 35 percent clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Low stream terrace. A terrace in an area that floods, commonly 3 to 10 feet higher in elevation than the adjacent flood plain.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mean annual increment. The average yearly volume of a stand of trees from the year of origin to the age under consideration.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Micas. A group of silicate minerals characterized by sheet or scale cleavage. Biotite is the ferromagnesian black mica. Muscovite is the potassic white mica.

Microrelief. The concave to convex changes in the land surface occurring over a relatively short distance or small area, such as 1 acre.

Migmatite. A rock composed of igneous or igneous-appearing material or metamorphic material, or both.

Mine or quarry (map symbol). An open excavation from which the soil and underlying material have been removed, exposing bedrock, or the surface opening to underground mines. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.
Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.
Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.
Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.
Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.
Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.
Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).
Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.
Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.
Muscovite. A nonferromagnesian rock-forming silicate mineral with its tetrahedra arranged in sheets. Commonly called "white mica" and sometimes called potassic mica.
Native pasture. Pasture that has seeded naturally in native grasses. It is on slopes too steep to manage with modern machinery.
Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)
Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.
No-till planting. A method of planting crops in which there is virtually no seedbed preparation. A thin slice of the soil is opened, and the seed is planted at the desired depth.
Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.
Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Low	0.5 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Parent material. The unconsolidated organic and mineral material in which soil forms.
Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Perennial water. An area that generally provides water for human or livestock consumption, commonly a lake, pond, river, or stream. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piedmont. The physiographic region of central North Carolina characterized by rolling landscapes formed from the weathering of residual rock material.

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pits, quarry (mine or quarry). A small borrow pit or pit (usually less than 5 acres) where soil, gravel, or stone has been removed.

Plant competition. The likelihood of invasion or growth of undesirable species when openings are made in the canopy.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse-grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Porphyroblast. A large crystal developed in metamorphic rock by recrystallization.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Potential productivity. Relative terms assigned to classes to indicate the potential of a soil for agricultural use compared with that of other soils in the survey area. The same soil in a different survey area may have a different rating for a given use. In this survey area six classes are used for comparative ratings of soil potential. They are as follows:

Very high.—Productivity is well above local standards because soil conditions are exceptionally favorable and management costs are low in relation to the expected yields.

High.—Productivity is above local standards. Soil conditions are favorable and management costs are relatively low in relation to the expected yields.

Moderately high.—Productivity is at or slightly above local standards. Soil conditions are generally favorable; however, management costs are moderate in relation to the expected yields.

Moderate.—Productivity is at or slightly below local standards. Soil conditions are marginal, and management costs are usually high in relation to the expected yields.

Low.—Productivity is significantly below local standards. Soil conditions are generally unfavorable, and management costs are usually very high in relation to the expected yields.

Very low.—Productivity is much below local standards. Soil conditions are unfavorable, and management costs usually exceed economic returns.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Ridge. A long, narrow elevation of the land surface, usually having a sharp crest and steep sides.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 drawbar horsepower rating.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. An area of exposed bedrock in a map unit that has less than 0.1 percent exposed bedrock. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Rotational grazing. Moving livestock from one grazing area to another to maintain optimum forage height and pasture productivity.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Runoff class (surface). Refers to the rate at which water flows away from the soil over the surface without infiltrating. Six classes of rate of runoff are recognized:

Ponded.—Little of the precipitation and water that runs onto the soil escapes as runoff, and free water stands on the surface for significant periods. The amount of water that is removed from ponded areas by movement through the soil, by plants, or by evaporation is usually greater than the total rainfall. Ponding normally occurs on level and nearly level soils in depressions. The water depth may fluctuate greatly.

Very slow.—Surface water flows away slowly, and free water stands on the surface for long periods or immediately enters the soil. Most of the water passes through the soil, is used by plants, or evaporates. The soils are commonly level or nearly level or are very porous.

Slow.—Surface water flows away so slowly that free water stands on the surface for moderate periods or enters the soil rapidly. Most of the water passes through the soil, is used by plants, or evaporates. The soils are nearly level or very gently sloping, or they are steeper but absorb precipitation very rapidly.

Medium.—Surface water flows away so rapidly that free water stands on the surface for only short periods. Part of the precipitation enters the soil and is used by plants, is lost by evaporation, or moves into underground channels. The soils are nearly level or gently sloping and absorb precipitation at a moderate rate, or they are steeper but absorb water rapidly.

Rapid.—Surface water flows away so rapidly that the period of concentration is brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly moderately steep or steep and have moderate or slow rates of absorption.

Very rapid.—Surface water flows away so rapidly that the period of concentration is very brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly steep or very steep and absorb precipitation slowly.

Sand. As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sandy. A general textural term that includes coarse sand, sand, fine sand, very fine sand, loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of sand or loamy sand that contains less than 50 percent very fine sand, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Sandy spot. An area where the surface layer is sandy (loamy sand or sand) in a map unit in which the dominant soil or soils have a loamy, silty, or clayey surface layer. Excluded are areas where the textural classes are adjoining, such as an area of loamy sand in a map unit in which the dominant soil or soils have a surface layer of sandy loam. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Saprolite. Unconsolidated residual material underlying the genetically developed soil and grading to bedrock below.

Saprolite instability. A property of highly micaceous saprolite that makes it very susceptible to piping, erosion, slumping, and failure to support loads.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Schist. A metamorphic rock dominated by fibrous or platy minerals. It has schistose cleavage and is a product of regional metamorphism.

Sedimentation. The deposit or accumulation of sediment consisting of soil material, nutrients, and chemicals transported by surface waters.

Seep. A small area on the landscape where water oozes through the soil and causes the surface to remain wet. The water does not flow on the surface.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Severely eroded spot. An area of soil that has lost an average of 75 percent or more of the original surface layer because of accelerated erosion in a map unit in which the dominant soil or soils have lost less than 25 percent of the original surface layer. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Short steep slope. An area where the soil is at least two slope classes steeper than the surrounding named map unit. Areas identified on the detailed soil maps by a special symbol typically are long, narrow bands that are less than 2 acres in size. (See Slope.)

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Side slope. The landscape position that is just below the shoulder and just above the toe slope, occupying most of the mountainside or hillside.

Sillimanite. An orthorhombic mineral that occurs in long, slender crystals, often as fibrous aggregates in schists.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

Skidding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most systems involve pulling the trees with wire cables attached to a bulldozer or rubber-tired tractor. Generally, felled trees are skidded or pulled with one end lifted to reduce friction and soil disturbance.

Skid trails. The paths left from skidding logs and the bulldozer or tractor used to pull them.

Slide or slip. A prominent landform scar or ridge caused by fairly recent mass movement (descent of earthy material resulting from failure of earth or rock under shear stress) along one or several surfaces. Areas identified on the detailed soil maps by a special symbol typically are less than 15 acres in size.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Nearly level	0 to 3 percent
Gently sloping	2 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 30 percent
Steep	25 to 60 percent
Very steep	45 percent and higher

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soft, weathered bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil compaction. An alteration of soil structure that ultimately can affect the biological and chemical properties of the soil. Compaction decreases the extent of voids and increases bulk density.

Soil creep. The slow mass movement of soil and soil materials downslope, primarily under the influence of gravity, facilitated by water saturation and by alternating freezing and thawing.

Soil map unit. A kind of soil or miscellaneous area or a combination of two or more soils or one or more soils and one or more miscellaneous areas that can be shown at the scale of mapping for the defined purposes and objectives of the soil survey. Soil map units are generally designed to reflect significant differences in use and management.

Soil sample site (map symbol). The location of a typifying pedon in the survey area.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Soil strength. Load-supporting capacity of a soil at specific moisture and density conditions.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Specialty crop. Crops, such as Fraser fir grown for use as Christmas trees, that require intensive management and a specific combination of soils and climate.

Spring. A small area on the landscape where water flows naturally through the soil onto the surface.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stony spot. An area where 0.01 to 0.1 percent of the surface is covered by rock fragments that are more than about 10 inches in diameter. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Suitability ratings. Ratings for the degree of suitability of soils for pasture, crops, woodland, and engineering uses. The ratings and the general criteria used for their selection are as follows:

Well suited.—The intended use may be initiated and maintained by using only the standard materials and methods typically required for that use. Good results can be expected.

Moderately suited.—The limitations affecting the intended use make special planning, design, or maintenance necessary.

Poorly suited.—The intended use is difficult or costly to initiate and maintain because of certain soil properties, such as steep slopes, a severe hazard of erosion, a high water table, low fertility, and a hazard of flooding. Major soil reclamation, special design, or intensive management practices are needed.

Unsuited.—The intended use is very difficult or costly to initiate and maintain, and thus it generally should not be undertaken.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." The textural classes are defined as follows:

Sands (coarse sand, sand, fine sand, and very fine sand).—Soil material in which the content of sand is 85 percent or more and the percentage of silt plus 1½ times the percentage of clay does not exceed 15.

Loamy sands (loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand).—Soil material in which, at the upper limit, the content of sand is 85 to 90 percent and the percentage of silt plus 1½ times the percentage of clay is not less than 15 and, at the lower limit, the content of sand is 70 to 85 percent and the percentage of silt plus twice the percentage of clay does not exceed 30.

Sandy loams (coarse sandy loam, sandy loam, fine sandy loam, and very fine sandy loam).—Soil material in which the content of clay is 20 percent or less, the percentage of silt plus twice the percentage of clay exceeds 30, and the content of sand is 52 percent or more or soil material in which the content of clay is less than 7 percent, the content of silt is less than 50 percent, and the content of sand is 43 to 52 percent.

Loam.—Soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

Silt loam.—Soil material that contains 50 percent or more silt and 12 to 27 percent clay or 50 to 80 percent silt and less than 12 percent clay.

Silt.—Soil material that contains 80 percent or more silt and less than 12 percent clay.

Sandy clay loam.—Soil material that contains 20 to 35 percent clay, less than 28 percent silt, and 45 percent or more sand.

Clay loam.—Soil material that contains 27 to 40 percent clay and 20 to 45 percent sand.

Silty clay loam.—Soil material that contains 27 to 40 percent clay and less than 20 percent sand.

Sandy clay.—Soil material that contains 35 percent or more clay and 45 percent or more sand.
Silty clay.—Soil material that contains 40 percent or more clay and 40 percent or more silt.
Clay.—Soil material that contains 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topography. The relative positions and elevations of the natural or manmade features of an area that describe the configuration of its surface.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Underlying material. Technically the C horizon; the part of the soil below the biologically altered A and B horizons.

Understory. The trees and other woody species growing under a more or less continuous cover of branches and foliage formed collectively by the upper portions of adjacent trees and other woody growth.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Very bouldery spot. An area where 0.1 to 3 percent of the surface is covered by rock fragments that are more than 24 inches in diameter. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Very stony spot. An area where 0.1 to 3 percent of the surface is covered by rock fragments that are more than about 10 inches in diameter. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Water table (apparent). A thick zone of free water in the soil. The apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table (perched). A saturated zone of water in the soil standing above an unsaturated zone.

Water table (seasonal high). The highest level of a saturated zone in the soil (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Wetness. A general term applied to soils that hold water at or near the surface long enough to be a common management problem.

Wet spot. An area of somewhat poorly drained to very poorly drained soils that are at least two drainage classes wetter than the named soils in the surrounding map unit. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size. (See Drainage class.)

Windthrow. The uprooting and tipping over of trees by the wind.

Tables

Table 1.—Temperature and Precipitation

(Recorded in the period 1976-96 at Forest City, North Carolina)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	48.7	25.2	36.9	69	3	64	4.83	2.28	7.04	7	3.1
February----	54.4	28.4	41.4	77	8	127	3.97	1.73	5.88	6	1.7
March-------	62.2	35.4	48.8	83	14	300	5.26	3.02	7.25	7	1.1
April-------	71.7	43.0	57.3	89	25	522	3.51	1.62	5.14	5	.0
May---------	78.5	51.7	65.1	91	34	774	4.55	3.12	5.87	7	.0
June--------	85.8	60.1	73.0	97	46	987	4.01	1.54	6.07	6	.0
July--------	89.5	64.2	76.9	101	55	1,141	3.92	2.46	5.24	7	.0
August------	87.1	63.2	75.1	98	52	1,089	4.83	2.58	6.81	6	.0
September---	81.0	56.9	69.0	93	41	869	3.66	.88	5.86	5	.0
October-----	71.5	44.5	58.0	87	28	555	4.63	1.81	6.99	5	.0
November----	62.1	36.4	49.2	80	18	296	4.13	2.20	5.83	6	.0
December----	53.0	28.6	40.8	73	8	121	3.69	1.89	5.26	6	.1
Yearly:											
Average---	70.4	44.8	57.6	---	---	---	---	---	---	---	
Extreme---	106	-8	---	101	0	---	---	---	---	---	
Total-----	---	---	---	---	---	6,846	51.00	43.06	58.14	73	6.0

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.—Freeze Dates in Spring and Fall

(Recorded in the period 1976-96 at Forest City, North Carolina)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 7	Apr. 23	May 1
2 years in 10 later than--	Mar. 30	Apr. 16	Apr. 26
5 years in 10 later than--	Mar. 16	Apr. 4	Apr. 14
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 3	Oct. 19	Oct. 12
2 years in 10 earlier than--	Nov. 8	Oct. 25	Oct. 17
5 years in 10 earlier than--	Nov. 17	Nov. 6	Oct. 26

Table 3.—Growing Season

(Recorded in the period 1976-96 at Forest City, North Carolina)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	221	194	172
8 years in 10	230	201	180
5 years in 10	246	215	193
2 years in 10	262	230	207
1 year in 10	271	237	214

Table 4.—Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
ApB	Appling sandy loam, 1 to 6 percent slopes	2,796	0.8
ApC	Appling sandy loam, 6 to 12 percent slopes	1,571	0.4
ArD	Ashe-Cleveland-Rock outcrop complex, 15 to 30 percent slopes	104	*
ArF	Ashe-Cleveland-Rock outcrop complex, 50 to 95 percent slopes	4,645	1.3
BoA	Bandana-Ostin complex, 0 to 3 percent slopes, occasionally flooded	904	0.2
BuB	Buncombe loamy sand, 0 to 5 percent slopes, occasionally flooded	2,488	0.7
CaB2	Cecil sandy clay loam, 2 to 8 percent slopes, eroded	25,452	7.0
CeB2	Cecil-Urban land complex, 2 to 8 percent slopes, eroded	2,619	0.7
ChA	Chewacla loam, 0 to 2 percent slopes, occasionally flooded	18,851	5.2
CoD	Cliffield-Cowee complex, 15 to 30 percent slopes, very stony	158	*
CpD	Cliffield-Pigeonroost complex, 15 to 30 percent slopes, very stony	1,778	0.5
CpE	Cliffield-Pigeonroost complex, 30 to 50 percent slopes, very stony	1,170	0.3
CrF	Cliffield-Rock outcrop complex, 50 to 95 percent slopes	567	0.2
DoB	Dogue loam, 1 to 6 percent slopes, rarely flooded	764	0.2
EcD	Edneyville-Chestnut complex, 15 to 30 percent slopes, very stony	762	0.2
EcE	Edneyville-Chestnut complex, 30 to 50 percent slopes, very stony	2,135	0.6
EvD	Evard-Cowee complex, 15 to 30 percent slopes, stony	10,826	3.0
EvE	Evard-Cowee complex, 30 to 50 percent slopes, stony	28,353	7.8
EwD	Evard-Cowee complex, 15 to 30 percent slopes, rocky	1,036	0.3
EwE	Evard-Cowee complex, 30 to 50 percent slopes, rocky	4,047	1.1
EwF	Evard-Cowee complex, 50 to 85 percent slopes, rocky	9,386	2.6
FaD	Fannin fine sandy loam, 15 to 30 percent slopes, stony	1,084	0.3
FaE	Fannin fine sandy loam, 30 to 50 percent slopes, stony	4,830	1.3
FbF	Fannin-Chestnut complex, 50 to 85 percent slopes, rocky	488	0.1
FvA	Fluvaquents-Udifluvents complex, 0 to 2 percent slopes, occasionally flooded	355	*
GaC	Greenlee-Tate complex, 6 to 15 percent slopes, extremely bouldery	275	*
GaD	Greenlee-Tate complex, 15 to 30 percent slopes, extremely bouldery	991	0.3
GbF	Greenlee-Tate complex, 30 to 70 percent slopes, rubbly	1,983	0.5
GrE	Grover loam, 25 to 45 percent slopes	5,573	1.5
HaC2	Hayesville sandy clay loam, 8 to 15 percent slopes, eroded	1,448	0.4
HaD2	Hayesville sandy clay loam, 15 to 30 percent slopes, eroded	3,713	1.0
HeB	Helena-Worsham complex, 1 to 6 percent slopes	1,453	0.4
HsB2	Hiwassee clay loam, 2 to 8 percent slopes, eroded	381	0.1
HsC2	Hiwassee clay loam, 8 to 15 percent slopes, eroded	1,080	0.3
IoA	Iotla sandy loam, 0 to 2 percent slopes, occasionally flooded	424	0.1
MaC2	Madison clay loam, 8 to 15 percent slopes, eroded	10,975	3.0
MaD2	Madison clay loam, 15 to 25 percent slopes, eroded	19,881	5.5
PaC2	Pacolet sandy clay loam, 8 to 15 percent slopes, eroded	52,696	14.5
PaD2	Pacolet sandy clay loam, 15 to 25 percent slopes, eroded	39,746	10.9
PbB2	Pacolet-Bethlehem complex, 2 to 8 percent slopes, eroded	7,883	2.2
PbC2	Pacolet-Bethlehem complex, 8 to 15 percent slopes, eroded	24,873	6.8
PbD2	Pacolet-Bethlehem complex, 15 to 25 percent slopes, eroded	19,633	5.4
PsB2	Pacolet-Saw complex, 2 to 8 percent slopes, eroded	3,556	1.0
PsC2	Pacolet-Saw complex, 8 to 15 percent slopes, eroded	6,322	1.7
PsD2	Pacolet-Saw complex, 15 to 25 percent slopes, eroded	6,984	1.9
Qp	Pits, quarry	98	*
RaE	Rion sandy loam, 25 to 45 percent slopes	9,619	2.6
RcF	Rion-Ashlar-Rock outcrop complex, 45 to 70 percent slopes	2,047	0.6
RnE	Rion-Cliffside complex, 25 to 60 percent slopes, very stony	2,239	0.6
RsC	Rock outcrop-Ashlar complex, 2 to 15 percent slopes	222	*
RxF	Rock outcrop-Cleveland complex, 30 to 95 percent slopes	554	0.2
SkB	Skyuka loam, 2 to 6 percent slopes	1,228	0.3
TaC	Tate gravelly loam, 8 to 15 percent slopes	90	*
TbC	Tate-Greenlee complex, 6 to 15 percent slopes, very stony	647	0.2
TbD	Tate-Greenlee complex, 15 to 30 percent slopes, very stony	671	0.2
ToA	Toccoa sandy loam, 0 to 3 percent slopes occasionally flooded	3,003	0.8
TtD	Toecane-Tusquitee complex, 15 to 30 percent slopes, very stony	25	*
UdC	Udorthents, loamy, 0 to 15 percent slopes	1,891	0.5
UoA	Udorthents, loamy, 0 to 3 percent slopes, rarely flooded	215	*

See footnote at end of table.

Table 4.—Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
UpA	Udorthents-Pits complex, mounded, 0 to 2 percent slopes, occasionally flooded	425	0.1
Ur	Urban land	1,438	0.4
WeA	Wehadkee silt loam, 0 to 2 percent slopes, frequently flooded	1,072	0.3
	Water	1,906	0.5
	Total	364,429	100.0

* Less than 0.1 percent.

Table 5.—Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of nonirrigated management by map unit. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Cotton lint	Soybeans	Tall fescue	Wheat
		Tons	Bu	Lbs	Bu	AUM*	Bu
ApB:							
Appling---------	2e	6.0	95.0	650.0	40.0	9.8	60.0
ApC:							
Appling---------	3e	5.8	75.0	600.0	30.0	9.2	50.0
ArD:		---	---	---	---	---	---
Ashe------------	6s						
Cleveland-------	7e						
Rock outcrop----	8s						
ArF:		---	---	---	---	---	---
Ashe------------	7s						
Cleveland-------	7e						
Rock outcrop----	8s						
BoA:		---	100.0	---	---	5.0	---
Bandana---------	3w						
Ostin-----------	4s						
BuB:							
Buncombe--------	4w	---	---	---	---	3.0	---
CaB2:							
Cecil-----------	2e	5.6	75.0	500.0	35.0	6.5	60.0
CeB2:		---	70.0	500.0	25.0	6.5	---
Cecil-----------	2e						
Urban land.							
ChA:							
Chewacla--------	3w	---	120.0	---	40.0	13.0	50.0
CoD:		---	---	---	---	---	---
Cliffield-------	6s						
Cowee-----------	6e						
CpD:		---	---	---	---	---	---
Cliffield-------	6s						
Pigeonroost-----	6e						
CpE:		---	---	---	---	---	---
Cliffield-------	7s						
Pigeonroost-----	7e						

See footnote at end of table.

Table 5.—Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Cotton lint	Soybeans	Tall fescue	Wheat
		Tons	Bu	Lbs	Bu	AUM*	Bu
CrF:		---	---	---	---	---	---
Cliffield-------	7s						
Rock outcrop----	8s						
DoB:							
Dogue-----------	2e	---	115.0	600.0	40.0	9.8	55.0
EcD:		---	---	---	---	---	---
Edneyville------	6s						
Chestnut--------	7s						
EcE:							
Edneyville-Chestnut-------	7s	---	---	---	---	---	---
EvD:							
Evard-Cowee-----	6e	---	---	---	---	---	---
EvE:							
Evard-Cowee-----	7e	---	---	---	---	---	---
EwD:							
Evard-Cowee-----	6e	---	---	---	---	---	---
EwE:							
Evard-Cowee-----	7e	---	---	---	---	---	---
EwF:							
Evard-Cowee-----	7e	---	---	---	---	---	---
FaD:							
Fannin----------	7e	---	---	---	---	---	---
FaE:							
Fannin----------	7e	---	---	---	---	---	---
FbF:							
Fannin-Chestnut-	7e	---	---	---	---	---	---
FvA.							
Fluvaquents-Udifluvents							
GaC:		---	---	---	---	---	---
Greenlee--------	7s						
Tate------------	4s						
GaD:		---	---	---	---	---	---
Greenlee--------	7s						
Tate------------	6s						
GbF:							
Greenlee-Tate---	7s	---	---	---	---	---	---
GrE:							
Grover----------	7e	---	---	---	---	4.5	---

See footnote at end of table.

Table 5.—Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Cotton lint	Soybeans	Tall fescue	Wheat
		Tons	Bu	Lbs	Bu	AUM*	Bu
HaC2:							
Hayesville------	4e	3.4	80.0	---	---	6.2	45.0
HaD2:							
Hayesville------	6e	---	---	---	---	5.5	---
HeB:		---	100.0	575.0	40.0	9.8	40.0
Helena----------	2e						
Worsham---------	4w						
HsB2:							
Hiwassee--------	2e	5.4	90.0	500.0	35.0	7.2	35.0
HsC2:							
Hiwassee--------	3e	4.8	80.0	---	30.0	6.6	30.0
IoA:							
Iotla-----------	2w	---	125.0	---	---	8.0	50.0
MaC2:							
Madison---------	4e	4.0	55.0	---	20.0	5.5	45.0
MaD2:							
Madison---------	6e	3.6	---	---	---	4.5	---
PaC2:							
Pacolet---------	4e	4.2	55.0	400.0	20.0	6.1	45.0
PaD2:							
Pacolet---------	6e	3.0	---	---	---	5.5	---
PbB2:							
Pacolet- Bethelhem------	3e	---	75.0	500.0	30.0	6.5	55.0
PbC2:							
Pacolet- Bethlehem------	4e	---	55.0	450.0	20.0	6.1	45.0
PbD2:							
Pacolet- Bethlehem------	6e	---	---	---	---	---	---
PsB2:							
Pacolet-Saw-----	3e	---	75.0	500.0	30.0	6.5	55.0
PsC2:							
Pacolet-Saw-----	4e	---	55.0	450.0	20.0	6.1	45.0
PsD2:							
Pacolet-Saw-----	6e	---	---	---	---	5.3	---
Qp:							
Pits------------	8s	---	---	---	---	---	---
RaE:							
Rion------------	7e	---	---	---	---	4.0	---

See footnote at end of table.

Table 5.—Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capability	Alfalfa hay	Corn	Cotton lint	Soybeans	Tall fescue	Wheat
		Tons	Bu	Lbs	Bu	AUM*	Bu
RcF:		---	---	---	---	4.0	---
Rion------------	7e						
Ashlar----------	7e						
Rock outcrop.							
RnE:		---	---	---	---	---	---
Rion------------	7e						
Cliffside-------	7s						
RsC:		---	---	---	---	---	---
Rock outcrop.							
Ashlar----------	4e						
RxF:		---	---	---	---	---	---
Rock outcrop.							
Cleveland-------	7e						
SkB:							
Skyuka----------	2e	6.2	120.0	---	35.0	---	65.0
TaC:							
Tate------------	4e	---	80.0	---	---	---	50.0
TbC:		---	---	---	---	---	---
Tate------------	4s						
Greenlee--------	7s						
TbD:		---	---	---	---	---	---
Tate------------	6s						
Greenlee--------	7s						
ToA:							
Toccoa----------	2w	---	110.0	900.0	40.0	11.0	50.0
TtD:		---	---	---	---	---	---
Toecane---------	7s						
Tusquitee-------	6s						
UdC, UoA.							
Udorthents							
UpA.							
Udorthents-Pits							
Ur.							
Urban land							
WeA:							
Wehadkee--------	6w	---	---	---	---	---	---

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Table 6.—Woodland Management and Productivity

(Absence of an entry indicates that information is not available)

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
ApB:										
Appling-------	8A	Slight	Slight	Slight	Slight	Moderate	Loblolly pine-------	84	118	Loblolly pine,
							Virginia pine-------	77	118	shortleaf pine.
							Hickory-------------	---	---	
							Scarlet oak---------	---	---	
							Shortleaf pine------	63	95	
							Southern red oak----	---	---	
							Sweetgum------------	---	---	
							Yellow-poplar-------	81	73	
							White oak-----------	---	---	
ApC:										
Appling-------	8A	Slight	Slight	Slight	Slight	Moderate	Loblolly pine-------	84	118	Loblolly pine,
							Virginia pine-------	77	118	shortleaf pine.
							Hickory-------------	---	---	
							Scarlet oak---------	---	---	
							Shortleaf pine------	63	95	
							Southern red oak----	---	---	
							Sweetgum------------	---	---	
							Yellow-poplar-------	81	73	
							White oak-----------	---	---	
ArD:										
Ashe----------	4R	Moderate	Moderate	Moderate	Moderate	Moderate	Chestnut oak--------	70	52	Eastern white
							Virginia pine-------	62	95	pine.
							Eastern white pine--	81	146	
							Pitch pine----------	57	---	
							Scarlet oak---------	---	---	
							Shortleaf pine------	57	82	
Cleveland-----	3D	Moderate	Moderate	Moderate	Severe	Slight	Chestnut oak--------	---	---	Eastern white
							Virginia pine-------	---	---	pine, shortleaf
							Eastern white pine--	---	---	pine.
							Hickory-------------	---	---	
							Northern red oak----	---	---	
							Pitch pine----------	---	---	
							Scarlet oak---------	---	---	
Rock outcrop.										
ArF:										
Ashe----------	4R	Severe	Severe	Moderate	Moderate	Moderate	Chestnut oak--------	70	52	Eastern white
							Virginia pine-------	62	95	pine.
							Eastern white pine--	81	146	
							Pitch pine----------	57	---	
							Scarlet oak---------	---	---	
							Shortleaf pine------	57	82	
Cleveland-----	3R	Severe	Severe	Moderate	Severe	Slight	Chestnut oak--------	---	---	Eastern white
							Virginia pine-------	---	---	pine, shortleaf
							Eastern white pine--	---	---	pine.
							Hickory-------------	---	---	
							Northern red oak----	---	---	
							Pitch pine----------	---	---	
							Scarlet oak---------	---	---	

See footnotes at end of table.

Table 6.—Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
ArF:										
Rock outcrop.										
BoA:										
Bandana-------	9W	Slight	Moderate	Slight	Slight	Moderate	Yellow-poplar-------	---	---	Eastern white pine.
							American sycamore---	---	---	
							Eastern hemlock-----	---	---	
							Red maple-----------	---	---	
							River birch---------	---	---	
Ostin---------	8F	Slight	Slight	Moderate	Slight	Moderate	Yellow-poplar-------	100	114	American sycamore, black walnut, eastern white pine, yellow-poplar.
							American sycamore---	---	---	
							Virginia pine-------	---	---	
							Black cherry--------	---	---	
							Black locust--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	---	---	
							Red maple-----------	---	---	
							River birch---------	---	---	
BuB:										
Buncombe------	8S	Slight	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	106	117	American sycamore, eastern white pine, yellow-poplar.
							American sycamore---	---	---	
							Elm-----------------	---	---	
							Hickory-------------	---	---	
							Loblolly pine-------	---	---	
							Northern red oak----	---	---	
							River birch---------	---	---	
							Southern red oak----	---	---	
							Sweetgum------------	---	---	
CaB2:										
Cecil---------	8C	Slight	Moderate	Moderate	Slight	Moderate	Loblolly pine-------	83	116	Loblolly pine, shortleaf pine.
							Shortleaf pine------	67	103	
							Virginia pine-------	71	---	
							Northern red oak----	81	---	
							White oak-----------	78	---	
CeB2:										
Cecil---------	8C	Slight	Moderate	Moderate	Slight	Moderate	Loblolly pine-------	83	116	Loblolly pine, shortleaf pine.
							Shortleaf pine------	67	103	
							Virginia pine-------	71	---	
							Northern red oak----	81	---	
							White oak-----------	78	---	
Urban land.										
ChA:										
Chewacla------	7W	Slight	Moderate	Slight	Moderate	Severe	Yellow-poplar-------	96	100	American sycamore, loblolly pine, sweetgum, yellow-poplar.
							Blackgum------------	---	---	
							Eastern cottonwood--	---	---	
							Green ash-----------	78	46	
							Loblolly pine-------	95	142	
							Red maple-----------	---	---	
							Southern red oak----	---	---	
							Sweetgum------------	100	138	
							Water oak-----------	90	86	
							Willow oak----------	90	86	

See footnotes at end of table.

Table 6.—Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
CoD:										
Cliffield-----	2R	Moderate	Moderate	Moderate	Moderate	Moderate	Chestnut oak--------	50	---	Chestnut oak,
							Scarlet oak---------	50	---	scarlet oak,
							Virginia pine-------	---	---	shortleaf pine.
							Black locust--------	---	---	
							Black oak-----------	---	---	
							Northern red oak----	---	---	
							Pitch pine----------	---	---	
							Red maple-----------	---	---	
							Shortleaf pine------	---	---	
							White oak-----------	---	---	
Cowee---------	3R	Moderate	Moderate	Slight	Moderate	Moderate	Chestnut oak--------	55	38	Eastern white
							Virginia pine-------	63	96	pine, shortleaf
							Black oak-----------	---	---	pine.
							Eastern white pine--	78	139	
							Northern red oak----	---	---	
							Pitch pine----------	52	---	
							Scarlet oak---------	54	38	
							Shortleaf pine------	---	---	
							Yellow-poplar-------	80	71	
							White oak-----------	---	---	
CpD:										
Cliffield-----	2R	Moderate	Moderate	Moderate	Moderate	Moderate	Chestnut oak--------	50	---	Chestnut oak,
							Scarlet oak---------	50	---	scarlet oak,
							Virginia pine-------	---	---	shortleaf pine.
							Black locust--------	---	---	
							Black oak-----------	---	---	
							Northern red oak----	---	---	
							Pitch pine----------	---	---	
							Red maple-----------	---	---	
							Shortleaf pine------	---	---	
							White oak-----------	---	---	
Pigeonroost---	3R	Moderate	Moderate	Moderate	Moderate	Moderate	Chestnut oak--------	55	38	Chestnut oak,
							Black oak-----------	---	---	eastern white
							Eastern white pine--	78	139	pine, scarlet
							Hickory-------------	---	---	oak, shortleaf
							Red maple-----------	---	---	pine, white
							Scarlet oak---------	54	38	oak.
							Yellow-poplar-------	80	71	
							White oak-----------	---	---	
CpE:										
Cliffield-----	2R	Severe	Severe	Moderate	Moderate	Moderate	Chestnut oak--------	50	---	Chestnut oak,
							Scarlet oak---------	50	---	scarlet oak,
							Virginia pine-------	---	---	shortleaf pine.
							Black locust--------	---	---	
							Black oak-----------	---	---	
							Northern red oak----	---	---	
							Pitch pine----------	---	---	
							Red maple-----------	---	---	
							Shortleaf pine------	---	---	
							White oak-----------	---	---	

See footnotes at end of table.

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
CpE:										
Pigeonroost---	3R	Severe	Severe	Moderate	Moderate	Moderate	Chestnut oak--------	55	38	Chestnut oak, eastern white pine, scarlet oak, shortleaf pine, white oak.
							Black oak-----------	---	---	
							Eastern white pine--	78	139	
							Hickory-------------	---	---	
							Red maple-----------	---	---	
							Scarlet oak---------	54	38	
							Yellow-poplar-------	80	71	
							White oak-----------	---	---	
CrF:										
Cliffield-----	2R	Severe	Severe	Moderate	Moderate	Moderate	Chestnut oak--------	50	---	Virginia pine, scarlet oak, shortleaf pine.
							Scarlet oak---------	50	---	
							Virginia pine-------	---	---	
							Black locust--------	---	---	
							Black oak-----------	---	---	
							Northern red oak----	---	---	
							Pitch pine----------	---	---	
							Red maple-----------	---	---	
							Shortleaf pine------	---	---	
							White oak-----------	---	---	
Rock outcrop.										
DoB:										
Dogue---------	10A	Slight	Moderate	Slight	Slight	Moderate	Loblolly pine-------	95	142	Loblolly pine.
							Southern red oak----	---	---	
							Sweetgum------------	---	---	
							Yellow-poplar-------	---	---	
							White oak-----------	---	---	
EcD:										
Edneyville----	12R	Moderate	Moderate	Slight	Slight	Moderate	Eastern white pine--	90	166	Eastern white pine, northern red oak, shortleaf pine, yellow-poplar.
							Virginia pine-------	75	115	
							Northern red oak----	83	---	
							Shortleaf pine------	64	97	
							Yellow-poplar-------	98	104	
Chestnut------	10R	Moderate	Moderate	Slight	Moderate	Moderate	Eastern white pine--	78	139	Eastern white pine, shortleaf pine, yellow-poplar.
							Black oak-----------	71	53	
							Chestnut oak--------	69	57	
							Northern red oak----	80	62	
							Pitch pine----------	---	---	
							Scarlet oak---------	68	50	
							Shortleaf pine------	---	---	
							Yellow-poplar-------	97	102	
							White oak-----------	70	52	
EcE:										
Edneyville----	12R	Severe	Severe	Slight	Slight	Moderate	Eastern white pine--	90	166	Eastern white pine, northern red oak, shortleaf pine, yellow-poplar.
							Virginia pine-------	75	115	
							Northern red oak----	83	---	
							Shortleaf pine------	64	97	
							Yellow-poplar-------	98	104	

See footnotes at end of table.

Table 6.—Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
EcE:										
Chestnut------	10R	Severe	Severe	Slight	Moderate	Moderate	Eastern white pine--	78	139	Fraser fir, pine, shortleaf pine, yellow-poplar.
							Black oak-----------	71	53	
							Chestnut oak--------	69	57	
							Northern red oak----	80	62	
							Pitch pine----------	---	---	
							Scarlet oak---------	68	50	
							Shortleaf pine------	---	---	
							Yellow-poplar-------	97	102	
							White oak-----------	70	52	
EvD:										
Evard---------	12R	Moderate	Moderate	Slight	Slight	Moderate	Eastern white pine--	91	168	Eastern white pine, shortleaf pine, yellow-poplar.
							Virginia pine-------	70	109	
							Hickory-------------	---	---	
							Northern red oak----	---	---	
							Pitch pine----------	---	---	
							Shortleaf pine------	73	---	
							Southern red oak----	---	---	
							Yellow-poplar-------	95	98	
							White oak-----------	75	57	
Cowee---------	10R	Moderate	Moderate	Slight	Moderate	Moderate	Eastern white pine--	78	139	Eastern white pine, shortleaf pine.
							Virginia pine-------	63	96	
							Black oak-----------	---	---	
							Chestnut oak--------	55	38	
							Northern red oak----	---	---	
							Pitch pine----------	52	---	
							Scarlet oak---------	54	38	
							Shortleaf pine------	---	---	
							Yellow-poplar-------	80	71	
							White oak-----------	---	---	
EvE:										
Evard---------	12R	Severe	Severe	Slight	Slight	Moderate	Eastern white pine--	91	168	Eastern white pine, shortleaf pine, yellow-poplar.
							Virginia pine-------	70	109	
							Hickory-------------	---	---	
							Northern red oak----	---	---	
							Pitch pine----------	---	---	
							Shortleaf pine------	73	---	
							Southern red oak----	---	---	
							Yellow-poplar-------	95	98	
							White oak-----------	75	57	
Cowee---------	10R	Severe	Severe	Slight	Moderate	Moderate	Eastern white pine--	78	139	Eastern white pine, shortleaf pine.
							Virginia pine-------	63	96	
							Black oak-----------	---	---	
							Chestnut oak--------	55	38	
							Northern red oak----	---	---	
							Pitch pine----------	52	---	
							Scarlet oak---------	54	38	
							Shortleaf pine------	---	---	
							Yellow-poplar-------	80	71	
							White oak-----------	---	---	

See footnotes at end of table.

Table 6.—Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
EwD:										
Evard	12R	Moderate	Moderate	Slight	Slight	Moderate	Eastern white pine	91	168	Eastern white pine, shortleaf pine, yellow-poplar.
							Virginia pine	70	109	
							Hickory	---	---	
							Northern red oak	---	---	
							Pitch pine	---	---	
							Shortleaf pine	73	---	
							Southern red oak	---	---	
							Yellow-poplar	95	98	
							White oak	75	57	
Cowee	10R	Moderate	Moderate	Slight	Moderate	Moderate	Eastern white pine	78	139	Eastern white pine, shortleaf pine.
							Virginia pine	63	96	
							Black oak	---	---	
							Chestnut oak	55	38	
							Northern red oak	---	---	
							Pitch pine	52	---	
							Scarlet oak	54	38	
							Shortleaf pine	---	---	
							Yellow-poplar	80	71	
							White oak	---	---	
EwE:										
Evard	12R	Severe	Severe	Slight	Slight	Moderate	Eastern white pine	91	168	Eastern white pine, shortleaf pine, yellow-poplar.
							Virginia pine	70	109	
							Hickory	---	---	
							Northern red oak	---	---	
							Pitch pine	---	---	
							Shortleaf pine	73	---	
							Southern red oak	---	---	
							Yellow-poplar	95	98	
							White oak	75	57	
Cowee	10R	Severe	Severe	Slight	Moderate	Moderate	Eastern white pine	78	139	Eastern white pine, shortleaf pine.
							Virginia pine	63	96	
							Black oak	---	---	
							Chestnut oak	55	38	
							Northern red oak	---	---	
							Pitch pine	52	---	
							Scarlet oak	54	38	
							Shortleaf pine	---	---	
							Yellow-poplar	80	71	
							White oak	---	---	
EwF:										
Evard	12R	Severe	Severe	Slight	Slight	Moderate	Eastern white pine	91	168	Eastern white pine, shortleaf pine, yellow-poplar.
							Virginia pine	70	109	
							Hickory	---	---	
							Northern red oak	---	---	
							Pitch pine	---	---	
							Shortleaf pine	73	---	
							Southern red oak	---	---	
							Yellow-poplar	95	98	
							White oak	75	57	

See footnotes at end of table.

Table 6.—Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
EwF:										
Cowee	10R	Severe	Severe	Slight	Moderate	Moderate	Eastern white pine	78	138	Eastern white pine, shortleaf pine.
							Virginia pine	63	96	
							Black oak	---	---	
							Chestnut oak	55	38	
							Northern red oak	---	---	
							Pitch pine	52	---	
							Scarlet oak	54	38	
							Shortleaf pine	---	---	
							Yellow-poplar	80	71	
							White oak	---	---	
FaD:										
Fannin	7R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar	96	100	Eastern white pine, shortleaf pine, yellow-poplar.
							Virginia pine	---	---	
							Chestnut oak	---	---	
							Eastern white pine	94	174	
							Northern red oak	84	66	
							Pitch pine	---	---	
							Scarlet oak	---	---	
							Shortleaf pine	---	---	
FaE:										
Fannin	7R	Severe	Severe	Slight	Slight	Moderate	Yellow-poplar	96	100	Eastern white pine, shortleaf pine, yellow-poplar.
							Virginia pine	---	---	
							Chestnut oak	---	---	
							Eastern white pine	94	174	
							Northern red oak	84	66	
							Pitch pine	---	---	
							Scarlet oak	---	---	
							Shortleaf pine	---	---	
FbF:										
Fannin	7R	Severe	Severe	Slight	Slight	Moderate	Yellow-poplar	96	100	Eastern white pine, shortleaf pine, yellow-poplar.
							Virginia pine	---	---	
							Chestnut oak	---	---	
							Eastern white pine	94	174	
							Northern red oak	84	66	
							Pitch pine	---	---	
							Scarlet oak	---	---	
							Shortleaf pine	---	---	
Chestnut	10R	Severe	Severe	Slight	Moderate	Moderate	Eastern white pine	78	139	Eastern white pine, shortleaf pine, yellow-poplar.
							Black oak	71	53	
							Chestnut oak	69	51	
							Northern red oak	80	62	
							Pitch pine	---	---	
							Scarlet oak	68	50	
							Shortleaf pine	---	---	
							Yellow-poplar	97	102	
							White oak	70	52	
FvA:										
Fluvaquents	8W	Slight	Severe	Severe	Slight	---	Yellow-poplar	---	---	Yellow-poplar.
							Sweetgum	---	---	
							Water tupelo	---	---	

See footnotes at end of table.

Table 6.—Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
FvA:										
Udifluvents	9W	Slight	Severe	Severe	Slight	---	Yellow-poplar	---	---	Yellow-poplar.
							Sweetgum	---	---	
							Water tupelo	---	---	
GaC:										
Greenlee	8X	Slight	Moderate	Moderate	Slight	Moderate	Yellow-poplar	101	109	Eastern white pine, yellow-poplar.
							Virginia pine	---	---	
							Black locust	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	98	182	
							Northern red oak	---	---	
							Pitch pine	---	---	
							Red maple	---	---	
							Scarlet oak	---	---	
							White oak	---	---	
Tate	6A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar	92	93	Eastern white pine, yellow-poplar.
							Virginia pine	---	---	
							Eastern white pine	89	164	
							Northern red oak	---	---	
							Shortleaf pine	---	---	
GaD:										
Greenlee	8X	Moderate	Moderate	Moderate	Slight	Moderate	Yellow-poplar	101	109	Eastern white pine, yellow-poplar.
							Virginia pine	---	---	
							Black locust	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	98	182	
							Northern red oak	---	---	
							Pitch pine	---	---	
							Red maple	---	---	
							Scarlet oak	---	---	
							White oak	---	---	
Tate	6R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar	92	93	Eastern white pine, yellow-poplar.
							Virginia pine	---	---	
							Eastern white pine	89	164	
							Northern red oak	---	---	
							Shortleaf pine	---	---	
GbF:										
Greenlee	8R	Severe	Severe	Moderate	Slight	Moderate	Yellow-poplar	101	109	Eastern white pine, yellow-poplar.
							Virginia pine	---	---	
							Black locust	---	---	
							Eastern hemlock	---	---	
							Eastern white pine	98	182	
							Northern red oak	---	---	
							Pitch pine	---	---	
							Red maple	---	---	
							Scarlet oak	---	---	
							White oak	---	---	
Tate	6R	Severe	Severe	Slight	Slight	Moderate	Yellow-poplar	92	93	Eastern white pine, yellow-poplar.
							Virginia pine	---	---	
							Eastern white pine	89	164	
							Northern red oak	---	---	
							Shortleaf pine	---	---	

See footnotes at end of table.

Table 6.—Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
GrE:										
Grover	7R	Severe	Severe	Slight	Slight	Moderate	Shortleaf pine	67	---	Loblolly pine, shortleaf pine, yellow-poplar.
							Black oak	---	---	
							Chestnut oak	---	---	
							Hickory	---	---	
							Scarlet oak	---	---	
							Southern red oak	---	---	
							Sweetgum	---	---	
							Loblolly pine	---	---	
							Yellow-poplar	---	---	
							White oak	---	---	
HaC2:										
Hayesville	7A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar	93	95	Eastern white pine, shortleaf pine.
							Virginia pine	74	114	
							Eastern white pine	84	153	
							Northern red oak	---	---	
							Pitch pine	82	---	
							Shortleaf pine	70	110	
HaD2:										
Hayesville	7R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar	93	95	Eastern white pine, shortleaf pine.
							Virginia pine	74	114	
							Eastern white pine	84	153	
							Northern red oak	---	---	
							Pitch pine	82	---	
							Shortleaf pine	70	110	
HeB:										
Helena	8A	Slight	Slight	Slight	Slight	Severe	Loblolly pine	84	118	Loblolly pine, shortleaf pine.
							Virginia pine	---	---	
							Black oak	---	---	
							Hickory	---	---	
							Northern red oak	---	---	
							Shortleaf pine	66	101	
							Southern red oak	---	---	
							Sweetgum	---	---	
							Yellow-poplar	---	---	
							White oak	---	---	
Worsham	7W	Slight	Severe	Severe	Slight	Severe	Yellow-poplar	93	95	Eastern white pine, loblolly pine, yellow-poplar.
							Virginia pine	---	---	
							Pin oak	---	---	
							Southern red oak	---	---	
HsB2:										
Hiwassee	10C	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine	96	143	Loblolly pine, shortleaf pine.
							Northern red oak	---	---	
							Shortleaf pine	---	---	
							Southern red oak	---	---	
							White oak	---	---	
HsC2:										
Hiwassee	10C	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine	96	143	Loblolly pine, shortleaf pine.
							Northern red oak	---	---	
							Shortleaf pine	---	---	
							Southern red oak	---	---	
							White oak	---	---	

See footnotes at end of table.

Table 6.—Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
IoA:										
Iotla---------	7A	Slight	Slight	Slight	Slight	Severe	Yellow-poplar-------	99	105	American sycamore, eastern white pine, yellow-poplar.
							American sycamore---	---	---	
							Black oak-----------	---	---	
							Black walnut--------	---	---	
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							River birch---------	---	---	
							White ash-----------	---	---	
							White oak-----------	---	---	
MaC2:										
Madison-------	7C	Slight	Moderate	Moderate	Slight	Severe	Shortleaf pine------	63	95	Loblolly pine, shortleaf pine.
							Virginia pine-------	71	110	
							Loblolly pine-------	---	---	
							Northern red oak----	---	---	
							White oak-----------	---	---	
MaD2:										
Madison-------	7R	Moderate	Moderate	Moderate	Slight	Severe	Shortleaf pine------	63	95	Loblolly pine, shortleaf pine.
							Virginia pine-------	71	110	
							Loblolly pine-------	---	---	
							Northern red oak----	---	---	
							White oak-----------	---	---	
PaC2:										
Pacolet-------	8C	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine-------	79	108	Loblolly pine, shortleaf pine, yellow-poplar.
							Shortleaf pine------	68	106	
							Yellow-poplar-------	90	90	
							Virginia pine-------	71	---	
							White oak-----------	---	---	
PaD2:										
Pacolet-------	8R	Moderate	Moderate	Moderate	Slight	Slight	Loblolly pine-------	79	108	Loblolly pine, shortleaf pine, yellow-poplar.
							Shortleaf pine------	68	106	
							Yellow-poplar-------	90	90	
							Virginia pine-------	71	---	
							White oak-----------	---	---	
PbB2:										
Pacolet-------	8R	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine-------	79	108	Loblolly pine, shortleaf pine, yellow-poplar.
							Shortleaf pine------	68	106	
							Yellow-poplar-------	90	90	
							Virginia pine-------	71	---	
							White oak-----------	---	---	
Bethlehem-----	7D	Slight	Slight	Slight	Moderate	Moderate	Loblolly pine-------	67	103	Loblolly pine, shortleaf pine.
							Virginia pine-------	76	117	
							Black oak-----------	---	---	
							Chestnut oak--------	64	47	
							Scarlet oak---------	73	55	
							White oak-----------	---	---	
PbC2:										
Pacolet-------	8R	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine-------	79	108	Loblolly pine, shortleaf pine, yellow-poplar.
							Shortleaf pine------	68	106	
							Yellow-poplar-------	90	90	
							Virginia pine-------	71	---	
							White oak-----------	---	---	

See footnotes at end of table.

Table 6.—Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
PbC2:										
Bethlehem-----	7D	Slight	Slight	Slight	Moderate	Moderate	Loblolly pine-------	67	103	Loblolly pine,
							Virginia pine-------	76	117	shortleaf pine.
							Black oak-----------	---	---	
							Chestnut oak--------	64	47	
							Scarlet oak---------	73	55	
							White oak-----------	---	---	
PbD2:										
Pacolet-------	8R	Moderate	Moderate	Moderate	Slight	Slight	Loblolly pine-------	79	108	Loblolly pine,
							Shortleaf pine------	68	106	shortleaf pine,
							Yellow-poplar-------	90	90	yellow-poplar.
							Virginia pine-------	71	---	
							White oak-----------	---	---	
Bethlehem-----	7R	Moderate	Moderate	Slight	Moderate	Moderate	Loblolly pine-------	67	103	Loblolly pine,
							Virginia pine-------	76	117	shortleaf pine.
							Black oak-----------	---	---	
							Chestnut oak--------	64	47	
							Scarlet oak---------	73	55	
							White oak-----------	---	---	
PsB2:										
Pacolet-------	8R	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine-------	79	108	Loblolly pine,
							Shortleaf pine------	68	106	shortleaf pine,
							Yellow-poplar-------	90	90	yellow-poplar.
							Virginia pine-------	71	---	
							White oak-----------	---	---	
Saw-----------	6D	Slight	Moderate	Moderate	Moderate	Slight	Loblolly pine-------	---	---	Loblolly pine,
							Shortleaf pine------	---	---	shortleaf pine.
							Virginia pine-------	---	---	
							Northern red oak----	---	---	
							Post oak------------	---	---	
							Scarlet oak---------	---	---	
							White oak-----------	---	---	
PsC2:										
Pacolet-------	8C	Slight	Moderate	Moderate	Slight	Slight	Loblolly pine-------	79	108	Loblolly pine,
							Shortleaf pine------	68	106	shortleaf pine,
							Yellow-poplar-------	90	90	yellow-poplar.
							Virginia pine-------	71	---	
							White oak-----------	---	---	
Saw-----------	6D	Slight	Moderate	Moderate	Moderate	Slight	Loblolly pine-------	---	---	Loblolly pine,
							Shortleaf pine------	---	---	shortleaf pine.
							Virginia pine-------	---	---	
							Northern red oak----	---	---	
							Post oak------------	---	---	
							Scarlet oak---------	---	---	
							White oak-----------	---	---	
PsD2:										
Pacolet-------	8R	Moderate	Moderate	Moderate	Slight	Slight	Loblolly pine-------	79	108	Loblolly pine,
							Shortleaf pine------	68	106	shortleaf pine,
							Yellow-poplar-------	90	90	yellow-poplar.
							Virginia pine-------	71	---	
							White oak-----------	---	---	

See footnotes at end of table.

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
PsD2:										
Saw-----------	6R	Moderate	Moderate	Slight	Moderate	Moderate	Loblolly pine-------	---	---	Loblolly pine,
							Shortleaf pine------	---	---	shortleaf pine.
							Virginia pine-------	---	---	
							Northern red oak----	---	---	
							Post oak------------	---	---	
							Scarlet oak---------	---	---	
							White oak-----------	---	---	
Qp.										
Pits										
RaE:										
Rion----------	8R	Severe	Severe	Slight	Slight	Slight	Shortleaf pine------	75	120	Loblolly pine,
							Hickory-------------	---	---	shortleaf pine,
							Loblolly pine-------	---	---	yellow-poplar.
							Northern red oak----	---	---	
							Post oak------------	---	---	
							Southern red oak----	---	---	
							Sweetgum------------	---	---	
							Yellow-poplar-------	98	104	
							White oak-----------	---	---	
							Virginia pine-------	78	119	
RcF:										
Rion----------	8R	Severe	Severe	Moderate	Slight	Slight	Shortleaf pine------	75	120	Loblolly pine,
							Hickory-------------	---	---	shortleaf pine,
							Loblolly pine-------	---	---	yellow-poplar.
							Northern red oak----	---	---	
							Post oak------------	---	---	
							Southern red oak----	---	---	
							Sweetgum------------	---	---	
							Yellow-poplar-------	98	104	
							White oak-----------	---	---	
							Virginia pine-------	78	119	
Ashlar--------	7R	Severe	Severe	Severe	Moderate	Slight	Shortleaf pine------	---	---	Loblolly pine,
							Virginia pine-------	---	---	shortleaf pine.
							Loblolly pine-------	---	---	
							Northern red oak----	---	---	
Rock outcrop.										
RnE:										
Rion----------	8R	Severe	Severe	Moderate	Slight	Slight	Shortleaf pine------	75	120	Loblolly pine,
							Hickory-------------	---	---	shortleaf pine,
							Loblolly pine-------	---	---	yellow-poplar.
							Northern red oak----	---	---	
							Post oak------------	---	---	
							Southern red oak----	---	---	
							Sweetgum------------	---	---	
							Yellow-poplar-------	98	104	
							White oak-----------	---	---	
							Virginia pine-------	78	119	

See footnotes at end of table.

Table 6.—Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns					Potential productivity			Suggested trees to manage[4]
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index[2]	Volume of wood fiber[3]	
RnE:										
Cliffside-----	3R	Severe	Severe	Moderate	Moderate	Slight	Chestnut oak--------	---	---	Loblolly pine, shortleaf pine.
							Virginia pine-------	---	---	
							Scarlet oak---------	---	---	
							Shortleaf pine------	---	---	
							White oak-----------	---	---	
RsC:										
Rock outcrop.										
Ashlar--------	7S	Slight	Slight	Moderate	Moderate	Moderate	Virginia pine-------	---	---	Loblolly pine, shortleaf pine.
							Shortleaf pine------	---	---	
							Loblolly pine-------	---	---	
							Northern red oak----	---	---	
RxF:										
Rock outcrop.										
Cleveland-----	3R	Severe	Severe	Moderate	Severe	Slight	Virginia pine-------	---	---	Eastern white pine, shortleaf pine.
							Chestnut oak--------	---	---	
							Eastern white pine--	---	---	
							Hickory-------------	---	---	
							Northern red oak----	---	---	
							Pitch pine----------	---	---	
							Scarlet oak---------	---	---	
SkB:										
Skyuka--------	10C	Slight	Slight	Moderate	Slight	Moderate	Loblolly pine-------	---	---	Loblolly pine, shortleaf pine.
							Red maple-----------	---	---	
							Shortleaf pine------	---	---	
							Sweetgum------------	---	---	
							Yellow-poplar-------	---	---	
TaC:										
Tate----------	6A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar-------	92	93	Eastern white pine, yellow-poplar.
							Virginia pine-------	---	---	
							Eastern white pine--	89	164	
							Northern red oak----	---	---	
							Shortleaf pine------	---	---	
TbC:										
Tate----------	6A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar-------	92	93	Eastern white pine, yellow-poplar.
							Virginia pine-------	---	---	
							Eastern white pine--	89	164	
							Northern red oak----	---	---	
							Shortleaf pine------	---	---	
Greenlee------	8X	Slight	Moderate	Moderate	Slight	Moderate	Yellow-poplar-------	101	109	Eastern white pine, yellow-poplar.
							Virginia pine-------	---	---	
							Black locust--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	98	182	
							Northern red oak----	---	---	
							Pitch pine----------	---	---	
							Red maple-----------	---	---	
							Scarlet oak---------	---	---	
							White oak-----------	---	---	

See footnotes at end of table.

Table 6.--Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
TbD:										
Tate----------	6R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar-------	92	93	Eastern white pine, yellow-poplar.
							Virginia pine-------	---	---	
							Eastern white pine--	89	164	
							Northern red oak----	---	---	
							Shortleaf pine------	---	---	
Greenlee------	8X	Moderate	Moderate	Moderate	Slight	Moderate	Yellow-poplar-------	101	109	Eastern white pine, yellow-poplar.
							Virginia pine-------	---	---	
							Black locust--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	98	182	
							Northern red oak----	---	---	
							Pitch pine----------	---	---	
							Red maple-----------	---	---	
							Scarlet oak---------	---	---	
							White oak-----------	---	---	
ToA:										
Toccoa--------	8A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar-------	107	---	American sycamore, loblolly pine, yellow-poplar.
							Loblolly pine-------	90	---	
							Southern red oak----	---	---	
							Sweetgum------------	100	---	
TtD:										
Toecane-------	8R	Moderate	Moderate	Slight	Slight	Severe	Yellow-poplar-------	104	---	Eastern white pine, yellow-poplar.
							Eastern hemlock-----	---	---	
Tusquitee-----	8R	Moderate	Moderate	Slight	Slight	Severe	Yellow-poplar-------	103	112	Black walnut, eastern white pine, yellow-poplar.
							Black cherry--------	---	---	
							Black locust--------	---	---	
							Black walnut--------	---	---	
							Eastern hemlock-----	---	---	
							Eastern white pine--	100	106	
							Hickory-------------	---	---	
							Northern red oak----	---	---	
							White oak-----------	---	---	
							Yellow birch--------	---	---	
UdC, UoA. Udorthents										
UpA. Udorthents-Pits										
Ur. Urban land										

See footnotes at end of table.

Table 6.—Woodland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume of wood fiber[3]	Suggested trees to manage[4]
WeA:										
Wehadkee------	8W	Slight	Severe	Moderate	Moderate	Severe	Willow oak----------	94	91	Green ash,
							Yellow-poplar-------	100	107	loblolly pine,
							Sweetgum-----------	97	128	sweetgum,
							Water oak----------	94	91	yellow-poplar.
							Loblolly pine-------	93	138	
							Green ash----------	89	64	
							White ash----------	---	---	
							River birch---------	---	---	
							American sycamore---	---	---	

[1] The number in the ordination symbol denotes potential productivity, in cubic meters per hectare per year, for a group (range) of site indices for the indicator species (first tree listed under "Common trees"). One cubic meter per hectare per year equals 14.3 cubic feet per acre per year.

[2] Site indices were assigned using available plot data from North Carolina databases. If available plot data was insufficient, indices for some species were derived from a comparison curve (Olson and Della-Bianca, USFS, SEFES Pap. 104) and Foster's Field Handbook, N.C. Forest Service 1982. If no data existed, site index was based on data from soils with similar properties or, in some cases, no site index was assigned.

[3] Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

[4] If hardwoods are desired on a forest site, the natural reproduction (seeds and sprouts) of acceptable species should be used. Special site preparation techniques may be needed. Planting hardwoods on a specific site should be based upon the recommendations of a forester.

Table 7.—Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ApB:					
Appling	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
ApC:					
Appling	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
ArD:					
Ashe	Severe: slope.	Severe: slope.	Severe: slope, too acid.	Moderate: slope.	Severe: slope, too acid.
Cleveland	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: large stones, slope.	Severe: slope, depth to rock.
Rock outcrop.					
ArF:					
Ashe	Severe: slope.	Severe: slope.	Severe: slope, too acid.	Severe: slope.	Severe: slope, too acid.
Cleveland	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Rock outcrop.					
BoA:					
Bandana	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: flooding, large stones.
Ostin	Severe: flooding.	Moderate: flooding, large stones, wetness.	Severe: small stones.	Slight	Severe: large stones.
BuB:					
Buncombe	Severe: flooding.	Moderate: too sandy.	Moderate: flooding, too sandy.	Moderate: too sandy.	Severe: droughty.
CaB2:					
Cecil	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
CeB2:					
Cecil	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Urban land.					

Table 7.—Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ChA:					
Chewacla	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
CoD:					
Cliffield	Severe: slope, too acid.	Severe: slope, too acid.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: slope, too acid.
Cowee	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope, small stones, too acid.	Moderate: slope.	Severe: slope.
CpD:					
Cliffield	Severe: large stones, slope, too acid.	Severe: large stones, slope, too acid.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: large stones, slope, too acid.
Pigeonroost	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope, small stones, too acid.	Moderate: slope.	Severe: slope, too acid.
CpE:					
Cliffield	Severe: large stones, slope, too acid.	Severe: large stones, slope, too acid.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, too acid.
Pigeonroost	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope, small stones, too acid.	Severe: slope.	Severe: slope, too acid.
CrF:					
Cliffield	Severe: large stones, slope, too acid.	Severe: large stones, slope, too acid.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: large stones, slope, too acid.
Rock outcrop.					
DoB:					
Dogue	Severe: flooding, too acid.	Severe: too acid.	Severe: too acid.	Moderate: wetness.	Severe: too acid.
EcD:					
Edneyville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Chestnut	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope, too acid.

Table 7.—Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
EcE:					
Edneyville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Chestnut	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, too acid.
EvD:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Cowee	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope, small stones, too acid.	Moderate: slope.	Severe: slope.
EvE:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope, small stones, too acid.	Severe: slope.	Severe: slope.
EwD:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Cowee	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope, small stones, too acid.	Moderate: slope.	Severe: slope.
EwE:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope, small stones, too acid.	Severe: slope.	Severe: slope.
EwF:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope, small stones, too acid.	Severe: slope.	Severe: slope.
FaD:					
Fannin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
FaE:					
Fannin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

Table 7.—Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FbF:					
Fannin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Chestnut	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, too acid.
FvA: Fluvaquents-Udifluvents	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
GaC:					
Greenlee	Moderate: large stones, slope.	Moderate: large stones, slope.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, too acid, droughty.
Tate	Moderate: large stones, slope.	Moderate: large stones, slope.	Severe: slope.	Slight	Moderate: large stones.
GaD:					
Greenlee	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, too acid, droughty.
Tate	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: large stones.
GbF:					
Greenlee	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: large stones, slope.	Severe: large stones, too acid, droughty.
Tate	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: large stones.
GrE:					
Grover	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HaC2:					
Hayesville	Severe: too acid.	Severe: too acid.	Severe: slope, too acid.	Slight	Severe: too acid.
HaD2:					
Hayesville	Severe: slope, too acid.	Severe: slope, too acid.	Severe: slope, too acid.	Moderate: slope.	Severe: slope, too acid.
HeB:					
Helena	Severe: too acid.	Severe: too acid.	Severe: too acid.	Moderate: wetness.	Severe: too acid.
Worsham	Severe: percs slowly, wetness.	Severe: percs slowly, wetness.	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.

Table 7.—Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
HsB2:					
Hiwassee	Slight	Slight	Moderate: slope.	Slight	Slight.
HsC2:					
Hiwassee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
IoA:					
Iotla	Severe: flooding.	Moderate: wetness.	Moderate: flooding, small stones.	Moderate: wetness.	Moderate: flooding, wetness.
MaC2:					
Madison	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
MaD2:					
Madison	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
PaC2:					
Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
PaD2:					
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
PbB2:					
Pacolet	Slight	Slight	Moderate: slope.	Slight	Slight.
Bethlehem	Severe: small stones.	Severe: small stones.	Severe: small stones.	Slight	Severe: small stones.
PbC2:					
Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Bethlehem	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Slight	Severe: small stones.
PbD2:					
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Bethlehem	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: slope, small stones.
PsB2:					
Pacolet	Slight	Slight	Moderate: slope.	Slight	Slight.
Saw	Slight	Slight	Moderate: slope, small stones, depth to rock.	Slight	Moderate: depth to rock.

Table 7.—Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
PsC2:					
Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Saw	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope, depth to rock.
PsD2:					
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Saw	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Qp. Pits					
RaE:					
Rion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RcF:					
Rion	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Ashlar	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Slight	Severe: slope, droughty.
Rock outcrop.					
RnE:					
Rion	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Cliffside	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
RsC:					
Rock outcrop.					
Ashlar	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Severe: droughty.
RxF:					
Rock outcrop.					
Cleveland	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
SkB:					
Skyuka	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.

Table 7.—Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
TaC:					
Tate	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: large stones, slope, small stones.
TbC:					
Tate	Moderate: large stones, slope.	Moderate: large stones, slope.	Severe: slope.	Slight	Moderate: large stones.
Greenlee	Moderate: large stones, slope.	Moderate: large stones, slope.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, too acid, droughty.
TbD:					
Tate	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Moderate: large stones.
Greenlee	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: large stones.	Severe: large stones, too acid, droughty.
ToA:					
Toccoa	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
TtD:					
Toecane	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: large stones, slope.
Tusquitee	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Moderate: slope.	Severe: slope.
UdC, UoA. Udorthents					
UpA. Udorthents-Pits					
Ur. Urban land					
WeA:					
Wehadkee	Severe: flooding, wetness.	Severe: wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: flooding, wetness.

Table 8.—Wildlife Habitat

(See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
ApB:											
Appling	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
ApC:											
Appling	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
ArD:											
Ashe	Poor	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Fair	Poor	Very poor.
Cleveland	Very poor.	Very poor.	Poor	Poor	Poor	---	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop.											
ArF:											
Ashe	Very poor.	Poor	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
Cleveland	Very poor.	Very poor.	Poor	Fair	Fair	---	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop.											
BoA:											
Bandana	Fair	Good	Good	Fair	Fair	---	Fair	Fair	Good	Fair	Fair.
Ostin	Poor	Poor	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
BuB:											
Buncombe	Very poor.	Poor	Poor	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
CaB2:											
Cecil	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
CeB2:											
Cecil	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.											
ChA:											
Chewacla	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair.
CoD:											
Cliffield	Poor	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Fair	Poor	Very poor.
Cowee	Poor	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.

Table 8.—Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
CpD:											
Cliffield	Poor	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Fair	Poor	Very poor.
Pigeonroost	Poor	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Good	Very poor.
CpE:											
Cliffield	Very poor.	Poor	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
Pigeonroost	Very poor.	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
CrF:											
Cliffield	Very poor.	Poor	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.											
DoB:											
Dogue	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
EcD:											
Edneyville	Very poor.	Very poor.	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Chestnut	Poor	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
EcE:											
Edneyville	Very poor.	Very poor.	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Chestnut	Very poor.	Poor	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
EvD:											
Evard	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
Cowee	Poor	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
EvE:											
Evard	Very poor.	Very poor.	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Cowee	Very poor.	Poor	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
EwD:											
Evard	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
Cowee	Poor	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.

Table 8.—Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
EwE:											
Evard	Very poor.	Very poor.	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Cowee	Very poor.	Poor	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
EwF:											
Evard	Very poor.	Very poor.	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Cowee	Very poor.	Poor	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
FaD:											
Fannin	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
FaE:											
Fannin	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
FbF:											
Fannin	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Chestnut	Very poor.	Poor	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
FvA:											
Fluvaquents	Poor	Poor	Poor	Fair	Poor	---	Good	Good	Poor	Poor	Good.
Udifluvents	Poor	Poor	Poor	Fair	Poor	---	Good	Good	Poor	Poor	Good.
GaC:											
Greenlee	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Tate	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
GaD:											
Greenlee	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Tate	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
GbF:											
Greenlee	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Tate	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
GrE:											
Grover	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
HaC2:											
Hayesville	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.

Table 8.—Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
HaD2:											
Hayesville	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
HeB:											
Helena	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
Worsham	Poor	Fair	Fair	Fair	Fair	---	Poor	Very poor.	Fair	Fair	Very poor.
HsB2:											
Hiwassee	Fair	Fair	Fair	Fair	Fair	---	Poor	Very poor.	Fair	Fair	Very poor.
HsC2:											
Hiwassee	Poor	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
IoA:											
Iotla	Fair	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor
MaC2:											
Madison	Poor	Fair	Fair	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
MaD2:											
Madison	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
PaC2:											
Pacolet	Very poor.	Poor	Very poor.	Poor	Poor	---	Very poor.	Very poor.	Very poor.	Poor	Very poor.
PaD2:											
Pacolet	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
PbB2:											
Pacolet	Poor	Poor	Poor	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Bethlehem	Fair	Good	Good	Fair	Fair	---	Very poor.	Very poor.	Good	Fair	Very poor.
PbC2:											
Pacolet	Very poor.	Poor	Very poor.	Poor	Poor	---	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Bethlehem	Fair	Good	Good	Fair	Fair	---	Very poor.	Very poor.	Good	Fair	Very poor.
PbD2:											
Pacolet	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Bethlehem	Poor	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.

Table 8.—Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
PsB2:											
Pacolet	Poor	Poor	Poor	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Saw	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Fair	Good	Very poor.
PsC2:											
Pacolet	Very poor.	Poor	Very poor.	Poor	Poor	---	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Saw	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
PsD2:											
Pacolet	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Saw	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
Qp. Pits											
RaE:											
Rion	Very poor.	Poor	Poor	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
RcF:											
Rion	Very poor.	Poor	Poor	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Ashlar	Very poor.	Very poor.	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.
Rock outcrop.											
RnE:											
Rion	Very poor.	Poor	Poor	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Cliffside	Very poor.	Poor	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
RsC:											
Rock outcrop.											
Ashlar	Fair	Good	Good	Fair	Fair	---	Very poor.	Very poor.	Good	Fair	Very poor.
RxF:											
Rock outcrop.											
Cleveland	Very poor.	Very poor.	Poor	Fair	Fair	---	Very poor.	Very poor.	Very poor.	Poor	Very poor.
SkB:											
Skyuka	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.

Table 8.—Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
TaC:											
Tate	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
TbC:											
Tate	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
Greenlee	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
TbD:											
Tate	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
Greenlee	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
ToA:											
Toccoa	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
TtD:											
Toecane	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Tusquitee	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
UdC, UoA. Udorthents											
UpA. Udorthents-Pits											
Ur. Urban land											
WeA:											
Wehadkee	Very poor.	Poor	Poor	Fair	Fair	---	Good	Fair	Poor	Fair	Fair.

Table 9.—Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ApB:						
Appling	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
ApC:						
Appling	Moderate: slope, too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
ArD:						
Ashe	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, too acid.
Cleveland	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rock outcrop.						
ArF:						
Ashe	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, too acid.
Cleveland	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rock outcrop.						
BoA:						
Bandana	Severe: wetness, cutbanks cave.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Moderate: flooding, large stones.
Ostin	Severe: wetness, cutbanks cave.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: large stones.
BuB:						
Buncombe	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: droughty.
CaB2:						
Cecil	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
CeB2:						
Cecil	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
Urban land.						

Table 9.—Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ChA:						
Chewacla	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, low strength, wetness.	Severe: wetness.
CoD:						
Cliffield	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, too acid.
Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CpD:						
Cliffield	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: large stones, slope, too acid.
Pigeonroost	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too acid.
CpE:						
Cliffield	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: large stones, slope, too acid.
Pigeonroost	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too acid.
CrF:						
Cliffield	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: large stones, slope, too acid.
Rock outcrop.						
DoB:						
Dogue	Severe: wetness, cutbanks cave.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength.	Severe: too acid.
EcD:						
Edneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Chestnut	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too acid.
EcE:						
Edneyville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Chestnut	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too acid.

Table 9.—Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
EvD:						
Evard	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EvE:						
Evard	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EwD:						
Evard	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EwE:						
Evard	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EwF:						
Evard	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
FaD:						
Fannin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
FaE:						
Fannin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
FbF:						
Fannin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Chestnut	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too acid.

Table 9.—Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
FvA-------------------- Fluvaquents-Udifluvents	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, low strength, wetness.	Severe: wetness.
GaC:						
Greenlee---------------	Severe: large stones, cutbanks cave.	Severe: large stones.	Severe: large stones.	Severe: large stones, slope.	Severe: large stones.	Severe: large stones, too acid, droughty.
Tate-------------------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: frost action, slope.	Moderate: large stones.
GaD:						
Greenlee---------------	Severe: large stones, slope, cutbanks cave.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, too acid, droughty.
Tate-------------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: large stones.
GbF:						
Greenlee---------------	Severe: large stones, slope, cutbanks cave.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, too acid, droughty.
Tate-------------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: large stones.
GrE:						
Grover-----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
HaC2:						
Hayesville-------------	Moderate: slope, too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: frost action, low strength, slope.	Severe: too acid.
HaD2:						
Hayesville-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, too acid.
HeB:						
Helena-----------------	Severe: wetness.	Severe: shrink-swell.	Severe: shrink-swell, wetness.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Severe: too acid.
Worsham----------------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
HsB2:						
Hiwassee---------------	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.

Table 9.—Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HsC2:						
Hiwassee	Moderate: slope, too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
IoA:						
Iotla	Severe: wetness, cutbanks cave.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding, wetness.
MaC2:						
Madison	Moderate: slope, too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
MaD2:						
Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PaC2:						
Pacolet	Moderate: slope, too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
PaD2:						
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PbB2:						
Pacolet	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
Bethlehem	Moderate: too clayey, depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: low strength.	Severe: small stones.
PbC2:						
Pacolet	Moderate: slope, too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
Bethlehem	Moderate: slope, too clayey, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: low strength, slope.	Severe: small stones.
PbD2:						
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bethlehem	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, small stones.
PsB2:						
Pacolet	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
Saw	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: low strength, depth to rock.	Moderate: depth to rock.

Table 9.—Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
PsC2:						
Pacolet	Moderate: slope, too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
Saw	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: low strength, slope, depth to rock.	Moderate: slope, depth to rock.
PsD2:						
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Saw	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Qp. Pits						
RaE:						
Rion	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RcF:						
Rion	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Ashlar	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Rock outcrop.						
RnE:						
Rion	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cliffside	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
RsC:						
Rock outcrop.						
Ashlar	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock.	Severe: droughty.
RxF:						
Rock outcrop.						
Cleveland	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.

Table 9.—Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
SkB:						
Skyuka------------------	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: shrink-swell, wetness.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
TaC:						
Tate--------------------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: frost action, slope.	Moderate: large stones, slope, small stones.
TbC:						
Tate--------------------	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: frost action, slope.	Moderate: large stones.
Greenlee----------------	Severe: large stones, cutbanks cave.	Severe: large stones.	Severe: large stones.	Severe: large stones, slope.	Severe: large stones.	Severe: large stones, too acid, droughty.
TbD:						
Tate--------------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: large stones.
Greenlee----------------	Severe: large stones, slope, cutbanks cave.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, too acid, droughty.
ToA:						
Toccoa------------------	Moderate: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
TtD:						
Toecane-----------------	Severe: large stones, slope, cutbanks cave.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.	Severe: large stones, slope.
Tusquitee---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
UdC, UoA. Udorthents						
UpA. Udorthents-Pits						
Ur. Urban land						
WeA:						
Wehadkee----------------	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, low strength, wetness.	Severe: flooding, wetness.

Table 10.—Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ApB:					
Appling	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: hard to pack, too clayey.
ApC:					
Appling	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: hard to pack, slope, too clayey.
ArD:					
Ashe	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, too acid, depth to rock.
Cleveland	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Rock outcrop.					
ArF:					
Ashe	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, too acid, depth to rock.
Cleveland	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
Rock outcrop.					
BoA:					
Bandana	Severe: flooding, wetness, poor filter.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: thin layer, wetness.
Ostin	Severe: flooding, wetness, poor filter.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, small stones, too sandy.
BuB:					
Buncombe	Severe: flooding, poor filter.	Severe: flooding, seepage.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.

Table 10.—Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CaB2:					
Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: hard to pack, too clayey.
CeB2:					
Cecil	Moderate: percs slowly.	Moderate: seepage. slope.	Moderate: too clayey.	Slight	Fair: hard to pack, too clayey.
Urban land.					
ChA:					
Chewacla	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
CoD:					
Cliffield	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, too acid, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Cowee	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too acid, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
CpD:					
Cliffield	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, too acid, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Pigeonroost	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too acid, depth to rock.	Severe: slope, depth to rock.	Poor: slope, too acid, depth to rock.
CpE:					
Cliffield	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, too acid, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Pigeonroost	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too acid, depth to rock.	Severe: slope, depth to rock.	Poor: slope, too acid, depth to rock.
CrF:					
Cliffield	Severe: slope, depth to rock.	Severe: large stones, slope, depth to rock.	Severe: slope, too acid, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
Rock outcrop.					
DoB:					
Dogue	Severe: percs slowly, wetness.	Severe: seepage.	Severe: seepage, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, too acid.

Table 10.—Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EcD:					
Edneyville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope.
Chestnut	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.
EcE:					
Edneyville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope.
Chestnut	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.
EvD:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Cowee	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too acid, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
EvE:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Cowee	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too acid, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
EwD:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Cowee	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too acid, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
EwE:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Cowee	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too acid, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
EwF:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

Table 10.—Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
EwF:					
Cowee	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, too acid, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
FaD:					
Fannin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
FaE:					
Fannin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
FbF:					
Fannin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Chestnut	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.
FvA: Fluvaquents-Udifluvents	Severe: flooding, percs slowly, wetness.	Severe: flooding.	Variable	Severe: flooding, wetness.	Variable.
GaC:					
Greenlee	Severe: large stones.	Severe: large stones, seepage, slope.	Severe: large stones, seepage.	Severe: seepage.	Poor: large stones, too acid.
Tate	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: large stones, slope, too clayey.
GaD:					
Greenlee	Severe: large stones, slope.	Severe: large stones, seepage, slope.	Severe: large stones, seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope, too acid.
Tate	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
GbF:					
Greenlee	Severe: large stones, slope.	Severe: large stones, seepage, slope.	Severe: large stones, seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope, too acid.
Tate	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
GrE:					
Grover	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

Table 10.—Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
HaC2:					
Hayesville	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too acid.	Moderate: slope.	Poor: too acid.
HaD2:					
Hayesville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too acid.	Severe: slope.	Poor: slope, too acid.
HeB:					
Helena	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness, too acid.	Moderate: wetness.	Poor: hard to pack, too clayey, too acid.
Worsham	Severe: percs slowly, wetness.	Moderate: slope.	Severe: too clayey, wetness.	Severe: wetness.	Poor: hard to pack, too clayey, wetness.
HsB2:					
Hiwassee	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: hard to pack, too clayey.
HsC2:					
Hiwassee	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: hard to pack, slope, too clayey.
IoA:					
Iotla	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
MaC2:					
Madison	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey.
MaD2:					
Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
PaC2:					
Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope, too clayey.
PaD2:					
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
PbB2:					
Pacolet	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
Bethlehem	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.

Table 10.—Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PbC2:					
Pacolet----------------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope, too clayey.
Bethlehem--------------	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock.
PbD2:					
Pacolet----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Bethlehem--------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
PsB2:					
Pacolet----------------	Moderate: percs slowly.	Moderate: seepage, slope.	Slight---------	Slight---------	Fair: too clayey.
Saw--------------------	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: seepage, depth to rock.	Severe: seepage, depth to rock.	Poor: depth to rock.
PsC2:					
Pacolet----------------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope, too clayey.
Saw--------------------	Severe: depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, depth to rock.	Severe: seepage, depth to rock.	Poor: depth to rock.
PsD2:					
Pacolet----------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Saw--------------------	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, depth to rock.
Qp. Pits					
RaE:					
Rion-------------------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
RcF:					
Rion-------------------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Ashlar-----------------	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: slope, small stones, depth to rock.

Table 10.—Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
RcF:					
Rock outcrop.					
RnE:					
Rion	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Cliffside	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, small stones, depth to rock.
RsC:					
Rock outcrop.					
Ashlar	Severe: depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, depth to rock.	Severe: seepage, depth to rock.	Poor: small stones, depth to rock.
RxF:					
Rock outcrop.					
Cleveland	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock.	Poor: slope, depth to rock.
SkB:					
Skyuka	Moderate: percs slowly, wetness.	Moderate: seepage, slope, wetness.	Severe: too clayey, wetness.	Moderate: wetness.	Poor: hard to pack, too clayey.
TaC:					
Tate	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: large stones, slope, too clayey.
TbC:					
Tate	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: large stones, slope, too clayey.
Greenlee	Severe: large stones.	Severe: large stones, seepage, slope.	Severe: large stones, seepage.	Severe: seepage.	Poor: large stones, too acid.
TbD:					
Tate	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
Greenlee	Severe: large stones, slope.	Severe: large stones, seepage, slope.	Severe: large stones, seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope, too acid.

Table 10.—Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ToA:					
Toccoa	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Good.
TtD:					
Toecane	Severe: large stones, slope.	Severe: large stones, seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: large stones, slope.
Tusquitee	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope, small stones.
UdC, UoA. Udorthents					
UpA. Udorthents-Pits					
Ur. Urban land					
WeA:					
Wehadkee	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: thin layer, wetness.

Table 11.—Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
ApB:				
Appling	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ApC:				
Appling	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ArD:				
Ashe	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope, too acid.
Cleveland	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, depth to rock.
Rock outcrop.				
ArF:				
Ashe	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope, too acid.
Cleveland	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, depth to rock.
Rock outcrop.				
BoA:				
Bandana	Fair: wetness.	Probable	Probable	Poor: area reclaim, small stones.
Ostin	Fair: large stones, wetness.	Probable	Probable	Poor: area reclaim, small stones, too sandy.
BuB:				
Buncombe	Good	Probable	Improbable: too sandy.	Poor: too sandy.
CaB2:				
Cecil	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CeB2:				
Cecil	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				

Table 11.—Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
ChA:				
Chewacla	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
CoD:				
Cliffield	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Cowee	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too acid.
CpD:				
Cliffield	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Pigeonroost	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too acid.
CpE:				
Cliffield	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Pigeonroost	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too acid.
CrF:				
Cliffield	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Rock outcrop.				
DoB:				
Dogue	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too clayey, too acid.
EcD:				
Edneyville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, slope.
Chestnut	Poor: depth to rock.	Improbable: thin layer, excess fines.	Improbable: thin layer, excess fines.	Poor: large stones, slope.
EcE:				
Edneyville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, slope.

Table 11.—Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
EcE:				
Chestnut	Poor: slope, depth to rock.	Improbable: thin layer, excess fines.	Improbable: thin layer, excess fines.	Poor: large stones, slope.
EvD:				
Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Cowee	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too acid.
EvE:				
Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Cowee	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too acid.
EwD:				
Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Cowee	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too acid.
EwE:				
Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Cowee	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too acid.
EwF:				
Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Cowee	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too acid.
FaD:				
Fannin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
FaE:				
Fannin	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
FbF:				
Fannin	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

Table 11.—Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
FbF:				
Chestnut	Poor: slope, depth to rock.	Improbable: thin layer, excess fines.	Improbable: thin layer, excess fines.	Poor: large stones, slope.
FvA Fluvaquents-Udifluvents	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
GaC:				
Greenlee	Poor: large stones.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones, too acid.
Tate	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones.
GaD:				
Greenlee	Poor: large stones.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones, too acid.
Tate	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, slope.
GbF:				
Greenlee	Poor: large stones, slope.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones, too acid.
Tate	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, slope.
GrE:				
Grover	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
HaC2:				
Hayesville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, too acid.
HaD2:				
Hayesville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey, too acid.
HeB:				
Helena	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, too acid.

Table 11.—Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
HeB:				
Worsham	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
HsB2:				
Hiwassee	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
HsC2:				
Hiwassee	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
IoA:				
Iotla	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
MaC2:				
Madison	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MaD2:				
Madison	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
PaC2:				
Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
PaD2:				
Pacolet	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
PbB2:				
Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Bethlehem	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
PbC2:				
Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Bethlehem	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
PbD2:				
Pacolet	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Bethlehem	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too clayey.

Table 11.—Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
PsB2:				
Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Saw	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
PsC2:				
Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Saw	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
PsD2:				
Pacolet	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Saw	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too clayey.
Qp. Pits				
RaE:				
Rion	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
RcF:				
Rion	Poor: slope.	Probable	Probable	Poor: area reclaim, slope, small stones.
Ashlar	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Rock outcrop.				
RnE:				
Rion	Poor: slope.	Probable	Probable	Poor: area reclaim, slope, small stones.
Cliffside	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
RsC:				
Rock outcrop.				
Ashlar	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

Table 11.—Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
RxF:				
Rock outcrop.				
Cleveland	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, depth to rock.
SkB:				
Skyuka	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
TaC:				
Tate	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
TbC:				
Tate	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones.
Greenlee	Poor: large stones.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones, too acid.
TbD:				
Tate	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, slope.
Greenlee	Poor: large stones.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones, too acid.
ToA:				
Toccoa	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
TtD:				
Toecane	Poor: large stones.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones, slope.
Tusquitee	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
UdC, UoA.				
Udorthents				
UpA.				
Udorthents-Pits				
Ur.				
Urban land				

Table 11.—Construction Materials--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
WeA:				
Wehadkee----------------	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

Table 12.—Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
ApB:							
Appling	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Soil blowing	Favorable.
ApC:							
Appling	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope, soil blowing.	Slope.
ArD:							
Ashe	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, depth to rock.	Large stones, slope, droughty.
Cleveland	Severe: slope, depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, depth to rock.	Large stones, slope, droughty.
Rock outcrop.							
ArF:							
Ashe	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, depth to rock.	Large stones, slope, droughty.
Cleveland	Severe: slope, depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, depth to rock.	Large stones, slope, droughty.
Rock outcrop.							
BoA:							
Bandana	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding	Wetness, droughty.	Large stones, wetness, soil blowing.	Large stones, wetness, droughty.
Ostin	Severe: seepage.	Severe: large stones, seepage.	Severe: cutbanks cave.	Flooding, large stones.	Flooding, large stones, wetness.	Large stones, too sandy, wetness.	Large stones, droughty.
BuB:							
Buncombe	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Fast intake, soil blowing, droughty.	Too sandy, soil blowing.	Rooting depth, droughty.

Table 12.—Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
CaB2:							
Cecil	Moderate: seepage, slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
CeB2:							
Cecil	Moderate: seepage, slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
Urban land.							
ChA:							
Chewacla	Moderate: seepage.	Severe: hard to pack, piping, wetness.	Moderate: slow refill.	Flooding	Flooding, wetness.	Wetness	Wetness.
CoD:							
Cliffield	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, depth to rock.	Large stones, slope, droughty.
Cowee	Severe: slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, too acid, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
CpD:							
Cliffield	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, depth to rock.	Large stones, slope, droughty.
Pigeonroost	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, too acid, depth to rock.	Large stones, slope, depth to rock.	Large stones, slope, depth to rock.
CpE:							
Cliffield	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, depth to rock.	Large stones, slope, droughty.
Pigeonroost	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, too acid, depth to rock.	Large stones, slope, depth to rock.	Large stones, slope, depth to rock.

Table 12.—Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
CrF:							
Cliffield	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, depth to rock.	Large stones, slope, droughty.
Rock outcrop.							
DoB:							
Dogue	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Slope, too acid.	Slope, wetness, soil blowing.	Wetness	Favorable.
EcD:							
Edneyville	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty.	Large stones, slope.	Large stones, slope, droughty.
Chestnut	Severe: seepage, slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, depth to rock.	Large stones, slope, depth to rock.
EcE:							
Edneyville	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty.	Large stones, slope.	Large stones, slope, droughty.
Chestnut	Severe: seepage, slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, depth to rock.	Large stones, slope, depth to rock.
EvD:							
Evard	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, too sandy, soil blowing.	Slope.
Cowee	Severe: slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, too acid, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
EvE:							
Evard	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, too sandy, soil blowing.	Slope.
Cowee	Severe: slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, too acid, depth to rock.	Slope, depth to rock.	Slope, depth to rock.

Table 12.—Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
EwD:							
Evard-----------	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, too sandy, soil blowing.	Slope.
Cowee-----------	Severe: slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, too acid, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
EwE:							
Evard-----------	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, too sandy, soil blowing.	Slope.
Cowee-----------	Severe: slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, too acid, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
EwF:							
Evard-----------	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, too sandy, soil blowing.	Slope.
Cowee-----------	Severe: slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, too acid, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
FaD:							
Fannin----------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
FaE:							
Fannin----------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
FbF:							
Fannin----------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
Chestnut--------	Severe: seepage, slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, depth to rock.	Large stones, slope, depth to rock.
FvA-------------- Fluvaquents-Udifluvents	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Flooding, percs slowly.	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.

Table 12.—Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
GaC:							
Greenlee	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, too sandy.	Large stones, slope, droughty.
Tate	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
GaD:							
Greenlee	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, too sandy.	Large stones, slope, droughty.
Tate	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
GbF:							
Greenlee	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, too sandy.	Large stones, slope, droughty.
Tate	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
GrE:							
Grover	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Slope.
HaC2:							
Hayesville	Severe: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, too acid.	Slope	Slope.
HaD2:							
Hayesville	Severe: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, too acid.	Slope	Slope.
HeB:							
Helena	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope, too acid.	Percs slowly, slope, wetness.	Percs slowly, wetness.	Percs slowly.
Worsham	Moderate: slope.	Severe: wetness.	Severe: slow refill.	Percs slowly, slope.	Slope, wetness.	Erodes easily, percs slowly, wetness.	Erodes easily, percs slowly, wetness.

Table 12.—Water Management--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
HsB2:							
Hiwassee--------	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Favorable------	Favorable.
HsC2:							
Hiwassee--------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
IoA:							
Iotla-----------	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Flooding-------	Flooding, wetness.	Wetness--------	Favorable.
MaC2:							
Madison---------	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope----------	Erodes easily, slope.	Erodes easily, slope.
MaD2:							
Madison---------	Severe: slope.	Severe: hard to pack, piping.	Severe: no water.	Deep to water	Slope----------	Erodes easily, slope.	Erodes easily, slope.
PaC2:							
Pacolet---------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
PaD2:							
Pacolet---------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
PbB2:							
Pacolet---------	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Favorable------	Favorable.
Bethlehem-------	Moderate: seepage, slope, depth to rock.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Large stones, soil blowing, depth to rock.	Large stones, depth to rock, droughty.
PbC2:							
Pacolet---------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope----------	Slope.
Bethlehem-------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Large stones, slope, depth to rock.	Large stones, slope, depth to rock.

Table 12.—Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
PbD2:							
Pacolet	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Bethlehem	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing, droughty.	Large stones, slope, depth to rock.	Large stones, slope, depth to rock.
PsB2:							
Pacolet	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
Saw	Severe: seepage.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, depth to rock.	Depth to rock	Depth to rock.
PsC2:							
Pacolet	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Saw	Severe: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.	Slope, depth to rock.
PsD2:							
Pacolet	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Saw	Severe: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, depth to rock, droughty.	Slope, soil blowing, depth to rock.	Slope, depth to rock, droughty.
Qp. Pits							
RaE:							
Rion	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty.	Slope, soil blowing.	Slope, droughty.
RcF:							
Rion	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
Ashlar	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty.	Slope, soil blowing, depth to rock.	Slope, depth to rock, droughty.
Rock outcrop.							

Table 12.—Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
RnE:							
Rion	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
Cliffside	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, droughty.	Large stones, slope, depth to rock.	Large stones, slope, droughty.
RsC:							
Rock outcrop.							
Ashlar	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, droughty.	Slope, soil blowing, depth to rock.	Slope, depth to rock, droughty.
RxF:							
Rock outcrop.							
Cleveland	Severe: slope, depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, depth to rock.	Large stones, slope, droughty.
SkB:							
Skyuka	Moderate: seepage, slope.	Severe: hard to pack.	Moderate: slow refill, deep to water.	Deep to water	Slope	Favorable	Favorable.
TaC:							
Tate	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
TbC:							
Tate	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.
Greenlee	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, too sandy.	Large stones, slope, droughty.
TbD:							
Tate	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope	Slope.

Table 12.—Water Management--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
TbD:							
Greenlee	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope, too sandy.	Large stones, slope, droughty.
ToA:							
Toccoa	Severe: seepage.	Severe: piping.	Moderate: deep to water.	Flooding	Flooding	Favorable	Favorable.
TtD:							
Toecane	Severe: seepage, slope.	Severe: large stones, seepage.	Severe: no water.	Deep to water	Large stones, slope, droughty.	Large stones, slope.	Large stones, slope, droughty.
Tusquitee	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Large stones, slope.	Large stones, slope.
UdC, UoA. Udorthents							
UpA. Udorthents-Pits							
Ur. Urban land							
WeA:							
Wehadkee	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding	Flooding, wetness, soil blowing.	Wetness, soil blowing.	Wetness.

Table 13.—Engineering Index Properties

(Absence of an entry indicates that the data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
ApB:												
Appling------	0-10	Sandy loam-----	SC-SM, SM	A-2	0	0-5	86-100	80-100	55-91	15-35	15-35	NP-7
	10-35	Sandy clay, clay loam, clay.	CL, MH, ML	A-7	0	0-5	95-100	90-100	70-95	51-80	41-74	15-30
	35-48	Sandy clay, clay loam, clay.	CL, SC	A-4, A-6, A-7	0	0-5	95-100	85-100	70-90	40-75	30-50	8-22
	48-65	Sandy clay, clay loam, clay.	CL, SC	A-4, A-6, A-7	0	0-5	95-100	85-100	70-90	40-75	30-50	8-22
ApC:												
Appling------	0-10	Sandy loam-----	SC-SM, SM	A-2	0	0-5	86-100	80-100	55-91	15-35	15-35	NP-7
	10-35	Sandy clay, clay loam, clay.	CL, MH, ML	A-7	0	0-5	95-100	90-100	70-95	51-80	41-74	15-30
	35-48	Sandy clay, clay loam, clay.	CL, SC	A-6, A-4, A-7	0	0-5	95-100	85-100	70-90	40-75	30-50	8-22
	48-65	Sandy clay, clay loam, clay.	CL, SC		0	0-5	95-100	85-100	70-90	40-75	30-50	8-22
ArD:												
Ashe---------	0-5	Gravelly sandy loam.	SC-SM, SM	A-2, A-4	10-15	5-10	80-90	65-90	60-90	30-49	25-35	NP-7
	5-22	Loam, gravelly coarse sandy loam, fine sandy loam.	SC-SM, SM	A-4	0-5	5-20	85-100	65-95	60-95	35-49	25-35	NP-7
	22-28	Sandy loam, gravelly loamy coarse sand, cobbly sandy loam.	SM	A-2, A-4	0-5	5-20	75-95	65-95	55-95	55-95	15-49	NP
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Cleveland----	0-3	Stony sandy loam.	SM	A-2, A-4	2-10	5-25	70-90	60-80	50-75	20-50	0-30	NP-3
	3-13	Stony sandy loam.	SM	A-2, A-4	2-10	5-25	70-90	60-80	50-75	20-50	0-30	NP-3
	13-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Rock outcrop.												

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
ArF:												
Ashe---------	0-5	Gravelly sandy loam.	SC-SM, SM	A-2, A-4	10-15	5-10	80-90	65-90	60-90	30-49	25-35	NP-7
	5-22	Loam, gravelly coarse sandy loam, fine sandy loam.	SC-SM, SM	A-4	0-5	5-20	85-100	65-95	60-95	35-49	25-35	NP-7
	22-28	Sandy loam, gravelly loamy coarse sand, cobbly sandy loam.	SM	A-2, A-4	0-5	5-20	75-95	65-95	55-95	55-95	15-49	NP
	28-32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Cleveland----	0-3	Stony sandy loam.	SM	A-2, A-4	2-10	5-25	70-90	60-80	50-75	20-50	0-30	NP-3
	3-13	Stony sandy loam.	SM	A-2, A-4	2-10	5-25	70-90	60-80	50-75	20-50	0-30	NP-3
	13-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Rock outcrop.												
BoA:												
Bandana------	0-6	Sandy loam-----	CL-ML, SM, ML, SC-SM	A-2-4, A-4	0	0-10	90-100	85-100	60-90	30-70	15-35	NP-10
	6-9	Gravelly sandy loam, sandy loam, loamy sand.	SC-SM, SM	A-2-4, A-4	0	0-15	90-100	65-100	50-80	25-49	15-25	NP-5
	9-17	Gravelly sandy loam, sandy loam, loamy sand.	SC-SM, SM	A-2-4, A-4	0	0-15	90-100	65-100	50-80	25-49	15-25	NP-5
	17-24	Loamy sand-----	SM	A-1-b	0	0-15	90-100	95-100	50-70	5-35	10-15	NP
	24-60	Extremely gravelly sand, very gravelly coarse sand, very cobbly loamy sand.	GP-GM, SM, GM, SP-SM	A-1	0-5	5-50	50-85	25-70	15-40	5-20	10-15	NP

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
BoA:												
Ostin--------	0-4	Cobbly sandy loam.	SM	A-1-b, A-2-4	0	15-35	80-95	70-85	40-70	15-30	10-25	NP-3
	4-20	Very gravelly loamy sand, extremely gravelly coarse sand, very cobbly coarse sand.	SM, SW-SM, SP-SM, SW	A-1-a, A-1-b	0-15	15-45	60-75	40-55	8-50	1-20	10-14	NP
	20-29	Extremely gravelly sand, extremely gravelly coarse sand, extremely cobbly coarse sand.	GP-GM, GP, GW, GW-GM	A-1-a, A-1-b	0-15	20-50	25-70	15-40	3-40	1-10	10-14	NP
	29-41	Gravelly sand, gravelly loamy sand, cobbly coarse sand.	SP-SM, SP, SW, SW-SM	A-1-b	0	0-15	75-90	60-75	3-40	1-10	10-14	NP
	41-48	Loamy sand-----	SM	A-1-b	0	0	90-94	80-90	60-70	5-10	10-14	NP
	48-63	Extremely gravelly sand, extremely gravelly coarse sand, extremely cobbly coarse sand.	GP, GW-GM, GP-GM, GW	A-1-a, A-1-b	0-15	20-50	25-70	15-40	3-40	1-10	---	NP
BuB:												
Buncombe-----	0-9	Loamy sand-----	SM, SP-SM	A-2, A-3	0	0	98-100	98-100	90-97	7-32	10-20	NP
	9-15	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-2, A-3	0	0	98-100	98-100	98-100	7-32	10-20	NP
	15-46	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-2, A-3	0	0	98-100	98-100	98-100	7-32	10-20	NP
	46-62	Variable-------	---	---	---	---	---	---	---	---	---	---
CaB2:												
Cecil--------	0-8	Sandy clay loam	CL, SM, ML, SC	A-4, A-6	0	0-5	75-100	75-100	68-95	38-81	21-40	3-17
	8-18	Clay, clay loam	CH, MH, ML	A-5, A-7	0	0-5	97-100	92-100	72-100	55-95	41-80	9-37
	18-39	Clay, clay loam	CH, MH, ML	A-5, A-7	0	0-5	97-100	92-100	72-100	55-95	41-80	9-37
	39-52	Clay, clay loam	CH, MH, ML	A-5, A-7	0	0-5	97-100	92-100	72-100	55-95	41-80	9-37
	52-68	Clay, clay loam	CH, ML, MH	A-5, A-7	0	0-5	97-100	92-100	72-100	55-95	41-80	9-37
CeB2:												
Cecil--------	0-8	Sandy clay loam	CL, SM, ML, SC	A-4, A-6	0	0-5	75-100	75-100	68-95	38-81	21-40	3-17
	8-18	Clay, clay loam	CH, MH, ML	A-5, A-7	0	0-5	97-100	92-100	72-100	55-95	41-80	9-37
	18-39	Clay, clay loam	MH, CH, ML	A-5, A-7	0	0-5	97-100	92-100	72-100	55-95	41-80	9-37
	39-52	Clay, clay loam	CH, MH, ML	A-5, A-7	0	0-5	97-100	92-100	72-100	55-95	41-80	9-37
	52-68	Clay, clay loam	CH, ML, MH	A-5, A-7	0	0-5	97-100	92-100	72-100	55-95	41-80	9-37
Urban land.												

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
ChA:												
Chewacla-----	0-8	Loam-----------	CL, CL-ML, ML	A-4, A-6, A-7	0	0	98-100	95-100	70-100	55-90	25-49	4-20
	8-16	Clay loam, loam, sandy loam.	CL, ML, SM, SC-SM	A-4, A-7-6, A-6	0	0	96-100	95-100	60-100	36-70	20-45	2-15
	16-21	Clay loam, loam, sandy loam.	CL, ML, SM, SC-SM	A-4, A-7-6, A-6	0	0	96-100	95-100	60-100	36-70	20-45	2-15
	21-34	Clay loam, loam, sandy loam.	ML, CL, SC-SM, SM	A-4, A-6, A-7-6	0	0	96-100	95-100	60-100	36-70	20-45	2-15
	34-48	Clay loam, loam, sandy loam.	ML, CL, SC-SM, SM	A-6, A-4, A-7-6	0	0	96-100	95-100	60-100	36-70	20-45	2-15
	48-61	Clay loam, loam, sandy loam.	ML, SC-SM, CL, SM	A-4, A-6, A-7-6	0	0	96-100	95-100	60-100	36-70	20-45	2-15
CoD:												
Cliffield----	0-3	Very cobbly sandy loam.	SM	A-2-4, A-4	5-20	20-40	70-85	55-80	50-60	25-45	20-35	NP-10
	3-25	Very gravelly sandy clay loam, very cobbly clay loam, very cobbly sandy clay loam.	GM, CL, ML, SM	A-4, A-2, A-6, A-7	5-20	20-40	70-85	50-75	35-70	25-60	20-45	NP-15
	25-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Cowee--------	0-5	Gravelly sandy loam.	ML, SC-SM, SM	A-2-4, A-2, A-4, A-5	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	5-10	Gravelly sandy loam.	ML, SM, SC-SM	A-2-4, A-2, A-4, A-5	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	10-21	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	ML, CL, SC, SM	A-4, A-2, A-6, A-7	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	21-34	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	CL, ML, SM, SC	A-4, A-2, A-6, A-7	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	34-42	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
	42-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
CpD:												
Cliffield----	0-3	Very cobbly sandy loam.	SM	A-2-4, A-4	5-20	20-40	70-85	55-80	50-60	25-45	20-35	NP-10
	3-25	Very gravelly sandy clay loam, very cobbly clay loam, very cobbly sandy clay loam.	CL, GM, SM, ML	A-4, A-6, A-2, A-7	5-20	20-40	70-85	50-75	35-70	25-60	20-45	NP-15
	25-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Pigeonroost--	0-3	Gravelly sandy loam.	ML, CL, SC, SM	A-2, A-4	0-1	5-25	70-95	60-90	40-75	25-70	20-30	NP-10
	3-12	Loam, sandy clay loam, gravelly sandy clay loam.	ML, CL, SC, SM	A-4, A-6	0-1	0-15	85-100	70-100	65-90	40-80	25-40	7-14
	12-26	Loam, sandy clay loam, gravelly sandy clay loam.	ML, SC, CL, SM	A-4, A-6	0-1	0-15	85-100	70-100	65-90	40-80	25-40	7-14
	26-61	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
CpE:												
Cliffield----	0-3	Very cobbly sandy loam.	SM	A-2-4, A-4	5-20	20-40	70-85	55-80	50-60	25-45	20-35	NP-10
	3-25	Very gravelly sandy clay loam, very cobbly clay loam, very cobbly sandy clay loam.	GM, CL, ML, SM	A-4, A-2, A-6, A-7	5-20	20-40	70-85	50-75	35-70	25-60	20-45	NP-15
	25-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Pigeonroost--	0-3	Gravelly sandy loam.	ML, CL, SC, SM	A-2, A-4	0-1	5-25	70-95	60-90	40-75	25-70	20-30	NP-10
	3-12	Loam, sandy clay loam, gravelly sandy clay loam.	ML, SC, CL, SM	A-4, A-6	0-1	0-15	85-100	70-100	65-90	40-80	25-40	7-14
	12-26	Loam, sandy clay loam, gravelly sandy clay loam.	ML, SC, CL, SM	A-4, A-6	0-1	0-15	85-100	70-100	65-90	40-80	25-40	7-14
	26-61	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
CrF:												
Cliffield----	0-3	Very cobbly sandy loam.	SM	A-2-4, A-4	5-20	20-40	70-85	55-80	50-60	25-45	20-35	NP-10
	3-25	Very gravelly sandy clay loam, very cobbly clay loam, very cobbly sandy clay loam.	GM, CL, ML, SM	A-2, A-4, A-7, A-6	5-20	20-40	70-85	50-75	35-70	25-60	20-45	NP-15
	25-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Rock outcrop.												
DoB:												
Dogue--------	0-11	Loam-----------	SC, SM, SC-SM	A-2, A-4	0	0	95-100	75-100	50-100	20-50	0-25	NP-10
	11-16	Clay loam, clay, sandy clay.	CH, SC, CL	A-6, A-7	0	0	95-100	75-100	65-100	40-90	35-60	16-40
	16-27	Clay loam, clay, sandy clay.	CH, CL, SC	A-6, A-7	0	0	95-100	75-100	65-100	40-90	35-60	16-40
	27-43	Clay loam, clay, sandy clay.	CH, CL, SC	A-6, A-7	0	0	95-100	75-100	65-100	40-90	35-60	16-40
	43-55	Clay loam, clay, sandy clay.	CH, CL, SC	A-6, A-7	0	0	95-100	75-100	65-100	40-90	35-60	16-40
	55-62	Gravelly sandy clay loam.	SC-SM, SC, SM, SP-SM	A-1, A-4, A-2	0	0	80-100	60-100	35-100	10-40	0-30	NP-10
EcD:												
Edneyville---	0-4	Sandy loam-----	MH, SM, ML, SC-SM	A-2, A-5, A-4	5-10	10-25	75-95	65-90	60-85	30-52	25-61	NP-7
	4-8	Sandy loam-----	MH, SM, ML, SC-SM	A-2, A-4, A-5	5-10	10-25	75-95	65-90	60-85	30-52	25-61	NP-7
	8-14	Sandy loam, loam, gravelly sandy loam.	ML, CL-ML, SC-SM, SM	A-2, A-5, A-4	0-5	5-15	85-100	70-100	60-95	30-68	25-45	NP-10
	14-26	Sandy loam, loam, gravelly sandy loam.	CL-ML, SM, ML, SC-SM	A-2, A-5, A-4	0-5	5-15	85-100	70-100	60-95	30-68	25-45	NP-10
	26-53	Sandy loam, gravelly sandy loam, fine sandy loam.	SC-SM, SM	A-2, A-4, A-5	0-10	5-15	70-95	60-90	50-75	28-49	25-45	NP-10
	53-65	Sandy loam, gravelly sandy loam, fine sandy loam.	SC-SM, SM	A-2, A-5, A-4	0-10	5-15	70-95	60-90	50-75	28-49	25-45	NP-10

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
EcD:												
Chestnut-----	0-3	Gravelly sandy loam.	SC-SM, SM	A-2-4, A-5, A-4	5-15	5-15	75-95	65-90	60-85	30-49	20-45	NP-7
	3-17	Gravelly loam, gravelly sandy loam, cobbly loam.	SC-SM, SM	A-2-4, A-4	0-5	5-30	75-98	65-97	60-85	34-49	20-35	NP-10
	17-23	Gravelly loam, gravelly sandy loam, cobbly loam.	SC-SM, SM	A-2-4, A-4	0-5	5-30	75-98	65-97	60-85	34-49	20-35	NP-10
	23-28	Loamy sand-----	SM	A-2	0	0	95-100	85-100	70-100	15-25	---	---
	28-42	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
	42-46	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
EcE:												
Edneyville---	0-4	Sandy loam-----	ML, MH, SC-SM, SM	A-2, A-4, A-5	5-10	10-25	75-95	65-90	60-85	30-52	25-61	NP-7
	4-8	Sandy loam-----	ML, MH, SC-SM, SM	A-2, A-4, A-5	5-10	10-25	75-95	65-90	60-85	30-52	25-61	NP-7
	8-14	Sandy loam, loam, gravelly sandy loam.	ML, CL-ML, SC-SM, SM	A-2, A-4, A-5	0-5	5-15	85-100	70-100	60-95	30-68	25-45	NP-10
	14-26	Sandy loam, loam, gravelly sandy loam.	ML, SC-SM, CL-ML, SM	A-4, A-2, A-5	0-5	5-15	85-100	70-100	60-95	30-68	25-45	NP-10
	26-53	Sandy loam, gravelly sandy loam, fine sandy loam.	SC-SM, SM	A-2, A-4, A-5	0-10	5-15	70-95	60-90	50-75	28-49	25-45	NP-10
	53-65	Sandy loam, gravelly sandy loam, fine sandy loam.	SC-SM, SM	A-2, A-5, A-4	0-10	5-15	70-95	60-90	50-75	28-49	25-45	NP-10
Chestnut-----	0-3	Gravelly sandy loam.	SC-SM, SM	A-4, A-2-4, A-5	5-15	5-15	75-95	65-90	60-85	30-49	20-45	NP-7
	3-17	Gravelly loam, gravelly sandy loam, cobbly loam.	SC-SM, SM	A-2-4, A-4	0-5	5-30	75-98	65-97	60-85	34-49	20-35	NP-10
	17-23	Gravelly loam, gravelly sandy loam, cobbly loam.	SC-SM, SM	A-2-4, A-4	0-5	5-30	75-98	65-97	60-85	34-49	20-35	NP-10
	23-28	Loamy sand-----	SM	A-2	0	0	95-100	85-100	70-100	15-25	---	---
	28-42	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
	42-46	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
EvD:												
Evard--------	0-3	Sandy loam-----	ML, SM	A-2, A-4	0	0-5	80-100	75-100	65-90	20-60	0-35	NP-9
	3-6	Sandy loam-----	ML, SM	A-2, A-4	0	0-5	80-100	75-100	65-90	20-60	0-35	NP-9
	6-12	Sandy clay loam, clay loam.	ML, CL, SC, SM	A-2, A-4, A-7-6, A-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	12-30	Sandy clay loam, clay loam.	CL, SM, ML, SC	A-4, A-2, A-6, A-7-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	30-37	Sandy loam, loam, sandy clay loam.	CL, SM, ML, SC	A-2, A-4	0	0-5	80-100	75-100	60-95	20-55	0-25	NP-9
	37-56	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0	0-15	75-100	70-100	60-90	15-50	0-14	NP
	56-65	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0	0-15	75-100	70-100	60-90	15-50	0-14	NP
Cowee--------	0-5	Gravelly sandy loam.	ML, SC-SM, SM	A-2-4, A-2, A-4, A-5	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	5-10	Gravelly sandy loam.	ML, SM, SC-SM	A-2-4, A-2, A-4, A-5	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	10-21	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	SC, SM, ML, CL	A-4, A-6, A-2, A-7	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	21-34	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	ML, CL, SC, SM	A-4, A-2, A-6, A-7	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	34-42	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
	42-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
EvE:												
Evard--------	0-3	Sandy loam-----	ML, SM	A-2, A-4	0	0-5	80-100	75-100	65-90	20-60	0-35	NP-9
	3-6	Sandy loam-----	ML, SM	A-2, A-4	0	0-5	80-100	75-100	65-90	20-60	0-35	NP-9
	6-12	Sandy clay loam, clay loam.	ML, CL, SC, SM	A-4, A-2, A-6, A-7-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	12-30	Sandy clay loam, clay loam.	ML, SC, CL, SM	A-2, A-4, A-7-6, A-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	30-37	Sandy loam, loam, sandy clay loam.	ML, SC, CL, SM	A-2, A-4	0	0-5	80-100	75-100	60-95	20-55	0-25	NP-9
	37-56	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0	0-15	75-100	70-100	60-90	15-50	0-14	NP
	56-65	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0	0-15	75-100	70-100	60-90	15-50	0-14	NP

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
EvE:												
Cowee--------	0-5	Gravelly sandy loam.	ML, SC-SM, SM	A-2-4, A-2, A-4, A-5	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	5-10	Gravelly sandy loam.	ML, SC-SM, SM	A-2-4, A-2, A-4, A-5	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	10-21	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	CL, SM, ML, SC	A-4, A-2, A-6, A-7	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	21-34	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	CL, SM, ML, SC	A-4, A-2, A-6, A-7	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	34-42	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
	42-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
EwD:												
Evard--------	0-3	Sandy loam-----	ML, SM	A-2, A-4	0	0-5	80-100	75-100	65-90	20-60	0-35	NP-9
	3-6	Sandy loam-----	ML, SM	A-2, A-4	0	0-5	80-100	75-100	65-90	20-60	0-35	NP-9
	6-12	Sandy clay loam, clay loam.	CL, ML, SM, SC	A-4, A-6, A-2, A-7-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	12-30	Sandy clay loam, clay loam.	ML, CL, SC, SM	A-2, A-4, A-7-6, A-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	30-37	Sandy loam, loam, sandy clay loam.	ML, SC, CL, SM	A-2, A-4	0	0-5	80-100	75-100	60-95	20-55	0-25	NP-9
	37-56	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0	0-15	75-100	70-100	60-90	15-50	0-14	NP
	56-65	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0	0-15	75-100	70-100	60-90	15-50	0-14	NP
Cowee--------	0-5	Gravelly sandy loam.	ML, SC-SM, SM	A-2-4, A-2, A-4, A-5	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	5-10	Gravelly sandy loam.	ML, SM, SC-SM	A-2-4, A-2, A-4, A-5	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	10-21	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	ML, CL, SC, SM	A-2, A-7, A-4, A-6	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	21-34	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	ML, SC, CL, SM	A-4, A-2, A-6, A-7	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	34-42	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
	42-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
EwE:												
Evard--------	0-3	Sandy loam-----	ML, SM	A-2, A-4	0	0-5	80-100	75-100	65-90	20-60	0-35	NP-9
	3-6	Sandy loam-----	ML, SM	A-2, A-4	0	0-5	80-100	75-100	65-90	20-60	0-35	NP-9
	6-12	Sandy clay loam, clay loam.	SC, SM, ML, CL	A-4, A-2, A-6, A-7-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	12-30	Sandy clay loam, clay loam.	CL, ML, SM, SC	A-4, A-2, A-6, A-7-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	30-37	Sandy loam, loam, sandy clay loam.	ML, CL, SC, SM	A-2, A-4	0	0-5	80-100	75-100	60-95	20-55	0-25	NP-9
	37-56	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0	0-15	75-100	70-100	60-90	15-50	0-14	NP
	56-65	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0	0-15	75-100	70-100	60-90	15-50	0-14	NP
Cowee--------	0-5	Gravelly sandy loam.	ML, SC-SM, SM	A-2-4, A-2, A-4, A-5	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	5-10	Gravelly sandy loam.	ML, SM, SC-SM	A-2-4, A-2, A-4, A-5	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	10-21	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	CL, SM, ML, SC	A-2, A-7, A-4, A-6	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	21-34	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	ML, CL, SC, SM	A-4, A-2, A-6, A-7	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	34-42	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
	42-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
EwF:												
Evard--------	0-3	Sandy loam-----	ML, SM	A-2, A-4	0	0-5	80-100	75-100	65-90	20-60	0-35	NP-9
	3-6	Sandy loam-----	ML, SM	A-2, A-4	0	0-5	80-100	75-100	65-90	20-60	0-35	NP-9
	6-12	Sandy clay loam, clay loam.	CL, ML, SM, SC	A-4, A-2, A-6, A-7-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	12-30	Sandy clay loam, clay loam.	ML, CL, SC, SM	A-4, A-2, A-6, A-7-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	30-37	Sandy loam, loam, sandy clay loam.	ML, CL, SC, SM	A-2, A-4	0	0-5	80-100	75-100	60-95	20-55	0-25	NP-9
	37-56	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0	0-15	75-100	70-100	60-90	15-50	0-14	NP
	56-65	Sandy loam, loam, loamy sand.	SM	A-2, A-4	0	0-15	75-100	70-100	60-90	15-50	0-14	NP

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
EwF:												
Cowee--------	0-5	Gravelly sandy loam.	ML, SC-SM, SM	A-2, A-5, A-2-4, A-4	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	5-10	Gravelly sandy loam.	ML, SC-SM, SM	A-2, A-5, A-2-4, A-4	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	10-21	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	ML, SC, CL, SM	A-4, A-2, A-6, A-7	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	21-34	Gravelly sandy clay loam, gravelly sandy loam, clay loam.	ML, CL, SC, SM	A-4, A-2, A-6, A-7	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	34-42	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
	42-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
FaD:												
Fannin-------	0-3	Fine sandy loam	MH, SM, ML	A-2, A-4, A-7-5, A-5	0	0-5	92-100	86-100	60-95	34-85	30-51	NP-18
	3-6	Clay loam, sandy clay loam, loam.	ML, MH, SM	A-4, A-6, A-7	0	2-10	97-100	90-100	67-95	40-85	30-55	5-23
	6-17	Clay loam, sandy clay loam, loam.	MH, ML, SM	A-6, A-4, A-7	0	2-10	97-100	90-100	67-95	40-85	30-55	5-23
	17-24	Clay loam, sandy clay loam, loam.	MH, SM, ML	A-4, A-6, A-7	0	2-10	97-100	90-100	67-95	40-85	30-55	5-23
	24-34	Loam, sandy loam, fine sandy loam.	ML, SM	A-2, A-5, A-4	0	0-15	75-100	70-98	60-90	15-70	30-50	NP-10
	34-60	Loam, sandy loam, fine sandy loam.	ML, SM	A-2, A-5, A-4	0	0-15	75-100	70-98	60-90	15-70	30-50	NP-10
FaE:												
Fannin-------	0-3	Fine sandy loam	ML, MH, SM	A-4, A-2, A-5, A-7-5	0	0-5	92-100	86-100	60-95	34-85	30-51	NP-18
	3-6	Clay loam, sandy clay loam, loam.	MH, ML, SM	A-4, A-7, A-6	0	2-10	97-100	90-100	67-95	40-85	30-55	5-23
	6-17	Clay loam, sandy clay loam, loam.	MH, SM, ML	A-4, A-6, A-7	0	2-10	97-100	90-100	67-95	40-85	30-55	5-23
	17-24	Clay loam, sandy clay loam, loam.	ML, MH, SM	A-4, A-7, A-6	0	2-10	97-100	90-100	67-95	40-85	30-55	5-23
	24-34	Loam, sandy loam, fine sandy loam.	ML, SM	A-2, A-5, A-4	0	0-15	75-100	70-98	60-90	15-70	30-50	NP-10
	34-60	Loam, sandy loam, fine sandy loam.	ML, SM	A-2, A-4, A-5	0	0-15	75-100	70-98	60-90	15-70	30-50	NP-10

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
FbF:												
Fannin-------	0-3	Fine sandy loam	MH, ML, SM	A-2, A-7-5, A-4, A-5	0	0-5	92-100	86-100	60-95	34-85	30-51	NP-18
	3-6	Clay loam, sandy clay loam, loam.	MH, SM, ML	A-4, A-6, A-7	0	2-10	97-100	90-100	67-95	40-85	30-55	5-23
	6-17	Clay loam, sandy clay loam, loam.	MH, ML, SM	A-4, A-6, A-7	0	2-10	97-100	90-100	67-95	40-85	30-55	5-23
	17-24	Clay loam, sandy clay loam, loam.	ML, MH, SM	A-4, A-6, A-7	0	2-10	97-100	90-100	67-95	40-85	30-55	5-23
	24-34	Loam, sandy loam, fine sandy loam.	ML, SM	A-4, A-2, A-5	0	0-15	75-100	70-98	60-90	15-70	30-50	NP-10
	34-60	Loam, sandy loam, fine sandy loam.	ML, SM	A-2, A-4, A-5	0	0-15	75-100	70-98	60-90	15-70	30-50	NP-10
Chestnut-----	0-3	Gravelly sandy loam.	SC-SM, SM	A-4, A-2-4, A-5	5-15	5-15	75-95	65-90	60-85	30-49	20-45	NP-7
	3-17	Gravelly loam, gravelly sandy loam, cobbly loam.	SC-SM, SM	A-2-4, A-4	0-5	5-30	75-98	65-97	60-85	34-49	20-35	NP-10
	17-23	Gravelly loam, gravelly sandy loam, cobbly loam.	SC-SM, SM	A-2-4, A-4	0-5	5-30	75-98	65-97	60-85	34-49	20-35	NP-10
	23-28	Loamy sand-----	SM	A-2	0	0	95-100	85-100	70-100	15-25	---	---
	28-42	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
	42-46	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
FvA:												
Fluvaquents--	0-60	Clay-----------	CL, MH, CH, ML	A-6, A-7	0	0	100	100	90-100	75-98	35-75	12-40
Udifluvents--	0-60	Silt loam------	CL-ML, CL, ML	A-4, A-7, A-6	0	0	100	100	90-100	70-98	23-45	3-18
GaC:												
Greenlee-----	0-5	Very cobbly sandy loam.	GM, SM	A-1-b, A-4, A-2-4	5-10	20-55	50-100	50-100	30-85	20-45	15-30	NP-7
	5-21	Very cobbly sandy loam, very stony sandy loam, very bouldery loam.	GM, SM	A-1-b, A-4, A-2-4	5-35	10-55	50-90	50-80	30-60	20-40	15-30	NP-7
	21-61	Very cobbly sandy loam, very stony sandy loam, very bouldery loam.	GM, SM	A-1-b, A-2-4, A-4	5-35	10-55	50-90	50-80	30-60	20-40	15-30	NP-7

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
GaC:												
Tate	0-5	Cobbly sandy loam.	ML, SM	A-4, A-6	10-20	5-15	85-95	80-95	65-95	40-80	15-38	NP-13
	5-10	Cobbly sandy loam.	ML, SM	A-4, A-6	10-20	5-15	85-95	80-95	65-95	40-80	15-38	NP-13
	10-22	Clay loam, sandy clay loam, loam.	CL-ML, CL, ML, SC-SM	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	22-51	Clay loam, sandy clay loam, loam.	CL, SC-SM, CL-ML, ML	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	51-61	Gravelly fine sandy loam, sandy loam, fine sandy loam.	GC-GM, SM, GM, SC-SM	A-2-6, A-2-4, A-4	0-10	5-35	40-100	40-90	35-60	30-50	15-35	NP-13
GaD:												
Greenlee	0-5	Very cobbly sandy loam.	GM, SM	A-1-b, A-4, A-2-4	5-10	20-55	50-100	50-100	30-85	20-45	15-30	NP-7
	5-21	Very cobbly sandy loam, very stony sandy loam, very bouldery loam.	GM, SM	A-1-b, A-2-4, A-4	5-35	10-55	50-90	50-80	30-60	20-40	15-30	NP-7
	21-61	Very cobbly sandy loam, very stony sandy loam, very bouldery loam.	GM, SM	A-1-b, A-2-4, A-4	5-35	10-55	50-90	50-80	30-60	20-40	15-30	NP-7
Tate	0-5	Cobbly sandy loam.	ML, SM	A-4, A-6	10-20	5-15	85-95	80-95	65-95	40-80	15-38	NP-13
	5-10	Cobbly sandy loam.	ML, SM	A-4, A-6	10-20	5-15	85-95	80-95	65-95	40-80	15-38	NP-13
	10-22	Clay loam, sandy clay loam, loam.	CL, SC-SM, CL-ML, ML	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	22-51	Clay loam, sandy clay loam, loam.	CL-ML, CL, ML, SC-SM	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	51-61	Gravelly fine sandy loam, sandy loam, fine sandy loam.	GM, GC-GM, SC-SM, SM	A-2-6, A-2-4, A-4	0-10	5-35	40-100	40-90	35-60	30-50	15-35	NP-13

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
GbF:												
Greenlee-----	0-5	Very cobbly sandy loam.	GM, SM	A-1-b, A-2-4, A-4	5-10	20-55	50-100	50-100	30-85	20-45	15-30	NP-7
	5-21	Very cobbly sandy loam, very stony sandy loam, very bouldery loam.	GM, SM	A-1-b, A-2-4, A-4	5-35	10-55	50-90	50-80	30-60	20-40	15-30	NP-7
	21-61	Very cobbly sandy loam, very stony sandy loam, very bouldery loam.	GM, SM	A-1-b, A-4, A-2-4	5-35	10-55	50-90	50-80	30-60	20-40	15-30	NP-7
Tate---------	0-5	Cobbly sandy loam.	ML, SM	A-4, A-6	10-20	5-15	85-95	80-95	65-95	40-80	15-38	NP-13
	5-10	Cobbly sandy loam.	ML, SM	A-4, A-6	10-20	5-15	85-95	80-95	65-95	40-80	15-38	NP-13
	10-22	Clay loam, sandy clay loam, loam.	CL, SC-SM, CL-ML, ML	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	22-51	Clay loam, sandy clay loam, loam.	CL-ML, CL, ML, SC-SM	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	51-61	Gravelly fine sandy loam, sandy loam, fine sandy loam.	GM, GC-GM, SC-SM, SM	A-2-6, A-2-4, A-4	0-10	5-35	40-100	40-90	35-60	30-50	15-35	NP-13
GrE:												
Grover-------	0-5	Loam-----------	SC-SM, SC, SM	A-2-4, A-4	0	0-5	95-100	90-100	50-75	25-49	20-30	NP-10
	5-19	Sandy clay loam, clay loam, loam.	MH, ML, SM	A-6, A-7	0	0-5	95-100	90-100	70-100	40-70	38-65	12-30
	19-24	Sandy clay loam, clay loam, loam.	MH, ML, SM	A-6, A-7	0	0-5	95-100	90-100	70-100	40-70	38-65	12-30
	24-62	Sandy loam, loam, sandy clay loam.	SC-SM, SM	A-2, A-2-4, A-5, A-4	0	0-5	90-100	85-100	65-95	25-49	25-50	NP-10
HaC2:												
Hayesville---	0-5	Sandy clay loam	CL, SM, ML, SC	A-4	0	0-5	90-100	85-95	70-95	35-60	25-35	NP-10
	5-10	Clay loam, clay	CH, ML, CL, MH	A-6, A-7	0	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	10-35	Clay loam, clay	CL, CH, MH, ML	A-6, A-7	0	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	35-45	Sandy clay loam, clay loam, loam.	MH, CL, ML, SM	A-6, A-7	0	0-5	90-100	90-100	85-95	45-65	36-55	11-25
	45-62	Sandy loam, loam, sandy clay loam.	ML, CL, SC, SM	A-4, A-6	0	5-15	90-100	90-95	65-90	40-55	25-40	NP-12

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
HaD2:												
Hayesville---	0-5	Sandy clay loam	ML, CL, SC, SM	A-4	0	0-5	90-100	85-95	70-95	35-60	25-35	NP-10
	5-10	Clay loam, clay	CL, CH, MH, ML	A-6, A-7	0	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	10-35	Clay loam, clay	CL, CH, MH, ML	A-6, A-7	0	0-5	90-100	85-100	70-100	55-80	36-66	11-35
	35-45	Sandy clay loam, clay loam, loam.	MH, CL, ML, SM	A-6, A-7	0	0-5	90-100	90-100	85-95	45-65	36-55	11-25
	45-62	Sandy loam, loam, sandy clay loam.	ML, SC, CL, SM	A-4, A-6	0	5-15	90-100	90-95	65-90	40-55	25-40	NP-12
HeB:												
Helena-------	0-5	Sandy loam-----	ML, SC, SM, SC-SM	A-2, A-4	0	0-5	90-100	90-100	51-95	26-75	15-35	NP-10
	5-10	Sandy loam-----	SC, ML, SC-SM, SM	A-2, A-4	0	0-5	90-100	90-100	51-95	26-75	15-35	NP-10
	10-15	Sandy clay loam, clay loam.	CL, SC	A-6, A-7	0	0-5	95-100	95-100	70-90	38-70	30-49	15-26
	15-29	Clay loam, sandy clay, clay.	CH	A-7	0	0-5	95-100	95-100	73-97	56-86	50-85	24-50
	29-36	Clay loam, sandy clay, clay.	CH	A-7	0	0-5	95-100	95-100	73-97	56-86	50-85	24-50
	36-53	Clay loam, sandy clay, clay.	CH	A-7	0	0-5	95-100	95-100	73-97	56-86	50-85	24-50
	53-63	Variable-------	---	---	---	---	---	---	---	---	---	---
Worsham------	0-3	Loam-----------	CL, CL-ML	A-4, A-6	---	0-5	90-100	85-100	70-100	50-90	20-35	4-12
	3-11	Sandy clay loam, clay loam, clay.	CH, SC, CL	A-2, A-7	---	0-5	90-100	85-100	70-100	30-95	42-66	22-40
	11-28	Sandy clay loam, clay loam, clay.	CL, CH, SC	A-2, A-7	---	0-5	90-100	85-100	70-100	30-95	42-66	22-40
	28-37	Sandy clay loam, clay loam, clay.	CH, CL, SC	A-2, A-7	---	0-5	90-100	85-100	70-100	30-95	42-66	22-40
	37-45	Sandy clay loam, clay loam, clay.	CH, SC, CL	A-2, A-7	---	0-5	90-100	85-100	70-100	30-95	42-66	22-40
	45-58	Sandy clay loam, clay loam, clay.	CH, CL, SC	A-2, A-7	---	0-5	90-100	85-100	70-100	30-95	42-66	22-40
	58-65	Sandy loam, sandy clay loam, clay loam.	CL, SC	A-4, A-2, A-6, A-7	---	0-10	90-95	80-95	50-90	30-70	20-50	8-30

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
HsB2:												
Hiwassee-----	0-6	Clay loam------	CL, CL-ML, ML	A-6, A-4, A-7-6	0	0-2	95-100	95-100	88-100	50-85	25-49	3-23
	6-10	Clay, silty clay, clay loam.	MH, ML	A-7-5, A-7-6	0	0-2	95-100	95-100	80-100	51-95	40-80	12-36
	10-25	Clay, silty clay, clay loam.	MH, ML	A-7-5, A-7-6	0	0-2	95-100	95-100	80-100	51-95	40-80	12-36
	25-45	Clay, silty clay, clay loam.	MH, ML	A-7-5, A-7-6	0	0-2	95-100	95-100	80-100	51-95	40-80	12-36
	45-62	Clay, silty clay, clay loam.	MH, ML	A-7-5, A-7-6	0	0-2	95-100	95-100	80-100	51-95	40-80	12-36
HsC2:												
Hiwassee-----	0-6	Clay loam------	CL, ML, CL-ML	A-6, A-4, A-7-6	0	0-2	95-100	95-100	88-100	50-85	25-49	3-23
	6-10	Clay, silty clay, clay loam.	MH, ML	A-7-5, A-7-6	0	0-2	95-100	95-100	80-100	51-95	40-80	12-36
	10-25	Clay, silty clay, clay loam.	MH, ML	A-7-5, A-7-6	0	0-2	95-100	95-100	80-100	51-95	40-80	12-36
	25-45	Clay, silty clay, clay loam.	MH, ML	A-7-5, A-7-6	0	0-2	95-100	95-100	80-100	51-95	40-80	12-36
	45-62	Clay, silty clay, clay loam.	MH, ML	A-7-5, A-7-6	0	0-2	95-100	95-100	80-100	51-95	40-80	12-36
IoA:												
Iotla--------	0-12	Sandy loam-----	SC, SM, SC-SM	A-2, A-4	0	0-5	95-100	75-100	60-85	25-49	20-35	NP-10
	12-21	Fine sandy loam, loam, sandy loam.	SC, ML, SC-SM, SM	A-2, A-5, A-4	0	0-5	95-100	75-100	60-92	25-67	20-46	NP-10
	21-26	Fine sandy loam, loam, sandy loam.	SC, SC-SM, ML, SM	A-2, A-4, A-5	0	0-5	95-100	75-100	60-92	25-67	20-46	NP-10
	26-30	Loamy sand, sand.	SM, SP-SM	A-2	0	0-5	95-100	85-100	55-85	10-35	10-20	NP
	30-50	Fine sandy loam, loam, sandy loam.	SC, SC-SM, SM	A-2, A-4	0	0-5	95-100	75-100	60-85	25-49	20-35	NP-10
	50-60	Loamy sand, sand.	SM, SP-SM	A-2	0	5-10	80-90	85-100	55-85	10-35	10-20	NP
MaC2:												
Madison------	0-7	Clay loam------	ML, CL, SC	A-4, A-7-6, A-6	0	0-3	90-100	85-100	70-95	46-80	30-50	7-20
	7-19	Clay, clay loam, sandy clay.	MH, ML	A-7	0	0-3	90-100	85-100	75-100	57-85	43-75	12-35
	19-30	Clay, clay loam, sandy clay.	MH, ML	A-7	0	0-3	90-100	85-100	75-100	57-85	43-75	12-35
	30-46	Loam, sandy clay loam, clay loam.	CL	A-4, A-6	0	0-3	90-100	85-100	70-95	50-80	30-40	7-20
	46-62	Fine sandy loam, sandy loam, loam.	ML, SM	A-2, A-4	0	0-5	85-100	80-100	60-90	26-55	25-35	NP-7

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
MaD2:												
Madison------	0-7	Clay loam------	CL, SC, ML	A-6, A-4, A-7-6	0	0-3	90-100	85-100	70-95	46-80	30-50	7-20
	7-19	Clay, clay loam, sandy clay.	MH, ML	A-7	0	0-3	90-100	85-100	75-100	57-85	43-75	12-35
	19-30	Clay, clay loam, sandy clay.	MH, ML	A-7	0	0-3	90-100	85-100	75-100	57-85	43-75	12-35
	30-46	Loam, sandy clay loam, clay loam.	CL	A-4, A-6	0	0-3	90-100	85-100	70-95	50-80	30-40	7-20
	46-62	Fine sandy loam, sandy loam, loam.	ML, SM	A-2, A-4	0	0-5	85-100	80-100	60-90	26-55	25-35	NP-7
PaC2:												
Pacolet------	0-5	Sandy clay loam	SC, SC-SM	A-4, A-6	0-1	0-1	95-100	90-100	65-87	36-50	20-40	4-17
	5-26	Sandy clay, clay loam, clay.	CL, ML, MH	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	26-37	Clay loam, sandy clay loam, sandy loam.	CL-ML, CL, SC, SC-SM	A-4, A-2, A-6	0-1	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	37-52	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6
	52-62	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6
PaD2:												
Pacolet------	0-5	Sandy clay loam	SC, SC-SM	A-4, A-6	0-1	0-1	95-100	90-100	65-87	36-50	20-40	4-17
	5-26	Sandy clay, clay loam, clay.	MH, CL, ML	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	26-37	Clay loam, sandy clay loam, sandy loam.	CL-ML, SC, CL, SC-SM	A-4, A-2, A-6	0-1	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	37-52	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6
	52-62	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-4, A-2-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6
PbB2:												
Pacolet------	0-5	Sandy clay loam	SC, SC-SM	A-4, A-6	0-1	0-1	95-100	90-100	65-87	36-50	20-40	4-17
	5-26	Sandy clay, clay loam, clay.	CL, ML, MH	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	26-37	Clay loam, sandy clay loam, sandy loam.	CL-ML, SC, CL, SC-SM	A-4, A-2, A-6	0-1	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	37-52	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6
	52-62	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
PbB2:												
Bethlehem----	0-7	Gravelly sandy clay loam.	GM, GP-GM, SP-SM, SM	A-1, A-4, A-2-4	0-2	0-20	50-83	35-76	20-60	10-45	15-40	NP-10
	7-24	Clay, clay loam, gravelly clay.	CH, ML, CL, MH	A-6, A-7	0	0-10	65-100	60-100	55-100	50-85	38-65	14-30
	24-33	Gravelly sandy clay loam, very gravelly sandy clay loam.	GC, GC-GM, SC-SM, SC	A-2, A-1, A-4, A-6	0-5	0-20	50-85	30-85	25-82	20-50	25-49	5-16
	33-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
PbC2:												
Pacolet------	0-5	Sandy clay loam	SC, SC-SM	A-4, A-6	0-1	0-1	95-100	90-100	65-87	36-50	20-40	4-17
	5-26	Sandy clay, clay loam, clay.	CL, MH, ML	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	26-37	Clay loam, sandy clay loam, sandy loam.	CL-ML, SC, CL, SC-SM	A-4, A-2, A-6	0-1	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	37-52	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6
	52-62	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6
Bethlehem----	0-7	Gravelly sandy clay loam.	GP-GM, GM, SM, SP-SM	A-2-4, A-1, A-4	0-2	0-20	50-83	35-76	20-60	10-45	15-40	NP-10
	7-24	Clay, clay loam, gravelly clay.	CL, CH, MH, ML	A-6, A-7	0	0-10	65-100	60-100	55-100	50-85	38-65	14-30
	24-33	Gravelly sandy clay loam, very gravelly sandy clay loam.	GC-GM, GC, SC, SC-SM	A-2, A-4, A-1, A-6	0-5	0-20	50-85	30-85	25-82	20-50	25-49	5-16
	33-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
PbD2:												
Pacolet------	0-5	Sandy clay loam	SC, SC-SM	A-4, A-6	0-1	0-1	95-100	90-100	65-87	36-50	20-40	4-17
	5-26	Sandy clay, clay loam, clay.	CL, ML, MH	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	26-37	Clay loam, sandy clay loam, sandy loam.	CL-ML, CL, SC, SC-SM	A-4, A-2, A-6	0-1	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	37-52	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6
	52-62	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
PbD2:												
Bethlehem----	0-7	Gravelly sandy clay loam.	GP-GM, SM, GM, SP-SM	A-2-4, A-1, A-4	0-2	0-20	50-83	35-76	20-60	10-45	15-40	NP-10
	7-24	Clay, clay loam, gravelly clay.	CL, CH, MH, ML	A-6, A-7	0	0-10	65-100	60-100	55-100	50-85	38-65	14-30
	24-33	Gravelly sandy clay loam, very gravelly sandy clay loam.	GC-GM, SC, GC, SC-SM	A-2, A-1, A-4, A-6	0-5	0-20	50-85	30-85	25-82	20-50	25-49	5-16
	33-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
PsB2:												
Pacolet------	0-5	Sandy clay loam	SC, SC-SM	A-4, A-6	0-1	0-1	95-100	90-100	65-87	36-50	20-40	4-17
	5-26	Sandy clay, clay loam, clay.	CL, ML, MH	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	26-37	Clay loam, sandy clay loam, sandy loam.	CL-ML, SC, CL, SC-SM	A-4, A-2, A-6	0-1	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	37-52	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6
	52-62	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6
Saw----------	0-7	Sandy loam-----	SC, ML, SC-SM, SM	A-5, A-4, A-6, A-7	0	0-5	85-100	85-100	65-90	36-65	30-50	3-15
	7-19	Sandy clay, clay loam, clay.	MH, CL, ML	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	19-25	Sandy clay, clay loam, clay.	CL, MH, ML	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	25-28	Sandy clay loam, sandy loam, gravelly sandy loam.	GM, SM, SC-SM	A-1-b, A-4, A-2-4	0	0-15	60-100	55-100	40-90	13-50	20-40	NP-10
	28-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
PsC2:												
Pacolet------	0-5	Sandy clay loam	SC, SC-SM	A-4, A-6	0-1	0-1	95-100	90-100	65-87	36-50	20-40	4-17
	5-26	Sandy clay, clay loam, clay.	CL, ML, MH	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	26-37	Clay loam, sandy clay loam, sandy loam.	CL, SC-SM, CL-ML, SC	A-4, A-2, A-6	0-1	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	37-52	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6
	52-62	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
PsC2:												
Saw----------	0-7	Sandy loam-----	SC, ML, SC-SM, SM	A-4, A-5, A-7, A-6	0	0-5	85-100	85-100	65-90	36-65	30-50	3-15
	7-19	Sandy clay, clay loam, clay.	CL, MH, ML	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	19-25	Sandy clay, clay loam, clay.	CL, ML, MH	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	25-28	Sandy clay loam, sandy loam, gravelly sandy loam.	GM, SM, SC-SM	A-1-b, A-4, A-2-4	0	0-15	60-100	55-100	40-90	13-50	20-40	NP-10
	28-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
PsD2:												
Pacolet------	0-5	Sandy clay loam	SC, SC-SM	A-4, A-6	0-1	0-1	95-100	90-100	65-87	36-50	20-40	4-17
	5-26	Sandy clay, clay loam, clay.	CL, MH, ML	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	26-37	Clay loam, sandy clay loam, sandy loam.	CL-ML, SC, CL, SC-SM	A-4, A-2, A-6	0-1	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	37-52	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6
	52-62	Sandy loam, fine sandy loam, loam.	SC-SM, SM	A-2-4, A-4	0-1	0-2	80-100	70-100	60-90	25-50	0-28	NP-6
Saw----------	0-7	Sandy loam-----	SC, ML, SC-SM, SM	A-5, A-4, A-6, A-7	0	0-5	85-100	85-100	65-90	36-65	30-50	3-15
	7-19	Sandy clay, clay loam, clay.	MH, CL, ML	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	19-25	Sandy clay, clay loam, clay.	CL, MH, ML	A-6, A-7	0-1	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	25-28	Sandy clay loam, sandy loam, gravelly sandy loam.	GM, SM, SC-SM	A-1-b, A-4, A-2-4	0	0-15	60-100	55-100	40-90	13-50	20-40	NP-10
	28-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Qp. Pits												

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
RaE:												
Rion---------	0-5	Sandy loam-----	SM	A-2, A-4	0-1	0-2	90-100	85-100	60-80	20-45	0-35	NP-7
	5-17	Sandy loam, sandy clay loam, clay loam.	CL, CL-ML, SC-SM, SC	A-2, A-6, A-4	0-1	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	17-25	Sandy loam, sandy clay loam, clay loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-1	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	25-38	Sandy loam, sandy clay loam, clay loam.	CL-ML, CL, SC, SC-SM	A-4, A-2, A-6	0-1	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	38-62	Sandy loam, sandy clay loam, loamy sand.	SC, SC-SM, SM	A-4, A-2, A-6	0-1	0-2	90-100	80-100	60-85	15-50	0-36	NP-12
RcF:												
Rion---------	0-5	Sandy loam-----	SM	A-2, A-4	0-1	0-2	90-100	85-100	60-80	20-45	0-35	NP-7
	5-17	Sandy loam, sandy clay loam, clay loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-1	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	17-25	Sandy loam, sandy clay loam, clay loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-1	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	25-38	Sandy loam, sandy clay loam, clay loam.	CL-ML, CL, SC, SC-SM	A-4, A-2, A-6	0-1	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	38-62	Sandy loam, sandy clay loam, loamy sand.	SC, SC-SM, SM	A-4, A-2, A-6	0-1	0-2	90-100	80-100	60-85	15-50	0-36	NP-12
Ashlar-------	0-5	Gravelly sandy loam.	GM, GC-GM, SC-SM, SM	A-1, A-2, A-4	0	0-2	55-90	50-75	40-70	20-50	0-25	NP-6
	5-17	Sandy loam, fine sandy loam, gravelly sandy loam.	GM, GC-GM, SC-SM, SM	A-1, A-2, A-4	0	0-8	55-100	50-100	30-75	15-50	0-25	NP-6
	17-27	Sandy loam, fine sandy loam, gravelly sandy loam.	GM, GC-GM, SC-SM, SM	A-1, A-2, A-4	0	0-8	55-100	50-100	30-75	15-50	0-25	NP-6
	27-32	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
	32-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Rock outcrop.												

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
RnE:												
Rion---------	0-5	Sandy loam-----	SM	A-2, A-4	0-1	0-2	90-100	85-100	60-80	20-45	0-35	NP-7
	5-17	Sandy loam, sandy clay loam, clay loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-1	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	17-25	Sandy loam, sandy clay loam, clay loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-1	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	25-38	Sandy loam, sandy clay loam, clay loam.	CL-ML, CL, SC, SC-SM	A-2, A-6, A-4	0-1	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	38-62	Sandy loam, sandy clay loam, loamy sand.	SC-SM, SC, SM	A-2, A-6, A-4	0-1	0-2	90-100	80-100	60-85	15-50	0-36	NP-12
Cliffside----	0-3	Gravelly sandy loam.	ML, SM	A-1-b, A-2-4, A-4	0-10	0-10	80-90	60-75	40-70	20-55	15-35	NP-10
	3-7	Gravelly sandy loam.	ML, SM	A-1-b, A-2-4, A-4	0-10	0-10	80-90	60-75	40-70	20-55	15-35	NP-10
	7-11	Very cobbly sandy clay loam, very gravelly sandy clay loam, very gravelly clay loam.	SC, SC-SM, SM	A-1-b, A-4, A-2-4	0-10	10-40	75-90	40-55	30-55	15-45	15-45	NP-15
	11-27	Very cobbly sandy clay loam, very gravelly sandy clay loam, very gravelly clay loam.	SC, SC-SM, SM	A-1-b, A-2-4, A-4	0-10	10-40	75-90	40-55	30-55	15-45	15-45	NP-15
	27-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
RsC:												
Rock outcrop.												
Ashlar-------	0-5	Gravelly sandy loam.	GM, SC-SM, GC-GM, SM	A-1, A-4, A-2	0	0-2	55-90	50-75	40-70	20-50	0-25	NP-6
	5-17	Sandy loam, fine sandy loam, gravelly sandy loam.	GM, GC-GM, SC-SM, SM	A-1, A-4, A-2	0	0-8	55-100	50-100	30-75	15-50	0-25	NP-6
	17-27	Sandy loam, fine sandy loam, gravelly sandy loam.	GM, SC-SM, GC-GM, SM	A-1, A-2, A-4	0	0-8	55-100	50-100	30-75	15-50	0-25	NP-6
	27-32	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
	32-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
RxF:												
Rock outcrop.												
Cleveland----	0-3	Stony sandy loam.	SM	A-2, A-4	2-10	5-25	70-90	60-80	50-75	20-50	0-30	NP-3
	3-13	Stony sandy loam.	SM	A-2, A-4	2-10	5-25	70-90	60-80	50-75	20-50	0-30	NP-3
	13-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
SkB:												
Skyuka-------	0-6	Loam-----------	CL, SC	A-6, A-7-6	0	0-5	95-100	80-100	65-95	40-80	35-50	15-25
	6-11	Clay loam, clay, sandy clay.	CH, MH	A-7-5	0	0-5	95-100	90-100	70-95	55-80	50-75	15-35
	11-21	Clay loam, clay, sandy clay.	CH, MH	A-7-5	0	0-5	95-100	90-100	70-95	55-80	50-75	15-35
	21-33	Clay loam, clay, sandy clay.	CH, MH	A-7-5	0	0-5	95-100	90-100	70-95	55-80	50-75	15-35
	33-52	Clay loam, clay, sandy clay.	CH, MH	A-7-5	0	0-5	95-100	90-100	70-95	55-80	50-75	15-35
	52-65	Clay loam, clay, sandy clay.	CH, MH	A-7-5	0	0-5	95-100	90-100	70-95	55-80	50-75	15-35
TaC:												
Tate---------	0-5	Cobbly sandy loam.	ML, SM	A-4, A-6	10-20	5-15	85-95	80-95	65-95	40-80	15-38	NP-13
	5-10	Cobbly sandy loam.	ML, SM	A-4, A-6	10-20	5-15	85-95	80-95	65-95	40-80	15-38	NP-13
	10-22	Clay loam, sandy clay loam, loam.	CL-ML, CL, ML, SC-SM	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	22-51	Clay loam, sandy clay loam, loam.	CL-ML, CL, ML, SC-SM	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	51-61	Gravelly fine sandy loam, sandy loam, fine sandy loam.	GM, GC-GM, SC-SM, SM	A-2-4, A-2-6, A-4	0-10	5-35	40-100	40-90	35-60	30-50	15-35	NP-13
TbC:												
Tate---------	0-5	Cobbly sandy loam.	ML, SM	A-4, A-6	10-20	5-15	85-95	80-95	65-95	40-80	15-38	NP-13
	5-10	Cobbly sandy loam.	ML, SM	A-4, A-6	10-20	5-15	85-95	80-95	65-95	40-80	15-38	NP-13
	10-22	Clay loam, sandy clay loam, loam.	CL-ML, CL, ML, SC-SM	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	22-51	Clay loam, sandy clay loam, loam.	CL-ML, CL, ML, SC-SM	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	51-61	Gravelly fine sandy loam, sandy loam, fine sandy loam.	GM, GC-GM, SC-SM, SM	A-2-4, A-4, A-2-6	0-10	5-35	40-100	40-90	35-60	30-50	15-35	NP-13

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
TbC:												
Greenlee-----	0-5	Very cobbly sandy loam.	GM, SM	A-1-b, A-2-4, A-4	5-10	20-55	50-100	50-100	30-85	20-45	15-30	NP-7
	5-21	Very cobbly sandy loam, very stony sandy loam, very bouldery loam.	GM, SM	A-1-b, A-4, A-2-4	5-35	10-55	50-90	50-80	30-60	20-40	15-30	NP-7
	21-61	Very cobbly sandy loam, very stony sandy loam, very bouldery loam.	GM, SM	A-1-b, A-4, A-2-4	5-35	10-55	50-90	50-80	30-60	20-40	15-30	NP-7
TbD:												
Tate---------	0-5	Cobbly sandy loam.	ML, SM	A-4, A-6	10-20	5-15	85-95	80-95	65-95	40-80	15-38	NP-13
	5-10	Cobbly sandy loam.	ML, SM	A-4, A-6	10-20	5-15	85-95	80-95	65-95	40-80	15-38	NP-13
	10-22	Clay loam, sandy clay loam, loam.	CL-ML, ML, CL, SC-SM	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	22-51	Clay loam, sandy clay loam, loam.	CL-ML, CL, ML, SC-SM	A-4, A-6	0-1	0-15	94-100	87-100	75-99	40-85	20-40	5-15
	51-61	Gravelly fine sandy loam, sandy loam, fine sandy loam.	GM, SC-SM, GC-GM, SM	A-2-4, A-4, A-2-6	0-10	5-35	40-100	40-90	35-60	30-50	15-35	NP-13
Greenlee-----	0-5	Very cobbly sandy loam.	GM, SM	A-1-b, A-2-4, A-4	5-10	20-55	50-100	50-100	30-85	20-45	15-30	NP-7
	5-21	Very cobbly sandy loam, very stony sandy loam, very bouldery loam.	GM, SM	A-1-b, A-2-4, A-4	5-35	10-55	50-90	50-80	30-60	20-40	15-30	NP-7
	21-61	Very cobbly sandy loam, very stony sandy loam, very bouldery loam.	GM, SM	A-2-4, A-1-b, A-4	5-35	10-55	50-90	50-80	30-60	20-40	15-30	NP-7
ToA:												
Toccoa-------	0-12	Sandy loam-----	ML, SM	A-2, A-4	0	0	95-100	95-100	50-85	30-55	0-30	NP-4
	12-22	Sandy loam, loam.	ML, SM	A-2, A-4	0	0	95-100	90-100	60-100	30-55	0-30	NP-4
	22-35	Sandy loam, loam.	ML, SM	A-2, A-4	0	0	95-100	90-100	60-100	30-55	0-30	NP-4
	35-50	Sandy loam, loam.	ML, SM	A-2, A-4	0	0	95-100	90-100	60-100	30-55	0-30	NP-4
	50-62	Loamy sand-----	SM	A-2	0	0	95-100	85-100	70-100	15-25	---	---

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
TtD:												
Toecane------	0-4	Cobbly loam----	SC-SM, SM	A-2-4, A-4	2-10	25-50	70-95	65-95	45-85	30-49	15-30	NP-7
	4-8	Cobbly loam----	SC-SM, SM	A-2-4, A-4	2-10	25-50	70-95	65-95	45-85	30-49	15-30	NP-7
	8-17	Cobbly loam, very cobbly fine sandy loam, very cobbly loam.	GC-GM, GM, SM, SC-SM	A-1-b, A-2-4, A-4	5-20	35-65	60-90	40-70	30-60	20-45	15-30	NP-7
	17-31	Cobbly loam, very cobbly sandy clay loam, very cobbly loam.	GC-GM, GM, SM, SC-SM	A-1-b, A-4, A-2-4	5-20	35-65	55-90	35-65	30-55	15-40	10-25	NP-7
	31-38	Cobbly sandy loam, very cobbly sandy loam, very cobbly loam.	GC-GM, GM, SM, SC-SM	A-1-b, A-4, A-2-4	5-20	35-65	55-90	35-65	30-55	15-40	10-25	NP-7
	38-62	Extremely cobbly loamy sand, extremely stony loamy sand, very stony sandy loam.	GM, GC-GM, SC-SM, SM	A-1-b, A-2-4	5-25	40-80	55-80	30-50	20-40	15-30	10-20	NP-5
Tusquitee----	0-6	Fine sandy loam	SC-SM, SM	A-1-b, A-2-4, A-4	5-10	15-25	75-90	70-85	30-75	20-50	28-50	NP-10
	6-9	Fine sandy loam	SC-SM, SM	A-2-4, A-1-b, A-4	5-10	15-25	75-90	70-85	30-75	20-50	28-50	NP-10
	9-22	Loam, sandy loam, fine sandy loam.	CL-ML, ML, SM, SC-SM	A-4	0-1	2-15	90-100	65-100	55-95	36-65	25-40	NP-10
	22-31	Loam, sandy loam, fine sandy loam.	CL-ML, ML, SM, SC-SM	A-4	0-1	2-15	90-100	65-100	55-95	36-65	25-40	NP-10
	31-42	Loam, sandy loam, fine sandy loam.	ML, CL-ML, SC-SM, SM	A-4	0-1	2-15	90-100	65-100	55-95	36-65	25-40	NP-10
	42-71	Loam, sandy loam, fine sandy loam.	ML, SC-SM, CL-ML, SM	A-4	0-1	2-15	90-100	65-100	55-95	36-65	25-40	NP-10
	71-86	Sandy clay loam, loam, fine sandy loam.	GM, SC-SM, GC-GM, SM	A-1, A-2, A-4	2-15	15-35	45-98	40-85	30-75	12-50	20-40	NP-10
UdC, UoA. Udorthents												
UpA. Udorthents-Pits												
Ur. Urban land												

Table 13.—Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
WeA:												
Wehadkee-----	0-6	Loam-----------	SC, SM, SC-SM	A-2, A-4	0	0	100	95-100	60-90	30-50	20-30	NP-10
	6-20	Silty clay loam, loam, sandy clay loam.	CL-ML, CL, ML, SC	A-4, A-6, A-7	0	0	100	99-100	85-100	45-98	25-58	6-25
	20-48	Variable-------	---	---	---	---	---	---	---	---	---	---
	48-62	Variable-------	---	---	---	---	---	---	---	---	---	---

Table 14.—Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
ApB:												
Appling----------	0-10	5-20	1.40-1.65	1.98-5.95	0.10-0.15	0.0-2.9	0.5-2.0	.24	.24	4	3	86
	10-35	35-60	1.25-1.45	0.57-1.98	0.15-0.17	0.0-2.9	0.0-0.5	.28	.28			
	35-48	20-45	1.25-1.45	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.28	.28			
	48-65	20-45	1.25-1.45	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.28	.28			
ApC:												
Appling----------	0-10	5-20	1.40-1.65	1.98-5.95	0.10-0.15	0.0-2.9	0.5-2.0	.24	.24	4	3	86
	10-35	35-60	1.25-1.45	0.57-1.98	0.15-0.17	0.0-2.9	0.0-0.5	.28	.28			
	35-48	20-45	1.25-1.45	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.28	.28			
	48-65	20-45	1.25-1.45	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.28	.28			
ArD:												
Ashe-------------	0-5	10-25	1.35-1.60	1.98-5.95	0.10-0.13	0.0-2.9	1.0-5.0	.17	.24	2	8	0
	5-22	10-25	1.35-1.60	1.98-5.95	0.10-0.14	0.0-2.9	0.0-1.0	.17	.24			
	22-28	5-15	1.45-1.65	1.98-5.95	0.08-0.12	0.0-2.9	0.0-1.0	.17	.24			
	28-32	---	---	---	---	---	---	---	---			
Cleveland--------	0-3	6-20	1.20-1.50	1.98-5.95	0.05-0.10	0.0-2.9	0.5-8.0	.17	.28	1	8	0
	3-13	6-20	1.20-1.50	1.98-5.95	0.05-0.10	0.0-2.9	0.5-8.0	.17	.28			
	13-60	---	---	---	---	---	---	---	---			
Rock outcrop.												
ArF:												
Ashe-------------	0-5	10-25	1.35-1.60	1.98-5.95	0.10-0.13	0.0-2.9	1.0-5.0	.17	.24	2	8	0
	5-22	10-25	1.35-1.60	1.98-5.95	0.10-0.14	0.0-2.9	0.0-1.0	.17	.24			
	22-28	5-15	1.45-1.65	1.98-5.95	0.08-0.12	0.0-2.9	0.0-1.0	.17	.24			
	28-32	---	---	---	---	---	---	---	---			
Cleveland--------	0-3	6-20	1.20-1.50	1.98-5.95	0.05-0.10	0.0-2.9	0.5-8.0	.17	.28	1	8	0
	3-13	6-20	1.20-1.50	1.98-5.95	0.05-0.10	0.0-2.9	0.5-8.0	.17	.28			
	13-60	---	---	---	---	---	---	---	---			
Rock outcrop.												
BoA:												
Bandana----------	0-6	10-27	1.30-1.50	1.98-5.95	0.12-0.18	0.0-2.9	1.0-5.0	.20	.20	4	3	86
	6-9	5-20	1.30-1.50	1.98-5.95	0.10-0.16	0.0-2.9	0.0-1.0	.17	.20			
	9-17	5-20	1.30-1.50	1.98-5.95	0.10-0.16	0.0-2.9	0.0-1.0	.17	.20			
	17-24	3-12	1.40-1.60	5.95-19.98	0.02-0.06	0.0-2.9	0.0-1.0	.05	.10			
	24-60	1-5	1.40-1.60	5.95-19.98	0.02-0.05	0.0-2.9	0.0-1.0	.05	.10			
Ostin------------	0-4	5-15	1.20-1.50	5.95-19.98	0.03-0.10	0.0-2.9	1.0-3.0	.10	.15	5	2	134
	4-20	1-5	1.40-1.60	5.95-19.98	0.02-0.05	0.0-2.9	0.0-0.5	.05	.10			
	20-29	1-5	1.40-1.60	19.98-19.98	0.02-0.05	0.0-2.9	0.0-0.5	.05	.10			
	29-41	1-5	1.40-1.60	19.98-19.98	0.02-0.05	0.0-2.9	0.0-0.5	.10	.15			
	41-48	1-5	1.40-1.60	19.98-19.98	0.02-0.05	0.0-2.9	0.5-1.5	.10	.15			
	48-63	1-5	1.40-1.60	19.98-19.98	0.02-0.05	0.0-2.9	0.0-0.5	.05	.10			
BuB:												
Buncombe---------	0-9	3-12	1.60-1.75	5.95-19.98	0.06-0.10	0.0-2.9	0.5-1.0	.10	.10	5	2	134
	9-15	3-12	1.60-1.75	5.95-19.98	0.03-0.07	0.0-2.9	0.0-0.5	.10	.10			
	15-46	3-12	1.60-1.75	5.95-19.98	0.03-0.07	0.0-2.9	0.0-0.5	.10	.10			
	46-62	---	---	---	---	---	---	---	---			

Table 14.—Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
CaB2:												
Cecil------------	0-8	20-35	1.30-1.50	0.57-1.98	0.13-0.15	0.0-2.9	0.5-1.0	.28	.28	3	5	56
	8-18	35-70	1.30-1.50	0.57-1.98	0.13-0.15	0.0-2.9	0.0-0.5	.28	.28			
	18-39	35-70	1.30-1.50	0.57-1.98	0.13-0.15	0.0-2.9	0.0-0.5	.28	.28			
	39-52	35-70	1.30-1.50	0.57-1.98	0.13-0.15	0.0-2.9	0.0-0.5	.28	.28			
	52-68	35-70	1.30-1.50	0.57-1.98	0.13-0.15	0.0-2.9	0.0-0.5	.28	.28			
CeB2:												
Cecil------------	0-8	20-35	1.30-1.50	0.57-1.98	0.13-0.15	0.0-2.9	0.5-1.0	.28	.28	3	5	56
	8-18	35-70	1.30-1.50	0.57-1.98	0.13-0.15	0.0-2.9	0.0-0.5	.28	.28			
	18-39	35-70	1.30-1.50	0.57-1.98	0.13-0.15	0.0-2.9	0.0-0.5	.28	.28			
	39-52	35-70	1.30-1.50	0.57-1.98	0.13-0.15	0.0-2.9	0.0-0.5	.28	.28			
	52-68	35-70	1.30-1.50	0.57-1.98	0.13-0.15	0.0-2.9	0.0-0.5	.28	.28			
Urban land.												
ChA:												
Chewacla---------	0-8	10-35	1.30-1.60	0.57-1.98	0.15-0.24	0.0-2.9	1.0-4.0	.28	.28	5	5	56
	8-16	18-35	1.30-1.60	0.57-1.98	0.12-0.20	0.0-2.9	0.5-2.0	.28	.28			
	16-21	18-35	1.30-1.60	0.57-1.98	0.12-0.20	0.0-2.9	0.5-2.0	.28	.28			
	21-34	18-35	1.30-1.60	0.57-1.98	0.12-0.20	0.0-2.9	0.5-2.0	.28	.28			
	34-48	18-35	1.30-1.60	0.57-1.98	0.12-0.20	0.0-2.9	0.5-2.0	.28	.28			
	48-61	18-35	1.30-1.60	0.57-1.98	0.12-0.20	0.0-2.9	0.5-2.0	.28	.28			
CoD:												
Cliffield--------	0-3	7-20	1.30-1.60	1.98-5.95	0.06-0.12	0.0-2.9	1.0-5.0	.15	.24	2	8	0
	3-25	10-35	1.20-1.60	0.57-1.98	0.10-0.13	0.0-2.9	0.5-1.0	.10	.28			
	25-60	---	---	0.00-0.06	---	---	---	---	---			
Cowee------------	0-5	8-20	1.25-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-5.0	.20	.28	3	5	56
	5-10	8-20	1.25-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-3.0	.20	.28			
	10-21	18-35	1.30-1.60	0.57-1.98	0.12-0.18	0.0-2.9	0.5-1.0	.24	.28			
	21-34	18-35	1.30-1.60	0.57-1.98	0.12-0.18	0.0-2.9	0.5-1.0	.24	.28			
	34-42	---	---	---	---	---	---	---	---			
	42-60	---	---	---	---	---	---	---	---			
CpD:												
Cliffield--------	0-3	7-20	1.30-1.60	1.98-5.95	0.06-0.12	0.0-2.9	1.0-5.0	.15	.24	2	8	0
	3-25	10-35	1.20-1.60	0.57-1.98	0.10-0.13	0.0-2.9	0.5-1.0	.10	.28			
	25-60	---	---	0.00-0.06	---	---	---	---	---			
Pigeonroost------	0-3	8-20	1.35-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-5.0	.15	.24	3	5	56
	3-12	18-35	1.30-1.50	0.57-1.98	0.12-0.18	0.0-2.9	0.0-0.5	.28	.28			
	12-26	18-35	1.30-1.50	0.57-1.98	0.12-0.18	0.0-2.9	0.0-0.5	.28	.28			
	26-61	---	---	0.00-0.06	---	---	---	---	---			
CpE:												
Cliffield--------	0-3	7-20	1.30-1.60	1.98-5.95	0.06-0.12	0.0-2.9	1.0-5.0	.15	.24	2	8	0
	3-25	10-35	1.20-1.60	0.57-1.98	0.10-0.13	0.0-2.9	0.5-1.0	.10	.28			
	25-60	---	---	0.00-0.06	---	---	---	---	---			
Pigeonroost------	0-3	8-20	1.35-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-5.0	.15	.24	3	5	56
	3-12	18-35	1.30-1.50	0.57-1.98	0.12-0.18	0.0-2.9	0.0-0.5	.28	.28			
	12-26	18-35	1.30-1.50	0.57-1.98	0.12-0.18	0.0-2.9	0.0-0.5	.28	.28			
	26-61	---	---	0.00-0.06	---	---	---	---	---			

Table 14.—Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
CrF:												
Cliffield--------	0-3	7-20	1.30-1.60	1.98-5.95	0.06-0.12	0.0-2.9	1.0-5.0	.15	.24	2	8	0
	3-25	10-35	1.20-1.60	0.57-1.98	0.10-0.13	0.0-2.9	0.5-1.0	.10	.28			
	25-60	---	---	0.00-0.06	---	---	---	---	---			
Rock outcrop.												
DoB:												
Dogue------------	0-11	5-10	1.35-1.50	1.98-5.95	0.08-0.15	0.0-2.9	0.5-1.0	.28	.28	5	3	86
	11-16	35-50	1.45-1.60	0.20-0.57	0.12-0.19	3.0-5.9	0.0-0.5	.28	.28			
	16-27	35-50	1.45-1.60	0.20-0.57	0.12-0.19	3.0-5.9	0.0-0.5	.28	.28			
	27-43	35-50	1.45-1.60	0.20-0.57	0.12-0.19	3.0-5.9	0.0-0.5	.28	.28			
	43-55	35-50	1.45-1.60	0.20-0.57	0.12-0.19	3.0-5.9	0.0-0.5	.28	.28			
	55-62	5-30	1.30-1.50	0.57-5.95	0.05-0.14	0.0-2.9	0.0-0.5	.17	.17			
EcD:												
Edneyville-------	0-4	5-20	1.35-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-6.0	.17	.24	5	8	0
	4-8	5-20	1.35-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-6.0	.17	.24			
	8-14	7-20	1.40-1.60	1.98-5.95	0.10-0.16	0.0-2.9	0.5-2.0	.20	.24			
	14-26	7-20	1.40-1.60	1.98-5.95	0.10-0.16	0.0-2.9	0.5-2.0	.20	.24			
	26-53	5-20	1.40-1.60	1.98-5.95	0.08-0.12	0.0-2.9	0.0-0.5	.20	.24			
	53-65	5-20	1.40-1.60	1.98-5.95	0.08-0.12	0.0-2.9	0.0-0.5	.20	.24			
Chestnut---------	0-3	5-20	1.35-1.60	1.98-5.95	0.08-0.12	0.0-2.9	1.0-8.0	.17	.24	3	8	0
	3-17	10-25	1.35-1.60	1.98-5.95	0.08-0.12	0.0-2.9	0.0-2.0	.17	.24			
	17-23	10-25	1.35-1.60	1.98-5.95	0.08-0.12	0.0-2.9	0.0-2.0	.17	.24			
	23-28	2-10	1.45-1.65	---	---	---	---	---	---			
	28-42	---	---	---	---	---	---	---	---			
	42-46	---	---	---	---	---	---	---	---			
EcE:												
Edneyville-------	0-4	5-20	1.35-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-6.0	.17	.24	5	8	0
	4-8	5-20	1.35-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-6.0	.17	.24			
	8-14	7-20	1.40-1.60	1.98-5.95	0.10-0.16	0.0-2.9	0.5-2.0	.20	.24			
	14-26	7-20	1.40-1.60	1.98-5.95	0.10-0.16	0.0-2.9	0.5-2.0	.20	.24			
	26-53	5-20	1.40-1.60	1.98-5.95	0.08-0.12	0.0-2.9	0.0-0.5	.20	.24			
	53-65	5-20	1.40-1.60	1.98-5.95	0.08-0.12	0.0-2.9	0.0-0.5	.20	.24			
Chestnut---------	0-3	5-20	1.35-1.60	1.98-5.95	0.08-0.12	0.0-2.9	1.0-8.0	.17	.24	3	8	0
	3-17	10-25	1.35-1.60	1.98-5.95	0.08-0.12	0.0-2.9	0.0-2.0	.17	.24			
	17-23	10-25	1.35-1.60	1.98-5.95	0.08-0.12	0.0-2.9	0.0-2.0	.17	.24			
	23-28	2-10	1.45-1.65	---	---	---	---	---	---			
	28-42	---	---	---	---	---	---	---	---			
	42-46	---	---	---	---	---	---	---	---			
EvD:												
Evard------------	0-3	5-20	1.30-1.60	1.98-5.95	0.10-0.14	0.0-2.9	1.0-5.0	.24	.24	5	3	86
	3-6	5-20	1.30-1.60	1.98-5.95	0.10-0.14	0.0-2.9	1.0-5.0	.24	.24			
	6-12	18-35	1.30-1.50	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.24	.24			
	12-30	18-35	1.30-1.50	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.24	.24			
	30-37	12-30	1.20-1.40	0.57-1.98	0.10-0.25	0.0-2.9	0.0-0.5	.24	.24			
	37-56	5-20	1.20-1.40	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.24	.24			
	56-65	5-20	1.20-1.40	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.24	.24			
Cowee------------	0-5	8-20	1.25-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-5.0	.20	.28	3	5	56
	5-10	8-20	1.25-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-3.0	.20	.28			
	10-21	18-35	1.30-1.60	0.57-1.98	0.12-0.18	0.0-2.9	0.5-1.0	.24	.28			
	21-34	18-35	1.30-1.60	0.57-1.98	0.12-0.18	0.0-2.9	0.5-1.0	.24	.28			
	34-42	---	---	---	---	---	---	---	---			
	42-60	---	---	---	---	---	---	---	---			

Table 14.—Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Linear extensibility	Organic matter	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
EvE:												
Evard------------	0-3	5-20	1.30-1.60	1.98-5.95	0.10-0.14	0.0-2.9	1.0-5.0	.24	.24	5	3	86
	3-6	5-20	1.30-1.60	1.98-5.95	0.10-0.14	0.0-2.9	1.0-5.0	.24	.24			
	6-12	18-35	1.30-1.50	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.24	.24			
	12-30	18-35	1.30-1.50	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.24	.24			
	30-37	12-30	1.20-1.40	0.57-1.98	0.10-0.25	0.0-2.9	0.0-0.5	.24	.24			
	37-56	5-20	1.20-1.40	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.24	.24			
	56-65	5-20	1.20-1.40	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.24	.24			
Cowee------------	0-5	8-20	1.25-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-5.0	.20	.28	3	5	56
	5-10	8-20	1.25-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-3.0	.20	.28			
	10-21	18-35	1.30-1.60	0.57-1.98	0.12-0.18	0.0-2.9	0.5-1.0	.24	.28			
	21-34	18-35	1.30-1.60	0.57-1.98	0.12-0.18	0.0-2.9	0.5-1.0	.24	.28			
	34-42	---	---	---	---	---	---	---	---			
	42-60	---	---	---	---	---	---	---	---			
EwD:												
Evard------------	0-3	5-20	1.30-1.60	1.98-5.95	0.10-0.14	0.0-2.9	1.0-5.0	.24	.24	5	3	86
	3-6	5-20	1.30-1.60	1.98-5.95	0.10-0.14	0.0-2.9	1.0-5.0	.24	.24			
	6-12	18-35	1.30-1.50	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.24	.24			
	12-30	18-35	1.30-1.50	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.24	.24			
	30-37	12-30	1.20-1.40	0.57-1.98	0.10-0.25	0.0-2.9	0.0-0.5	.24	.24			
	37-56	5-20	1.20-1.40	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.24	.24			
	56-65	5-20	1.20-1.40	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.24	.24			
Cowee------------	0-5	8-20	1.25-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-5.0	.20	.28	3	5	56
	5-10	8-20	1.25-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-3.0	.20	.28			
	10-21	18-35	1.30-1.60	0.57-1.98	0.12-0.18	0.0-2.9	0.5-1.0	.24	.28			
	21-34	18-35	1.30-1.60	0.57-1.98	0.12-0.18	0.0-2.9	0.5-1.0	.24	.28			
	34-42	---	---	---	---	---	---	---	---			
	42-60	---	---	---	---	---	---	---	---			
EwE:												
Evard------------	0-3	5-20	1.30-1.60	1.98-5.95	0.10-0.14	0.0-2.9	1.0-5.0	.24	.24	5	3	86
	3-6	5-20	1.30-1.60	1.98-5.95	0.10-0.14	0.0-2.9	1.0-5.0	.24	.24			
	6-12	18-35	1.30-1.50	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.24	.24			
	12-30	18-35	1.30-1.50	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.24	.24			
	30-37	12-30	1.20-1.40	0.57-1.98	0.10-0.25	0.0-2.9	0.0-0.5	.24	.24			
	37-56	5-20	1.20-1.40	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.24	.24			
	56-65	5-20	1.20-1.40	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.24	.24			
Cowee------------	0-5	8-20	1.25-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-5.0	.20	.28	3	5	56
	5-10	8-20	1.25-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-3.0	.20	.28			
	10-21	18-35	1.30-1.60	0.57-1.98	0.12-0.18	0.0-2.9	0.5-1.0	.24	.28			
	21-34	18-35	1.30-1.60	0.57-1.98	0.12-0.18	0.0-2.9	0.5-1.0	.24	.28			
	34-42	---	---	---	---	---	---	---	---			
	42-60	---	---	---	---	---	---	---	---			
EwF:												
Evard------------	0-3	5-20	1.30-1.60	1.98-5.95	0.10-0.14	0.0-2.9	1.0-5.0	.24	.24	5	3	86
	3-6	5-20	1.30-1.60	1.98-5.95	0.10-0.14	0.0-2.9	1.0-5.0	.24	.24			
	6-12	18-35	1.30-1.50	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.24	.24			
	12-30	18-35	1.30-1.50	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.24	.24			
	30-37	12-30	1.20-1.40	0.57-1.98	0.10-0.25	0.0-2.9	0.0-0.5	.24	.24			
	37-56	5-20	1.20-1.40	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.24	.24			
	56-65	5-20	1.20-1.40	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.24	.24			

Table 14.—Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
EwF:												
Cowee------------	0-5	8-20	1.25-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-5.0	.20	.28	3	5	56
	5-10	8-20	1.25-1.60	1.98-5.95	0.10-0.15	0.0-2.9	1.0-3.0	.20	.28			
	10-21	18-35	1.30-1.60	0.57-1.98	0.12-0.18	0.0-2.9	0.5-1.0	.24	.28			
	21-34	18-35	1.30-1.60	0.57-1.98	0.12-0.18	0.0-2.9	0.5-1.0	.24	.28			
	34-42	---	---	---	---	---	---	---	---			
	42-60	---	---	---	---	---	---	---	---			
FaD:												
Fannin-----------	0-3	5-25	1.30-1.50	1.98-5.95	0.12-0.18	0.0-2.9	1.0-5.0	.32	.32	3	5	56
	3-6	18-35	1.30-1.50	0.57-1.98	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	6-17	18-35	1.30-1.50	0.57-1.98	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	17-24	18-35	1.30-1.50	0.57-1.98	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	24-34	5-25	1.30-1.50	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.32	.32			
	34-60	5-25	1.30-1.50	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.32	.32			
FaE:												
Fannin-----------	0-3	5-25	1.30-1.50	1.98-5.95	0.12-0.18	0.0-2.9	1.0-5.0	.32	.32	3	5	56
	3-6	18-35	1.30-1.50	0.57-1.98	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	6-17	18-35	1.30-1.50	0.57-1.98	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	17-24	18-35	1.30-1.50	0.57-1.98	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	24-34	5-25	1.30-1.50	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.32	.32			
	34-60	5-25	1.30-1.50	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.32	.32			
FbF:												
Fannin-----------	0-3	5-25	1.30-1.50	1.98-5.95	0.12-0.18	0.0-2.9	1.0-5.0	.32	.32	3	5	56
	3-6	18-35	1.30-1.50	0.57-1.98	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	6-17	18-35	1.30-1.50	0.57-1.98	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	17-24	18-35	1.30-1.50	0.57-1.98	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	24-34	5-25	1.30-1.50	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.32	.32			
	34-60	5-25	1.30-1.50	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.32	.32			
Chestnut---------	0-3	5-20	1.35-1.60	1.98-5.95	0.08-0.12	0.0-2.9	1.0-8.0	.17	.24	3	8	0
	3-17	10-25	1.35-1.60	1.98-5.95	0.08-0.12	0.0-2.9	0.0-2.0	.17	.24			
	17-23	10-25	1.35-1.60	1.98-5.95	0.08-0.12	0.0-2.9	0.0-2.0	.17	.24			
	23-28	2-10	1.45-1.65	---	---	---	---	---	---			
	28-42	---	---	---	---	---	---	---	---			
	42-46	---	---	---	---	---	---	---	---			
FvA:												
Fluvaquents------	0-60	27-50	1.20-1.70	0.06-0.20	0.12-0.16	3.0-5.9	0.0-2.0	.28	.28	5	4	86
Udifluvents------	0-60	10-27	1.20-1.40	0.20-0.57	0.12-0.18	3.0-5.9	0.0-2.0	.20	.20	5	5	56
GaC:												
Greenlee---------	0-5	5-25	1.30-1.50	1.98-5.95	0.06-0.11	0.0-2.9	2.0-5.0	.10	.20	5	8	0
	5-21	5-25	1.40-1.60	1.98-5.95	0.05-0.10	0.0-2.9	0.5-1.0	.10	.20			
	21-61	5-25	1.40-1.60	1.98-5.95	0.05-0.10	0.0-2.9	0.5-1.0	.10	.20			
Tate-------------	0-5	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	1.0-3.0	.17	.24	5	8	0
	5-10	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	1.0-2.0	.17	.24			
	10-22	18-35	1.30-1.45	0.57-1.98	0.17-0.19	0.0-2.9	0.0-1.0	.28	.28			
	22-51	18-35	1.30-1.45	0.57-1.98	0.17-0.19	0.0-2.9	0.0-1.0	.28	.28			
	51-61	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	0.0-0.5	.17	.24			
GaD:												
Greenlee---------	0-5	5-25	1.30-1.50	1.98-5.95	0.06-0.11	0.0-2.9	2.0-5.0	.10	.20	5	8	0
	5-21	5-25	1.40-1.60	1.98-5.95	0.05-0.10	0.0-2.9	0.5-1.0	.10	.20			
	21-61	5-25	1.40-1.60	1.98-5.95	0.05-0.10	0.0-2.9	0.5-1.0	.10	.20			

Table 14.—Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
GaD:												
Tate-------------	0-5	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	1.0-3.0	.17	.24	5	8	0
	5-10	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	1.0-2.0	.17	.24			
	10-22	18-35	1.30-1.45	0.57-1.98	0.17-0.19	0.0-2.9	0.0-1.0	.28	.28			
	22-51	18-35	1.30-1.45	0.57-1.98	0.17-0.19	0.0-2.9	0.0-1.0	.28	.28			
	51-61	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	0.0-0.5	.17	.24			
GbF:												
Greenlee---------	0-5	5-25	1.30-1.50	1.98-5.95	0.06-0.11	0.0-2.9	2.0-5.0	.10	.20	5	8	0
	5-21	5-25	1.40-1.60	1.98-5.95	0.05-0.10	0.0-2.9	0.5-1.0	.10	.20			
	21-61	5-25	1.40-1.60	1.98-5.95	0.05-0.10	0.0-2.9	0.5-1.0	.10	.20			
Tate-------------	0-5	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	1.0-3.0	.17	.24	5	8	0
	5-10	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	1.0-2.0	.17	.24			
	10-22	18-35	1.30-1.45	0.57-1.98	0.17-0.19	0.0-2.9	0.0-1.0	.28	.28			
	22-51	18-35	1.30-1.45	0.57-1.98	0.17-0.19	0.0-2.9	0.0-1.0	.28	.28			
	51-61	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	0.0-0.5	.17	.24			
GrE:												
Grover-----------	0-5	4-18	1.45-1.65	1.98-5.95	0.10-0.12	0.0-2.9	0.5-2.0	.24	.24	3	3	86
	5-19	18-35	1.25-1.40	0.57-1.98	0.12-0.14	0.0-2.9	0.0-0.5	.32	.32			
	19-24	18-35	1.25-1.40	0.57-1.98	0.12-0.14	0.0-2.9	0.0-0.5	.32	.32			
	24-62	4-25	1.60-1.70	0.57-1.98	0.10-0.14	0.0-2.9	0.0-0.5	.32	.32			
HaC2:												
Hayesville-------	0-5	10-25	1.35-1.60	1.98-5.95	0.12-0.20	0.0-2.9	1.0-3.0	.24	.24	4	5	56
	5-10	30-50	1.20-1.35	0.57-1.98	0.15-0.20	0.0-2.9	0.5-1.0	.28	.28			
	10-35	30-50	1.20-1.35	0.57-1.98	0.15-0.20	0.0-2.9	0.5-1.0	.28	.28			
	35-45	20-40	1.30-1.40	0.57-1.98	0.12-0.20	0.0-2.9	0.0-0.5	.28	.28			
	45-62	5-25	1.45-1.65	1.98-5.95	0.11-0.15	0.0-2.9	0.0-0.5	.24	.24			
HaD2:												
Hayesville-------	0-5	10-25	1.35-1.60	1.98-5.95	0.12-0.20	0.0-2.9	1.0-3.0	.24	.24	4	5	56
	5-10	30-50	1.20-1.35	0.57-1.98	0.15-0.20	0.0-2.9	0.5-1.0	.28	.28			
	10-35	30-50	1.20-1.35	0.57-1.98	0.15-0.20	0.0-2.9	0.5-1.0	.28	.28			
	35-45	20-40	1.30-1.40	0.57-1.98	0.12-0.20	0.0-2.9	0.0-0.5	.28	.28			
	45-62	5-25	1.45-1.65	1.98-5.95	0.11-0.15	0.0-2.9	0.0-0.5	.24	.24			
HeB:												
Helena-----------	0-5	5-20	1.58-1.62	1.98-5.95	0.10-0.12	0.0-2.9	0.5-2.0	.24	.24	4	5	56
	5-10	5-20	1.58-1.62	1.98-5.95	0.10-0.12	0.0-2.9	0.5-1.5	.24	.24			
	10-15	20-35	1.46-1.56	0.20-0.57	0.13-0.15	3.0-5.9	0.0-0.5	.28	.28			
	15-29	35-60	1.44-1.55	0.06-0.20	0.13-0.15	6.0-8.9	0.0-0.5	.28	.28			
	29-36	35-60	1.44-1.55	0.06-0.20	0.13-0.15	6.0-8.9	0.0-0.5	.28	.28			
	36-53	35-60	1.44-1.55	0.06-0.20	0.13-0.15	6.0-8.9	0.0-0.5	.28	.28			
	53-63	---	---	---	---	---	---	---	---			
Worsham----------	0-3	10-25	1.25-1.55	0.57-1.98	0.14-0.20	0.0-2.9	1.0-3.0	.37	.37	4	5	56
	3-11	30-55	1.35-1.65	0.00-0.06	0.10-0.16	3.0-5.9	0.0-0.5	.28	.28			
	11-28	30-55	1.35-1.65	0.00-0.06	0.10-0.16	3.0-5.9	0.0-0.5	.28	.28			
	28-37	30-55	1.35-1.65	0.00-0.06	0.10-0.16	3.0-5.9	0.0-0.5	.28	.28			
	37-45	30-55	1.35-1.65	0.00-0.06	0.10-0.16	3.0-5.9	0.0-0.5	.28	.28			
	45-58	30-55	1.35-1.65	0.00-0.06	0.10-0.16	3.0-5.9	0.0-0.5	.28	.28			
	58-65	10-40	1.20-1.50	0.20-0.57	0.08-0.19	3.0-5.9	0.0-0.5	.28	.28			
HsB2:												
Hiwassee---------	0-6	10-35	1.35-1.55	0.57-1.98	0.12-0.15	0.0-2.9	0.5-2.0	.28	.28	5	6	48
	6-10	35-60	1.30-1.45	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	10-25	35-60	1.30-1.45	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	25-45	35-60	1.30-1.45	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	45-62	35-60	1.30-1.45	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			

Table 14.—Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
HsC2:												
Hiwassee----------	0-6	10-35	1.35-1.55	0.57-1.98	0.12-0.15	0.0-2.9	0.5-2.0	.28	.28	5	6	48
	6-10	35-60	1.30-1.45	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	10-25	35-60	1.30-1.45	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	25-45	35-60	1.30-1.45	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	45-62	35-60	1.30-1.45	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
IoA:												
Iotla-------------	0-12	12-18	1.45-1.65	1.98-5.95	0.10-0.15	0.0-2.9	2.0-5.0	.20	.20	5	5	56
	12-21	12-23	1.45-1.65	1.98-5.95	0.10-0.15	0.0-2.9	0.0-1.0	.20	.20			
	21-26	12-23	1.45-1.65	1.98-5.95	0.10-0.15	0.0-2.9	0.0-1.0	.20	.20			
	26-30	4-12	1.60-1.75	5.95-19.98	0.06-0.10	0.0-2.9	0.0-0.5	.10	.10			
	30-50	12-18	1.45-1.65	1.98-5.95	0.10-0.15	0.0-2.9	0.0-1.0	.20	.20			
	50-60	4-12	1.60-1.75	5.95-19.98	0.06-0.10	0.0-2.9	0.0-0.5	.10	.10			
MaC2:												
Madison-----------	0-7	25-35	1.30-1.40	0.57-1.98	0.12-0.16	0.0-2.9	0.5-2.0	.28	.28	3	6	48
	7-19	30-50	1.20-1.40	0.57-1.98	0.13-0.18	0.0-2.9	0.0-0.5	.32	.32			
	19-30	30-50	1.20-1.40	0.57-1.98	0.13-0.18	0.0-2.9	0.0-0.5	.32	.32			
	30-46	25-35	1.30-1.40	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.32	.32			
	46-62	5-20	1.30-1.50	0.57-1.98	0.10-0.14	0.0-2.9	0.0-0.5	.37	.37			
MaD2:												
Madison-----------	0-7	25-35	1.30-1.40	0.57-1.98	0.12-0.16	0.0-2.9	0.5-2.0	.28	.28	3	6	48
	7-19	30-50	1.20-1.40	0.57-1.98	0.13-0.18	0.0-2.9	0.0-0.5	.32	.32			
	19-30	30-50	1.20-1.40	0.57-1.98	0.13-0.18	0.0-2.9	0.0-0.5	.32	.32			
	30-46	25-35	1.30-1.40	0.57-1.98	0.12-0.16	0.0-2.9	0.0-0.5	.32	.32			
	46-62	5-20	1.30-1.50	0.57-1.98	0.10-0.14	0.0-2.9	0.0-0.5	.37	.37			
PaC2:												
Pacolet-----------	0-5	20-35	1.30-1.50	0.57-1.98	0.10-0.14	0.0-2.9	0.5-1.0	.24	.24	2	5	56
	5-26	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	26-37	15-30	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	37-52	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	52-62	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
PaD2:												
Pacolet-----------	0-5	20-35	1.30-1.50	0.57-1.98	0.10-0.14	0.0-2.9	0.5-1.0	.24	.24	2	5	56
	5-26	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	26-37	15-30	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	37-52	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	52-62	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
PbB2:												
Pacolet-----------	0-5	20-35	1.30-1.50	0.57-1.98	0.10-0.14	0.0-2.9	0.5-1.0	.24	.24	2	5	56
	5-26	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	26-37	15-30	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	37-52	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	52-62	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
Bethlehem---------	0-7	7-35	1.40-1.65	1.98-5.95	0.06-0.10	0.0-2.9	1.0-3.0	.15	.28	3	3	86
	7-24	35-60	1.25-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.32			
	24-33	20-35	1.40-1.60	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.20	.28			
	33-60	---	---	---	---	---	---	---	---			
PbC2:												
Pacolet-----------	0-5	20-35	1.30-1.50	0.57-1.98	0.10-0.14	0.0-2.9	0.5-1.0	.24	.24	2	5	56
	5-26	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	26-37	15-30	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	37-52	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	52-62	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			

Table 14.—Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
PbC2:												
Bethlehem--------	0-7	7-35	1.40-1.65	1.98-5.95	0.06-0.10	0.0-2.9	1.0-3.0	.15	.28	3	3	86
	7-24	35-60	1.25-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.32			
	24-33	20-35	1.40-1.60	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.20	.28			
	33-60	---	---	---	---	---	---	---	---			
PbD2:												
Pacolet----------	0-5	20-35	1.30-1.50	0.57-1.98	0.10-0.14	0.0-2.9	0.5-1.0	.24	.24	2	5	56
	5-26	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	26-37	15-30	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	37-52	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	52-62	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
Bethlehem--------	0-7	7-35	1.40-1.65	1.98-5.95	0.06-0.10	0.0-2.9	1.0-3.0	.15	.28	3	3	86
	7-24	35-60	1.25-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.32			
	24-33	20-35	1.40-1.60	0.57-1.98	0.08-0.12	0.0-2.9	0.0-0.5	.20	.28			
	33-60	---	---	---	---	---	---	---	---			
PsB2:												
Pacolet----------	0-5	20-35	1.30-1.50	0.57-1.98	0.10-0.14	0.0-2.9	0.5-1.0	.24	.24	2	5	56
	5-26	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	26-37	15-30	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	37-52	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	52-62	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
Saw--------------	0-7	20-40	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.5-1.0	.28	.28	2	5	56
	7-19	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	19-25	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	25-28	5-30	1.30-1.50	0.57-5.95	0.07-0.12	0.0-2.9	0.0-0.5	.20	.28			
	28-60	---	---	---	---	---	---	---	---			
PsC2:												
Pacolet----------	0-5	20-35	1.30-1.50	0.57-1.98	0.10-0.14	0.0-2.9	0.5-1.0	.24	.24	2	5	56
	5-26	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	26-37	15-30	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	37-52	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	52-62	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
Saw--------------	0-7	20-40	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.5-1.0	.28	.28	2	5	56
	7-19	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	19-25	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	25-28	5-30	1.30-1.50	0.57-5.95	0.07-0.12	0.0-2.9	0.0-0.5	.20	.28			
	28-60	---	---	---	---	---	---	---	---			
PsD2:												
Pacolet----------	0-5	20-35	1.30-1.50	0.57-1.98	0.10-0.14	0.0-2.9	0.5-1.0	.24	.24	2	5	56
	5-26	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	26-37	15-30	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	37-52	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
	52-62	10-25	1.20-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.28	.28			
Saw--------------	0-7	20-40	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.5-1.0	.28	.28	2	3	86
	7-19	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	19-25	35-65	1.30-1.50	0.57-1.98	0.12-0.15	0.0-2.9	0.0-0.5	.28	.28			
	25-28	5-30	1.30-1.50	0.57-5.95	0.07-0.12	0.0-2.9	0.0-0.5	.20	.28			
	28-60	---	---	---	---	---	---	---	---			
Qp.												
Pits												

Table 14.—Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
RaE:												
Rion-------------	0-5	5-20	1.30-1.50	1.98-5.95	0.08-0.12	0.0-2.9	0.5-2.0	.24	.24	3	3	86
	5-17	18-35	1.40-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.20	.24			
	17-25	18-35	1.40-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.20	.24			
	25-38	18-35	1.40-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.20	.24			
	38-62	2-20	1.30-1.50	1.98-5.95	0.06-0.12	0.0-2.9	0.0-0.5	.20	.24			
RcF:												
Rion-------------	0-5	5-20	1.30-1.50	1.98-5.95	0.08-0.12	0.0-2.9	0.5-2.0	.24	.24	3	---	---
	5-17	18-35	1.40-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.20	.24			
	17-25	18-35	1.40-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.20	.24			
	25-38	18-35	1.40-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.20	.24			
	38-62	2-20	1.30-1.50	1.98-5.95	0.06-0.12	0.0-2.9	0.0-0.5	.20	.24			
Ashlar-----------	0-5	5-15	1.30-1.55	1.98-5.95	0.04-0.14	0.0-2.9	0.5-1.0	.24	.24	2	3	86
	5-17	5-15	1.30-1.55	1.98-5.95	0.04-0.14	0.0-2.9	0.0-0.5	.24	.28			
	17-27	5-15	1.30-1.55	1.98-5.95	0.04-0.14	0.0-2.9	0.0-0.5	.24	.28			
	27-32	---	---	---	---	---	---	---	---			
	32-60	---	---	---	---	---	---	---	---			
Rock outcrop.												
RnE:												
Rion-------------	0-5	5-20	1.30-1.50	1.98-5.95	0.08-0.12	0.0-2.9	0.5-2.0	.24	.24	3	---	---
	5-17	18-35	1.40-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.20	.24			
	17-25	18-35	1.40-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.20	.24			
	25-38	18-35	1.40-1.50	0.57-1.98	0.08-0.15	0.0-2.9	0.0-0.5	.20	.24			
	38-62	2-20	1.30-1.50	1.98-5.95	0.06-0.12	0.0-2.9	0.0-0.5	.20	.24			
Cliffside--------	0-3	7-20	1.30-1.60	1.98-5.95	0.08-0.13	0.0-2.9	0.5-2.0	.10	.24	2	3	86
	3-7	7-20	1.30-1.60	1.98-5.95	0.08-0.13	0.0-2.9	0.5-2.0	.10	.24			
	7-11	10-35	1.25-1.60	0.57-1.98	0.10-0.13	0.0-2.9	0.0-0.5	.10	.28			
	11-27	10-35	1.25-1.60	0.57-1.98	0.10-0.13	0.0-2.9	0.0-0.5	.10	.28			
	27-60	---	---	0.06-0.20	---	---	---	---	---			
RsC:												
Rock outcrop.												
Ashlar-----------	0-5	5-15	1.30-1.55	1.98-5.95	0.04-0.14	0.0-2.9	0.5-1.0	.24	.24	2	3	86
	5-17	5-15	1.30-1.55	1.98-5.95	0.04-0.14	0.0-2.9	0.0-0.5	.24	.28			
	17-27	5-15	1.30-1.55	1.98-5.95	0.04-0.14	0.0-2.9	0.0-0.5	.24	.28			
	27-32	---	---	---	---	---	---	---	---			
	32-60	---	---	---	---	---	---	---	---			
RxF:												
Rock outcrop.												
Cleveland--------	0-3	6-20	1.20-1.50	1.98-5.95	0.05-0.10	0.0-2.9	0.5-8.0	.17	.28	1	8	0
	3-13	6-20	1.20-1.50	1.98-5.95	0.05-0.10	0.0-2.9	0.5-8.0	.17	.28			
	13-60	---	---	---	---	---	---	---	---			
SkB:												
Skyuka-----------	0-6	20-35	1.20-1.60	0.57-1.98	0.14-0.20	0.0-2.9	1.0-3.0	.28	.28	4	5	56
	6-11	35-60	1.20-1.50	0.57-1.98	0.14-0.20	3.0-5.9	0.5-1.0	.28	.28			
	11-21	35-60	1.20-1.50	0.57-1.98	0.14-0.20	3.0-5.9	0.5-1.0	.28	.28			
	21-33	35-60	1.20-1.50	0.57-1.98	0.14-0.20	3.0-5.9	0.5-1.0	.28	.28			
	33-52	35-60	1.20-1.50	0.57-1.98	0.14-0.20	3.0-5.9	0.5-1.0	.28	.28			
	52-65	35-60	1.20-1.50	0.57-1.98	0.14-0.20	3.0-5.9	0.5-1.0	.28	.28			

Table 14.—Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
TaC:												
Tate-------------	0-5	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	1.0-3.0	.17	.24	5	5	56
	5-10	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	1.0-2.0	.17	.24			
	10-22	18-35	1.30-1.45	0.57-1.98	0.17-0.19	0.0-2.9	0.0-1.0	.28	.28			
	22-51	18-35	1.30-1.45	0.57-1.98	0.17-0.19	0.0-2.9	0.0-1.0	.28	.28			
	51-61	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	0.0-0.5	.17	.24			
TbC:												
Tate-------------	0-5	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	1.0-3.0	.17	.24	5	8	0
	5-10	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	1.0-2.0	.17	.24			
	10-22	18-35	1.30-1.45	0.57-1.98	0.17-0.19	0.0-2.9	0.0-1.0	.28	.28			
	22-51	18-35	1.30-1.45	0.57-1.98	0.17-0.19	0.0-2.9	0.0-1.0	.28	.28			
	51-61	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	0.0-0.5	.17	.24			
Greenlee---------	0-5	5-25	1.30-1.50	1.98-5.95	0.06-0.11	0.0-2.9	2.0-5.0	.10	.20	5	8	0
	5-21	5-25	1.40-1.60	1.98-5.95	0.05-0.10	0.0-2.9	0.5-1.0	.10	.20			
	21-61	5-25	1.40-1.60	1.98-5.95	0.05-0.10	0.0-2.9	0.5-1.0	.10	.20			
TbD:												
Tate-------------	0-5	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	1.0-3.0	.17	.24	5	8	0
	5-10	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	1.0-2.0	.17	.24			
	10-22	18-35	1.30-1.45	0.57-1.98	0.17-0.19	0.0-2.9	0.0-1.0	.28	.28			
	22-51	18-35	1.30-1.45	0.57-1.98	0.17-0.19	0.0-2.9	0.0-1.0	.28	.28			
	51-61	5-25	1.35-1.60	1.98-5.95	0.12-0.15	0.0-2.9	0.0-0.5	.17	.24			
Greenlee---------	0-5	5-25	1.30-1.50	1.98-5.95	0.06-0.11	0.0-2.9	2.0-5.0	.10	.20	5	8	0
	5-21	5-25	1.40-1.60	1.98-5.95	0.05-0.10	0.0-2.9	0.5-1.0	.10	.20			
	21-61	5-25	1.40-1.60	1.98-5.95	0.05-0.10	0.0-2.9	0.5-1.0	.10	.20			
ToA:												
Toccoa-----------	0-12	2-15	1.40-1.55	1.98-5.95	0.09-0.12	0.0-2.9	1.0-2.0	.10	.10	4	3	86
	12-22	2-19	1.40-1.50	1.98-5.95	0.09-0.12	0.0-2.9	---	.20	.20			
	22-35	2-19	1.40-1.50	1.98-5.95	0.09-0.12	0.0-2.9	---	.20	.20			
	35-50	2-19	1.40-1.50	1.98-5.95	0.09-0.12	0.0-2.9	---	.20	.20			
	50-62	2-10	1.45-1.65	---	---	---	---	---	---			
TtD:												
Toecane----------	0-4	5-25	1.30-1.50	1.98-5.95	0.10-0.14	0.0-2.9	5.0-12	.10	.20	5	8	0
	4-8	5-25	1.30-1.50	1.98-5.95	0.10-0.14	0.0-2.9	2.0-6.0	.10	.20			
	8-17	5-25	1.40-1.60	1.98-5.95	0.08-0.12	0.0-2.9	0.5-2.0	.10	.20			
	17-31	2-20	1.40-1.60	1.98-5.95	0.06-0.10	0.0-2.9	0.0-0.5	.10	.20			
	31-38	2-20	1.40-1.60	1.98-5.95	0.06-0.10	0.0-2.9	0.0-0.5	.10	.20			
	38-62	1-12	1.45-1.65	1.98-5.95	0.04-0.08	0.0-2.9	0.0-0.5	.10	.24			
Tusquitee--------	0-6	5-20	1.20-1.40	1.98-5.95	0.11-0.18	0.0-2.9	3.0-8.0	.17	.24	5	8	0
	6-9	5-20	1.20-1.40	1.98-5.95	0.11-0.18	0.0-2.9	3.0-8.0	.17	.24			
	9-22	7-20	1.30-1.60	1.98-5.95	0.11-0.21	0.0-2.9	0.5-1.0	.20	.24			
	22-31	7-20	1.30-1.60	1.98-5.95	0.11-0.21	0.0-2.9	0.5-1.0	.20	.24			
	31-42	7-20	1.30-1.60	1.98-5.95	0.11-0.21	0.0-2.9	0.5-1.0	.20	.24			
	42-71	7-20	1.30-1.60	1.98-5.95	0.11-0.21	0.0-2.9	0.5-1.0	.20	.24			
	71-86	5-20	1.30-1.60	1.98-5.95	0.06-0.12	0.0-2.9	0.0-0.5	.15	.24			
UdC, UoA. Udorthents												
UpA. Udorthents-Pits												
Ur. Urban land												

Table 14.—Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
WeA:												
Wehadkee---------	0-6	5-20	1.35-1.60	1.98-5.95	0.10-0.15	0.0-2.9	2.0-5.0	.24	.24	5	3	86
	6-20	18-35	1.30-1.50	0.57-1.98	0.16-0.20	0.0-2.9	0.0-2.0	.32	.32			
	20-48	---	---	---	---	---	---	---	---			
	48-62	---	---	---	---	---	---	---	---			

Table 15.—Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100g	meq/100g	pH	Pct
ApB:					
Appling	0-10	1.0-5.0	---	4.5-6.5	0
	10-35	---	3.0-12	4.5-5.5	0
	35-48	---	2.0-8.0	4.5-5.5	0
	48-65	---	2.0-8.0	4.5-5.5	---
ApC:					
Appling	0-10	1.0-5.0	---	4.5-6.5	0
	10-35	---	3.0-12	4.5-5.5	0
	35-48	---	2.0-8.0	4.5-5.5	0
	48-65	---	2.0-8.0	4.5-5.5	---
ArD:					
Ashe	0-5	---	2.0-8.0	4.5-6.0	0
	5-22	---	1.0-5.0	4.5-6.0	0
	22-28	---	1.0-5.0	4.5-6.0	0
	28-32	---	---	---	---
Cleveland	0-3	---	2.0-8.0	4.5-6.0	0
	3-13	---	2.0-8.0	4.5-6.0	---
	13-60	---	---	---	---
Rock outcrop.					
ArF:					
Ashe	0-5	---	2.0-8.0	4.5-6.0	0
	5-22	---	1.0-5.0	4.5-6.0	0
	22-28	---	1.0-5.0	4.5-6.0	0
	28-32	---	---	---	---
Cleveland	0-3	---	2.0-8.0	4.5-6.0	0
	3-13	---	2.0-8.0	4.5-6.0	---
	13-60	---	---	---	---
Rock outcrop.					
BoA:					
Bandana	0-6	5.0-15	---	5.1-6.5	0
	6-9	1.0-10	---	5.1-6.5	0
	9-17	1.0-10	---	5.1-6.5	0
	17-24	1.0-10	---	5.1-6.5	---
	24-60	1.0-10	---	5.1-6.5	0
Ostin	0-4	1.0-3.0	---	4.5-7.3	0
	4-20	0.0-1.0	---	4.5-7.3	0
	20-29	0.0-1.0	---	4.5-7.3	0
	29-41	0.0-1.0	---	4.5-7.3	0
	41-48	0.5-1.5	---	4.5-7.3	---
	48-63	0.0-1.0	---	4.5-7.3	0
BuB:					
Buncombe	0-9	2.0-10	---	4.5-6.5	0
	9-15	1.0-10	---	4.5-6.5	0
	15-46	1.0-10	---	4.5-6.5	0
	46-62	---	---	---	---

Table 15.—Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100g	meq/100g	pH	Pct
CaB2:					
Cecil----------------	0-8	5.0-10	---	4.5-6.5	0
	8-18	---	3.0-12	4.5-5.5	0
	18-39	---	3.0-12	4.5-5.5	0
	39-52	---	3.0-12	4.5-5.5	0
	52-68	---	3.0-12	4.5-5.5	0
CeB2:					
Cecil----------------	0-8	5.0-10	---	4.5-6.5	0
	8-18	---	3.0-12	4.5-5.5	0
	18-39	---	3.0-12	4.5-5.5	0
	39-52	---	3.0-12	4.5-5.5	0
	52-68	---	3.0-12	4.5-5.5	0
Urban land.					
ChA:					
Chewacla-------------	0-8	5.0-30	---	4.5-6.5	0
	8-16	10-25	---	4.5-6.5	0
	16-21	10-25	---	4.5-6.5	0
	21-34	10-25	---	4.5-6.5	0
	34-48	10-25	---	4.5-6.5	0
	48-61	10-25	---	4.5-6.5	0
CoD:					
Cliffield------------	0-3	---	2.0-9.0	3.5-5.5	0
	3-25	---	2.0-7.0	4.5-5.5	0
	25-60	---	---	---	---
Cowee----------------	0-5	---	1.0-8.0	3.5-6.0	0
	5-10	---	1.0-8.0	3.5-6.0	0
	10-21	---	2.0-8.0	3.5-6.0	0
	21-34	---	2.0-8.0	3.5-6.0	0
	34-42	---	---	---	---
	42-60	---	---	---	---
CpD:					
Cliffield------------	0-3	---	2.0-9.0	3.5-5.5	0
	3-25	---	2.0-7.0	4.5-5.5	0
	25-60	---	---	---	---
Pigeonroost----------	0-3	---	1.0-8.0	3.5-6.0	0
	3-12	---	2.0-8.0	3.5-6.0	0
	12-26	---	2.0-8.0	3.5-6.0	0
	26-61	---	---	---	---
CpE:					
Cliffield------------	0-3	---	2.0-9.0	3.5-5.5	0
	3-25	---	2.0-7.0	4.5-5.5	0
	25-60	---	---	---	---
Pigeonroost----------	0-3	---	1.0-8.0	3.5-6.0	0
	3-12	---	2.0-8.0	3.5-6.0	0
	12-26	---	2.0-8.0	3.5-6.0	0
	26-61	---	---	---	---

Table 15.—Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100g	meq/100g	pH	Pct
CrF:					
Cliffield	0-3	---	2.0-9.0	3.5-5.5	0
	3-25	---	2.0-7.0	4.5-5.5	0
	25-60	---	---	---	---
Rock outcrop.					
DoB:					
Dogue	0-11	---	2.0-6.0	3.5-5.5	0
	11-16	---	8.0-20	3.5-5.5	0
	16-27	---	8.0-20	3.5-5.5	0
	27-43	---	8.0-20	3.5-5.5	0
	43-55	---	8.0-20	3.5-5.5	0
	55-62	---	1.0-6.0	3.5-5.5	0
EcD:					
Edneyville	0-4	---	2.0-12	4.5-6.0	0
	4-8	---	2.0-12	4.5-6.0	0
	8-14	---	2.0-6.0	4.5-6.0	0
	14-26	---	2.0-6.0	4.5-6.0	0
	26-53	---	1.0-4.0	4.5-6.0	0
	53-65	---	1.0-4.0	4.5-6.0	0
Chestnut	0-3	---	2.0-8.0	3.5-6.0	0
	3-17	---	1.0-5.0	3.5-6.0	0
	17-23	---	1.0-5.0	3.5-6.0	0
	23-28	---	---	---	---
	28-42	---	---	---	---
	42-46	---	---	---	---
EcE:					
Edneyville	0-4	---	2.0-12	4.5-6.0	0
	4-8	---	2.0-12	4.5-6.0	0
	8-14	---	2.0-6.0	4.5-6.0	0
	14-26	---	2.0-6.0	4.5-6.0	0
	26-53	---	1.0-4.0	4.5-6.0	0
	53-65	---	1.0-4.0	4.5-6.0	0
Chestnut	0-3	---	2.0-8.0	3.5-6.0	0
	3-17	---	1.0-5.0	3.5-6.0	0
	17-23	---	1.0-5.0	3.5-6.0	0
	23-28	---	---	---	---
	28-42	---	---	---	---
	42-46	---	---	---	---
EvD:					
Evard	0-3	---	5.0-12	4.5-6.0	0
	3-6	---	5.0-12	4.5-6.0	0
	6-12	---	5.0-7.0	4.5-6.0	0
	12-30	---	5.0-7.0	4.5-6.0	0
	30-37	---	3.0-5.0	4.5-6.0	0
	37-56	---	2.0-4.0	4.5-6.0	0
	56-65	---	2.0-4.0	4.5-6.0	0
Cowee	0-5	---	1.0-8.0	3.5-6.0	0
	5-10	---	1.0-8.0	3.5-6.0	0
	10-21	---	2.0-8.0	3.5-6.0	0
	21-34	---	2.0-8.0	3.5-6.0	0
	34-42	---	---	---	---
	42-60	---	---	---	---

Table 15.—Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100g	meq/100g	pH	Pct
EvE:					
Evard	0-3	---	5.0-12	4.5-6.0	0
	3-6	---	5.0-12	4.5-6.0	0
	6-12	---	5.0-7.0	4.5-6.0	0
	12-30	---	5.0-7.0	4.5-6.0	0
	30-37	---	3.0-5.0	4.5-6.0	0
	37-56	---	2.0-4.0	4.5-6.0	0
	56-65	---	2.0-4.0	4.5-6.0	0
Cowee	0-5	---	1.0-8.0	3.5-6.0	0
	5-10	---	1.0-8.0	3.5-6.0	0
	10-21	---	2.0-8.0	3.5-6.0	0
	21-34	---	2.0-8.0	3.5-6.0	0
	34-42	---	---	---	---
	42-60	---	---	---	---
EwD:					
Evard	0-3	---	5.0-12	4.5-6.0	0
	3-6	---	5.0-12	4.5-6.0	0
	6-12	---	5.0-7.0	4.5-6.0	0
	12-30	---	5.0-7.0	4.5-6.0	0
	30-37	---	3.0-5.0	4.5-6.0	0
	37-56	---	2.0-4.0	4.5-6.0	0
	56-65	---	2.0-4.0	4.5-6.0	0
Cowee	0-5	---	1.0-8.0	3.5-6.0	0
	5-10	---	1.0-8.0	3.5-6.0	0
	10-21	---	2.0-8.0	3.5-6.0	0
	21-34	---	2.0-8.0	3.5-6.0	0
	34-42	---	---	---	---
	42-60	---	---	---	---
EwE:					
Evard	0-3	---	5.0-12	4.5-6.0	0
	3-6	---	5.0-12	4.5-6.0	0
	6-12	---	5.0-7.0	4.5-6.0	0
	12-30	---	5.0-7.0	4.5-6.0	0
	30-37	---	3.0-5.0	4.5-6.0	0
	37-56	---	2.0-4.0	4.5-6.0	0
	56-65	---	2.0-4.0	4.5-6.0	0
Cowee	0-5	---	1.0-8.0	3.5-6.0	0
	5-10	---	1.0-8.0	3.5-6.0	0
	10-21	---	2.0-8.0	3.5-6.0	0
	21-34	---	2.0-8.0	3.5-6.0	0
	34-42	---	---	---	---
	42-60	---	---	---	---
EwF:					
Evard	0-3	---	5.0-12	4.5-6.0	0
	3-6	---	5.0-12	4.5-6.0	0
	6-12	---	5.0-7.0	4.5-6.0	0
	12-30	---	5.0-7.0	4.5-6.0	0
	30-37	---	3.0-5.0	4.5-6.0	0
	37-56	---	2.0-4.0	4.5-6.0	0
	56-65	---	2.0-4.0	4.5-6.0	0

Table 15.—Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100g	meq/100g	pH	Pct
EwF:					
Cowee----------------	0-5	---	1.0-8.0	3.5-6.0	0
	5-10	---	1.0-8.0	3.5-6.0	0
	10-21	---	2.0-8.0	3.5-6.0	0
	21-34	---	2.0-8.0	3.5-6.0	0
	34-42	---	---	---	---
	42-60	---	---	---	---
FaD:					
Fannin---------------	0-3	2.0-10	---	4.5-6.5	0
	3-6	3.0-8.0	---	4.5-6.5	0
	6-17	3.0-8.0	---	4.5-6.5	0
	17-24	3.0-8.0	---	4.5-6.5	0
	24-34	1.0-5.0	---	4.5-6.5	0
	34-60	1.0-5.0	---	4.5-6.5	0
FaE:					
Fannin---------------	0-3	2.0-10	---	4.5-6.5	0
	3-6	3.0-8.0	---	4.5-6.5	0
	6-17	3.0-8.0	---	4.5-6.5	0
	17-24	3.0-8.0	---	4.5-6.5	0
	24-34	1.0-5.0	---	4.5-6.5	0
	34-60	1.0-5.0	---	4.5-6.5	0
FbF:					
Fannin---------------	0-3	2.0-10	---	4.5-6.5	0
	3-6	3.0-8.0	---	4.5-6.5	0
	6-17	3.0-8.0	---	4.5-6.5	0
	17-24	3.0-8.0	---	4.5-6.5	0
	24-34	1.0-5.0	---	4.5-6.5	0
	34-60	1.0-5.0	---	4.5-6.5	0
Chestnut-------------	0-3	---	2.0-8.0	3.5-6.0	0
	3-17	---	1.0-5.0	3.5-6.0	0
	17-23	---	1.0-5.0	3.5-6.0	0
	23-28	---	---	---	---
	28-42	---	---	---	---
	42-46	---	---	---	---
FvA:					
Fluvaquents----------	0-60	---	---	5.6-8.4	0
Udifluvents----------	0-60	---	---	5.6-8.4	0
GaC:					
Greenlee-------------	0-5	---	3.0-10	3.5-6.0	0
	5-21	---	1.0-6.0	3.5-6.0	0
	21-61	---	1.0-6.0	3.5-6.0	0
Tate-----------------	0-5	2.0-6.0	---	4.5-6.5	0
	5-10	2.0-6.0	---	4.5-6.5	0
	10-22	3.0-7.0	---	4.5-6.5	0
	22-51	3.0-7.0	---	4.5-6.5	0
	51-61	1.0-3.0	---	4.5-6.5	0
GaD:					
Greenlee-------------	0-5	---	3.0-10	3.5-6.0	0
	5-21	---	1.0-6.0	3.5-6.0	0
	21-61	---	1.0-6.0	3.5-6.0	0

Table 15.—Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100g	meq/100g	pH	Pct
GaD:					
Tate	0-5	2.0-6.0	---	4.5-6.5	0
	5-10	2.0-6.0	---	4.5-6.5	0
	10-22	3.0-7.0	---	4.5-6.5	0
	22-51	3.0-7.0	---	4.5-6.5	0
	51-61	1.0-3.0	---	4.5-6.5	0
GbF:					
Greenlee	0-5	---	3.0-10	3.5-6.0	0
	5-21	---	1.0-6.0	3.5-6.0	0
	21-61	---	1.0-6.0	3.5-6.0	0
Tate	0-5	2.0-6.0	---	4.5-6.5	0
	5-10	2.0-6.0	---	4.5-6.5	0
	10-22	3.0-7.0	---	4.5-6.5	0
	22-51	3.0-7.0	---	4.5-6.5	0
	51-61	1.0-3.0	---	4.5-6.5	0
GrE:					
Grover	0-5	1.0-4.0	---	4.5-6.5	0
	5-19	---	2.0-4.0	4.5-6.0	0
	19-24	---	2.0-4.0	4.5-6.0	0
	24-62	---	1.0-3.0	4.5-6.0	0
HaC2:					
Hayesville	0-5	---	2.0-6.0	3.5-6.5	0
	5-10	---	3.0-8.0	3.5-6.0	0
	10-35	---	3.0-8.0	3.5-6.0	0
	35-45	---	2.0-6.0	3.5-6.0	0
	45-62	---	1.0-5.0	3.5-6.0	0
HaD2:					
Hayesville	0-5	---	2.0-6.0	3.5-6.5	0
	5-10	---	3.0-8.0	3.5-6.0	0
	10-35	---	3.0-8.0	3.5-6.0	0
	35-45	---	2.0-6.0	3.5-6.0	0
	45-62	---	1.0-5.0	3.5-6.0	0
HeB:					
Helena	0-5	---	1.0-6.0	3.5-6.5	0
	5-10	---	1.0-6.0	3.5-6.5	0
	10-15	---	4.0-7.0	3.5-5.5	0
	15-29	---	7.0-13	3.5-5.5	0
	29-36	---	7.0-13	3.5-5.5	0
	36-53	---	7.0-13	3.5-5.5	0
	53-63	---	---	---	---
Worsham	0-3	---	---	4.5-5.5	---
	3-11	---	---	4.5-5.5	---
	11-28	---	---	4.5-5.5	---
	28-37	---	---	4.5-5.5	---
	37-45	---	---	4.5-5.5	---
	45-58	---	---	4.5-5.5	---
	58-65	---	---	4.5-5.5	---
HsB2:					
Hiwassee	0-6	3.0-10	---	4.5-6.5	0
	6-10	4.0-15	---	4.5-6.5	0
	10-25	4.0-15	---	4.5-6.5	0
	25-45	4.0-15	---	4.5-6.5	0
	45-62	4.0-15	---	4.5-6.5	0

Table 15.—Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100g	meq/100g	pH	Pct
HsC2:					
Hiwassee	0-6	3.0-10	---	4.5-6.5	0
	6-10	4.0-15	---	4.5-6.5	0
	10-25	4.0-15	---	4.5-6.5	0
	25-45	4.0-15	---	4.5-6.5	0
	45-62	4.0-15	---	4.5-6.5	0
IoA:					
Iotla	0-12	4.0-9.0	---	5.1-7.3	0
	12-21	2.0-6.0	---	5.1-7.3	0
	21-26	2.0-6.0	---	5.1-7.3	0
	26-30	1.0-3.0	---	5.1-7.3	0
	30-50	2.0-5.0	---	5.1-7.3	0
	50-60	1.0-3.0	---	5.1-7.3	0
MaC2:					
Madison	0-7	3.0-6.0	---	4.5-6.5	0
	7-19	---	3.0-6.0	4.5-5.5	0
	19-30	---	3.0-6.0	4.5-5.5	0
	30-46	---	2.0-4.0	4.5-6.0	0
	46-62	---	1.0-3.0	4.5-6.0	0
MaD2:					
Madison	0-7	3.0-6.0	---	4.5-6.5	0
	7-19	---	3.0-6.0	4.5-5.5	0
	19-30	---	3.0-6.0	4.5-5.5	0
	30-46	---	2.0-4.0	4.5-6.0	0
	46-62	---	1.0-3.0	4.5-6.0	0
PaC2:					
Pacolet	0-5	4.0-10	---	4.5-6.5	0
	5-26	---	6.0-18	4.5-6.0	0
	26-37	---	5.0-12	4.5-6.0	0
	37-52	---	4.0-10	4.5-6.0	0
	52-62	---	4.0-10	4.5-6.0	0
PaD2:					
Pacolet	0-5	4.0-10	---	4.5-6.5	0
	5-26	---	6.0-18	4.5-6.0	0
	26-37	---	5.0-12	4.5-6.0	0
	37-52	---	4.0-10	4.5-6.0	0
	52-62	---	4.0-10	4.5-6.0	0
PbB2:					
Pacolet	0-5	4.0-10	---	4.5-6.5	0
	5-26	---	6.0-18	4.5-6.0	0
	26-37	---	5.0-12	4.5-6.0	0
	37-52	---	4.0-10	4.5-6.0	0
	52-62	---	4.0-10	4.5-6.0	0
Bethlehem	0-7	---	2.0-10	4.5-5.5	0
	7-24	---	7.0-12	4.5-5.5	0
	24-33	---	4.0-8.0	4.5-5.5	0
	33-60	---	---	---	---
PbC2:					
Pacolet	0-5	4.0-10	---	4.5-6.5	0
	5-26	---	6.0-18	4.5-6.0	0
	26-37	---	5.0-12	4.5-6.0	0
	37-52	---	4.0-10	4.5-6.0	0
	52-62	---	4.0-10	4.5-6.0	0

Table 15.—Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100g	meq/100g	pH	Pct
PbC2:					
Bethlehem	0-7	---	2.0-10	4.5-5.5	0
	7-24	---	7.0-12	4.5-5.5	0
	24-33	---	4.0-8.0	4.5-5.5	0
	33-60	---	---	---	---
PbD2:					
Pacolet	0-5	4.0-10	---	4.5-6.5	0
	5-26	---	6.0-18	4.5-6.0	0
	26-37	---	5.0-12	4.5-6.0	0
	37-52	---	4.0-10	4.5-6.0	0
	52-62	---	4.0-10	4.5-6.0	0
Bethlehem	0-7	---	2.0-10	4.5-5.5	0
	7-24	---	7.0-12	4.5-5.5	0
	24-33	---	4.0-8.0	4.5-5.5	0
	33-60	---	---	---	---
PsB2:					
Pacolet	0-5	4.0-10	---	4.5-6.5	0
	5-26	---	6.0-18	4.5-6.0	0
	26-37	---	5.0-12	4.5-6.0	0
	37-52	---	4.0-10	4.5-6.0	0
	52-62	---	4.0-10	4.5-6.0	0
Saw	0-7	3.0-7.0	---	4.5-7.3	0
	7-19	---	6.0-18	4.5-6.0	0
	19-25	---	6.0-18	4.5-6.0	0
	25-28	---	2.0-6.0	4.5-6.0	0
	28-60	---	---	---	---
PsC2:					
Pacolet	0-5	4.0-10	---	4.5-6.5	0
	5-26	---	6.0-18	4.5-6.0	0
	26-37	---	5.0-12	4.5-6.0	0
	37-52	---	4.0-10	4.5-6.0	0
	52-62	---	4.0-10	4.5-6.0	0
Saw	0-7	3.0-7.0	---	4.5-7.3	0
	7-19	---	6.0-18	4.5-6.0	0
	19-25	---	6.0-18	4.5-6.0	0
	25-28	---	2.0-6.0	4.5-6.0	0
	28-60	---	---	---	---
PsD2:					
Pacolet	0-5	4.0-10	---	4.5-6.5	0
	5-26	---	6.0-18	4.5-6.0	0
	26-37	---	5.0-12	4.5-6.0	0
	37-52	---	4.0-10	4.5-6.0	0
	52-62	---	4.0-10	4.5-6.0	0
Saw	0-7	3.0-7.0	---	4.5-7.3	0
	7-19	---	6.0-18	4.5-6.0	0
	19-25	---	6.0-18	4.5-6.0	0
	25-28	---	2.0-6.0	4.5-6.0	0
	28-60	---	---	---	---
Qp.					
Pits					

Table 15.—Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100g	meq/100g	pH	Pct
RaE:					
Rion	0-5	4.0-7.0	---	4.5-6.5	0
	5-17	4.0-10	---	4.5-6.5	0
	17-25	4.0-10	---	4.5-6.5	0
	25-38	4.0-10	---	4.5-6.5	0
	38-62	2.0-8.0	---	4.5-6.5	0
RcF:					
Rion	0-5	4.0-7.0	---	4.5-6.5	0
	5-17	4.0-10	---	4.5-6.5	0
	17-25	4.0-10	---	4.5-6.5	0
	25-38	4.0-10	---	4.5-6.5	0
	38-62	2.0-8.0	---	4.5-6.5	0
Ashlar	0-5	---	---	4.5-6.0	---
	5-17	---	---	4.5-5.5	---
	17-27	---	---	4.5-5.5	---
	27-32	---	---	---	---
	32-60	---	---	---	---
Rock outcrop.					
RnE:					
Rion	0-5	4.0-7.0	---	4.5-6.5	0
	5-17	4.0-10	---	4.5-6.5	0
	17-25	4.0-10	---	4.5-6.5	0
	25-38	4.0-10	---	4.5-6.5	0
	38-62	2.0-8.0	---	4.5-6.5	0
Cliffside	0-3	---	2.0-6.0	4.5-5.5	0
	3-7	---	2.0-6.0	4.5-5.5	0
	7-11	---	2.0-8.0	4.5-5.5	0
	11-27	---	2.0-8.0	4.5-5.5	0
	27-60	---	---	---	---
RsC:					
Rock outcrop.					
Ashlar	0-5	---	---	4.5-6.0	---
	5-17	---	---	4.5-5.5	---
	17-27	---	---	4.5-5.5	---
	27-32	---	---	---	---
	32-60	---	---	---	---
RxF:					
Rock outcrop.					
Cleveland	0-3	---	2.0-8.0	4.5-6.0	0
	3-13	---	2.0-8.0	4.5-6.0	---
	13-60	---	---	---	---
SkB:					
Skyuka	0-6	10-25	---	5.1-6.5	0
	6-11	15-40	---	5.1-6.5	0
	11-21	15-40	---	5.1-6.5	0
	21-33	15-40	---	5.1-6.5	0
	33-52	15-40	---	5.1-6.5	0
	52-65	15-40	---	5.1-6.5	0

Table 15.—Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100g	meq/100g	pH	Pct
TaC:					
Tate	0-5	2.0-6.0	---	4.5-6.5	0
	5-10	2.0-6.0	---	4.5-6.5	0
	10-22	3.0-7.0	---	4.5-6.5	0
	22-51	3.0-7.0	---	4.5-6.5	0
	51-61	1.0-3.0	---	4.5-6.5	0
TbC:					
Tate	0-5	2.0-6.0	---	4.5-6.5	0
	5-10	2.0-6.0	---	4.5-6.5	0
	10-22	3.0-7.0	---	4.5-6.5	0
	22-51	3.0-7.0	---	4.5-6.5	0
	51-61	1.0-3.0	---	4.5-6.5	0
Greenlee	0-5	---	3.0-10	3.5-6.0	0
	5-21	---	1.0-6.0	3.5-6.0	0
	21-61	---	1.0-6.0	3.5-6.0	0
TbD:					
Tate	0-5	2.0-6.0	---	4.5-6.5	0
	5-10	2.0-6.0	---	4.5-6.5	0
	10-22	3.0-7.0	---	4.5-6.5	0
	22-51	3.0-7.0	---	4.5-6.5	0
	51-61	1.0-3.0	---	4.5-6.5	0
Greenlee	0-5	---	3.0-10	3.5-6.0	0
	5-21	---	1.0-6.0	3.5-6.0	0
	21-61	---	1.0-6.0	3.5-6.0	0
ToA:					
Toccoa	0-12	2.0-5.0	---	5.1-6.5	6-10
	12-22	1.0-4.0	---	5.1-6.5	4-6
	22-35	1.0-4.0	---	5.1-6.5	4-6
	35-50	1.0-4.0	---	5.1-6.5	4-6
	50-62	---	---	---	---
TtD:					
Toecane	0-4	---	6.0-17	3.5-6.0	0
	4-8	---	6.0-17	3.5-6.0	0
	8-17	---	1.0-7.0	3.5-6.0	0
	17-31	---	1.0-5.0	3.5-6.0	0
	31-38	---	1.0-5.0	3.5-6.0	0
	38-62	---	1.0-5.0	3.5-6.0	0
Tusquitee	0-6	4.0-12	---	4.5-6.5	0
	6-9	4.0-12	---	4.5-6.5	0
	9-22	---	2.0-5.0	4.5-6.0	0
	22-31	---	2.0-5.0	4.5-6.0	0
	31-42	---	2.0-5.0	4.5-6.0	0
	42-71	---	2.0-5.0	4.5-6.0	0
	71-86	---	1.0-5.0	4.5-6.0	0
UdC, UoA. Udorthents					
UpA. Udorthents-Pits					
Ur. Urban land					

Table 15.—Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100g	meq/100g	pH	Pct
WeA:					
Wehadkee-------------	0-6	5.0-20	---	4.5-6.5	0
	6-20	5.0-25	---	4.5-6.5	0
	20-48	---	---	---	---
	48-62	---	---	---	---

Table 16.—Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated. The symbol < means less than; > means greater than)

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
ApB:						
Appling	B					
		All months	---	---	---	---
ApC:						
Appling	B					
		All months	---	---	---	---
ArD:						
Ashe	B					
		All months	---	---	---	---
Cleveland	C					
		All months	---	---	---	---
Rock outcrop.						
ArF:						
Ashe	B					
		All months	---	---	---	---
Cleveland	C					
		All months	---	---	---	---
Rock outcrop.						
BoA:						
Bandana	B					
		January	1.0-2.0	>5.0	Brief	Occasional
		February	1.0-2.0	>5.0	Brief	Occasional
		March	1.0-2.0	>5.0	Brief	Occasional
		April	1.0-2.0	>5.0	Brief	Occasional
		May	1.0-2.0	>5.0	Very brief	Rare
		June	2.0-3.0	>5.0	Very brief	Rare
		July	3.0-4.0	>5.0	Very brief	Rare
		August	3.3-4.5	>5.0	Very brief	Rare
		September	3.3-4.5	>5.0	Very brief	Rare
		October	2.0-3.0	>5.0	Brief	Occasional
		November	1.0-2.0	>5.0	Brief	Occasional
		December	1.0-2.0	>5.0	Brief	Occasional
Ostin	A					
		January	2.0-3.5	>5.0	Brief	Occasional
		February	2.0-3.5	>5.0	Brief	Occasional
		March	2.0-3.5	>5.0	Brief	Occasional
		April	2.0-3.5	>5.0	Brief	Occasional
		May	2.5-3.5	>5.0	Very brief	Rare
		June	3.0-4.0	>5.0	Very brief	Rare
		July	3.5-4.0	>5.0	Very brief	Rare
		August	4.0-4.2	>5.0	Very brief	Rare
		September	4.0-4.2	>5.0	Very brief	Rare
		October	2.5-3.5	>5.0	Brief	Occasional
		November	2.0-3.5	>5.0	Brief	Occasional
		December	2.0-3.5	>5.0	Brief	Occasional

Table 16.—Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
BuB:						
Buncombe-----------	A					
		January	---	---	Very brief	Occasional
		February	---	---	Very brief	Occasional
		March	---	---	Very brief	Occasional
		April	---	---	Very brief	Occasional
		May	---	---	Very brief	Occasional
		June	---	---	Very brief	Occasional
		July	---	---	Very brief	Rare
		August	---	---	Very brief	Rare
		September	---	---	Very brief	Rare
		October	---	---	Very brief	Rare
		November	---	---	Very brief	Occasional
		December	---	---	Very brief	Occasional
CaB2:						
Cecil---------------	B					
		All months	---	---	---	---
CeB2:						
Cecil---------------	B					
		All months	---	---	---	---
Urban land.						
ChA:						
Chewacla------------	C					
		January	0.5-1.5	>5.0	Brief	Occasional
		February	0.5-1.5	>5.0	Brief	Occasional
		March	0.5-1.5	>5.0	Brief	Occasional
		April	0.5-1.5	>5.0	Brief	Occasional
		May	1.0-2.0	>5.0	Very brief	Rare
		June	1.5-2.0	>5.0	Very brief	Rare
		July	3.0-4.0	>5.0	Very brief	Rare
		August	3.3-4.5	>5.0	Very brief	Rare
		September	3.3-4.5	>5.0	Very brief	Rare
		October	1.5-2.0	>5.0	Very brief	Rare
		November	0.5-1.5	>5.0	Brief	Occasional
		December	0.5-1.5	>5.0	Brief	Occasional
CoD:						
Cliffield-----------	B					
		All months	---	---	---	---
Cowee---------------	B					
		All months	---	---	---	---
CpD:						
Cliffield-----------	B					
		All months	---	---	---	---
Pigeonroost---------	B					
		All months	---	---	---	---
CpE:						
Cliffield-----------	B					
		All months	---	---	---	---
Pigeonroost---------	B					
		All months	---	---	---	---

Table 16.—Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
CrF:						
Cliffield	B					
		All months	---	---	---	---
Rock outcrop.						
DoB:						
Dogue	C					
		January	1.5-3.0	>5.0	Brief	Rare
		February	1.5-3.0	>5.0	Brief	Rare
		March	1.5-3.0	>5.0	Brief	Rare
		April	2.0-3.0	>5.0	Brief	Rare
		May	2.5-3.0	>5.0	Very brief	Very rare
		June	4.0-6.0	>5.0	Very brief	Very rare
		July	---	---	Very brief	Very rare
		August	---	---	Very brief	Very rare
		September	---	---	Very brief	Very rare
		October	4.0-6.0	>5.0	Very brief	Very rare
		November	2.0-3.0	>5.0	Brief	Rare
		December	1.5-3.0	>5.0	Brief	Rare
EcD:						
Edneyville	B					
		All months	---	---	---	---
Chestnut	B					
		All months	---	---	---	---
EcE:						
Edneyville	B					
		All months	---	---	---	---
Chestnut	B					
		All months	---	---	---	---
EvD:						
Evard	B					
		All months	---	---	---	---
Cowee	B					
		All months	---	---	---	---
EvE:						
Evard	B					
		All months	---	---	---	---
Cowee	B					
		All months	---	---	---	---
EwD:						
Evard	B					
		All months	---	---	---	---
Cowee	B					
EwE:						
Evard	B					
		All months	---	---	---	---
Cowee	B					
		All months	---	---	---	---

Table 16.—Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table Upper limit	Water table Lower limit	Flooding Duration	Flooding Frequency
EwF:						
Evard	B					
		All months	---	---	---	---
Cowee	B					
		All months	---	---	---	---
FaD:						
Fannin	B					
		All months	---	---	---	---
FaE:						
Fannin	B					
		All months	---	---	---	---
FbF:						
Fannin	B					
		All months	---	---	---	---
Chestnut	B					
		All months	---	---	---	---
FvA:						
Fluvaquents	D					
		January	1.0-2.0	>5.0	Long	Frequent
		February	0.5-2.5	>5.0	Long	Frequent
		March	0.5-2.5	>5.0	Long	Frequent
		April	2.0-3.0	>5.0	Long	Frequent
		May	2.0-3.0	>5.0	Long	Frequent
		June	2.0-3.0	>5.0	Long	Frequent
		July	2.0-3.0	>5.0	Long	Frequent
		August	2.0-3.0	>5.0	Long	Frequent
		September	2.0-3.0	>5.0	Long	Frequent
		October	2.0-3.0	>5.0	Long	Frequent
		November	2.0-3.0	>5.0	Long	Frequent
		December	1.0-2.0	>5.0	Long	Frequent
Udifluvents	D					
		January	2.0-4.0	>5.0	Long	Occasional
		February	2.0-4.0	>5.0	Long	Occasional
		March	2.0-4.0	>5.0	Long	Occasional
		April	3.0-5.0	>5.0	Long	Occasional
		May	3.0-5.0	>5.0	Long	Occasional
		June	3.0-5.0	>5.0	Long	Occasional
		July	3.0-5.0	>5.0	Long	Occasional
		August	3.0-5.0	>5.0	Long	Occasional
		September	3.0-5.0	>5.0	Long	Occasional
		October	3.0-5.0	>5.0	Long	Occasional
		November	3.0-5.0	>5.0	Long	Occasional
		December	2.0-4.0	>5.0	Long	Occasional
GaC:						
Greenlee	B					
		All months	---	---	---	---
Tate	B					
		All months	---	---	---	---
GaD:						
Greenlee	B					
		All months	---	---	---	---
Tate	B					
		All months	---	---	---	---

Table 16.—Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
GbF:						
Greenlee	B					
		All months	---	---	---	---
Tate	B					
		All months	---	---	---	---
GrE:						
Grover	B					
		All months	---	---	---	---
HaC2:						
Hayesville	B					
		All months	---	---	---	---
HaD2:						
Hayesville	B					
		All months	---	---	---	---
HeB:						
Helena	C					
		January	1.5-2.5	2.5-3.5	---	---
		February	1.5-2.5	2.5-3.5	---	---
		March	1.5-2.5	2.5-3.5	---	---
		April	1.5-2.5	2.5-3.5	---	---
		May	2.5-3.5	2.5-3.5	---	---
		June	4.0-6.0	>5.0	---	---
		October	2.5-3.5	2.5-3.5	---	---
		November	1.5-2.5	2.5-3.5	---	---
		December	1.5-2.5	2.5-3.5	---	---
Worsham	D					
		January	0.0-1.0	>5.0	---	---
		February	0.0-1.0	>5.0	---	---
		March	0.0-1.0	>5.0	---	---
		April	0.0-1.0	>5.0	---	---
		May	0.5-1.0	>5.0	---	---
		June	1.0-2.0	>5.0	---	---
		July	1.0-2.0	>5.0	---	---
		August	1.0-2.0	>5.0	---	---
		September	1.0-2.0	>5.0	---	---
		October	0.5-1.0	>5.0	---	---
		November	0.0-1.0	>5.0	---	---
		December	0.0-1.0	>5.0	---	---
HsB2:						
Hiwassee	B					
		All months	---	---	---	---
HsC2:						
Hiwassee	B					
		All months	---	---	---	---

Table 16.—Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
IoA:						
Iotla---------------	B					
		January	1.5-3.5	>5.0	Brief	Occasional
		February	1.5-3.5	>5.0	Brief	Occasional
		March	1.5-3.5	>5.0	Brief	Occasional
		April	1.5-3.5	>5.0	Brief	Occasional
		May	2.5-3.5	>5.0	Brief	Occasional
		June	3.0-6.0	>5.0	Brief	Rare
		July	4.0-6.0	>5.0	Brief	Rare
		August	4.0-6.0	>5.0	Brief	Rare
		September	4.0-6.0	>5.0	Brief	Rare
		October	3.0-6.0	>5.0	Brief	Rare
		November	1.5-3.5	>5.0	Brief	Occasional
		December	1.5-3.5	>5.0	Brief	Occasional
MaC2:						
Madison-------------	B					
		All months	---	---	---	---
MaD2:						
Madison-------------	B					
		All months	---	---	---	---
PaC2:						
Pacolet-------------	B					
		All months	---	---	---	---
PaD2:						
Pacolet-------------	B					
		All months	---	---	---	---
PbB2:						
Pacolet-------------	B					
		All months	---	---	---	---
Bethlehem-----------	B					
		All months	---	---	---	---
PbC2:						
Pacolet-------------	B					
		All months	---	---	---	---
Bethlehem-----------	B					
		All months	---	---	---	---
PbD2:						
Pacolet-------------	B					
		All months	---	---	---	---
Bethlehem-----------	B					
		All months	---	---	---	---
PsB2:						
Pacolet-------------	B					
		All months	---	---	---	---
Saw-----------------	B					
		All months	---	---	---	---

Table 16.—Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
PsC2:						
Pacolet	B					
		All months	---	---	---	---
Saw	B					
		All months	---	---	---	---
PsD2:						
Pacolet	B					
		All months	---	---	---	---
Saw	B					
		All months	---	---	---	---
Qp. Pits						
RaE:						
Rion	B					
		All months	---	---	---	---
RcF:						
Rion	B					
		All months	---	---	---	---
Ashlar	B					
		All months	---	---	---	---
Rock outcrop.						
RnE:						
Rion	B					
		All months	---	---	---	---
Cliffside	B					
		All months	---	---	---	---
RsC:						
Rock outcrop.						
Ashlar	B					
		All months	---	---	---	---
RxF:						
Rock outcrop.						
Cleveland	C					
		All months	---	---	---	---
SkB:						
Skyuka	B					
		All months	---	---	---	---
TaC:						
Tate	B					
		All months	---	---	---	---
TbC:						
Tate	B					
		All months	---	---	---	---
Greenlee	B					
		All months	---	---	---	---

Table 16.—Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
TbD:						
Tate----------------	B					
		All months	---	---	---	---
Greenlee------------	B					
		All months	---	---	---	---
ToA:						
Toccoa--------------	B					
		January	2.5-5.0	---	Brief	Occasional
		February	2.5-5.0	---	Brief	Occasional
		March	2.5-5.0	---	Brief	Occasional
		April	2.5-5.0	---	Brief	Occasional
		May	---	---	Brief	Occasional
		June	---	---	Brief	Rare
		July	---	---	Brief	Rare
		August	---	---	Brief	Rare
		September	---	---	Brief	Rare
		October	---	---	Brief	Occasional
		November	2.5-5.0	---	Brief	Occasional
		December	2.5-5.0	---	Brief	Occasional
TtD:						
Toecane-------------	B					
		All months	---	---	---	---
Tusquitee-----------	B					
		All months	---	---	---	---
UdC, UoA. Udorthents						
UpA. Udorthents-Pits						
Ur. Urban land.						
WeA:						
Wehadkee------------	D					
		January	0.0-1.0	>5.0	Long	Frequent
		February	0.0-1.0	>5.0	Long	Frequent
		March	0.0-1.0	>5.0	Long	Frequent
		April	0.0-1.0	>5.0	Long	Frequent
		May	0.0-1.0	>5.0	Long	Frequent
		June	1.0-2.0	>5.0	Long	Frequent
		July	1.0-2.0	>5.0	Brief	Occasional
		August	1.0-2.0	>5.0	Brief	Occasional
		September	1.0-2.0	>5.0	Brief	Occasional
		October	0.5-1.0	>5.0	Brief	Occasional
		November	0.0-1.0	>5.0	Long	Frequent
		December	0.0-1.0	>5.0	Long	Frequent

Table 17.—Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Subsidence: Initial	Subsidence: Total	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In	In			
ApB:							
Appling	---	---	0	---	None	Moderate	Moderate
ApC:							
Appling	---	---	0	---	None	Moderate	Moderate
ArD:							
Ashe	Bedrock (lithic)	20-40	0	---	Moderate	Low	High
Cleveland	Bedrock (lithic)	10-20	0	---	Moderate	Low	High
Rock outcrop.							
ArF:							
Ashe	Bedrock (lithic)	20-40	0	---	Moderate	Low	High
Cleveland	Bedrock (lithic)	10-20	0	---	Moderate	Low	High
Rock outcrop.							
BoA:							
Bandana	---	---	0	---	Low	High	Moderate
Ostin	---	---	0	---	Low	Low	Moderate
BuB:							
Buncombe	---	---	0	---	None	Low	Moderate
CaB2:							
Cecil	---	---	0	---	None	High	High
CeB2:							
Cecil	---	---	0	---	None	High	High
Urban land.							
ChA:							
Chewacla	---	---	0	---	None	High	Moderate
CoD:							
Cliffield	Bedrock (lithic)	20-40	0	---	Moderate	Moderate	High
Cowee	Bedrock (paralithic)	20-40	0	---	Moderate	Moderate	High
CpD:							
Cliffield	Bedrock (lithic)	20-40	0	---	Moderate	Moderate	High
Pigeonroost	Bedrock (paralithic)	20-40	0	---	Moderate	Moderate	High
CpE:							
Cliffield	Bedrock (lithic)	20-40	0	---	Moderate	Moderate	High
Pigeonroost	Bedrock (paralithic)	20-40	0	---	Moderate	Moderate	High

Table 17.—Soil Features--Continued

Map symbol and soil name	Restrictive layer		Subsidence		Potential frost action	Risk of corrosion	
	Kind	Depth to top	Initial	Total		Uncoated steel	Concrete
		In	In	In			
CrF:							
Cliffield----------	Bedrock (lithic)	20-40	0	---	Moderate	Moderate	High
Rock outcrop.							
DoB:							
Dogue--------------	---	---	0	---	None	High	High
EcD:							
Edneyville---------	---	---	0	---	Moderate	Low	High
Chestnut-----------	Bedrock (paralithic)	20-40	0	---	Moderate	Low	High
EcE:							
Edneyville---------	---	---	0	---	Moderate	Low	High
Chestnut-----------	Bedrock (paralithic)	20-40	0	---	Moderate	Low	High
EvD:							
Evard--------------	---	---	0	---	Moderate	Moderate	High
Cowee--------------	Bedrock (paralithic)	20-40	0	---	Moderate	Moderate	High
EvE:							
Evard--------------	---	---	0	---	Moderate	Moderate	High
Cowee--------------	Bedrock (paralithic)	20-40	0	---	Moderate	Moderate	High
EwD:							
Evard--------------	---	---	0	---	Moderate	Moderate	High
Cowee--------------	Bedrock (paralithic)	20-40	0	---	Moderate	Moderate	High
EwE:							
Evard--------------	---	---	0	---	Moderate	Moderate	High
Cowee--------------	Bedrock (paralithic)	20-40	0	---	Moderate	Moderate	High
EwF:							
Evard--------------	---	---	0	---	Moderate	Moderate	High
Cowee--------------	Bedrock (paralithic)	20-40	0	---	Moderate	Moderate	High
FaD:							
Fannin-------------	---	---	0	---	Moderate	Moderate	Moderate
FaE:							
Fannin-------------	---	---	0	---	Moderate	Moderate	Moderate

Table 17.—Soil Features--Continued

Map symbol and soil name	Restrictive layer		Subsidence		Potential frost action	Risk of corrosion	
	Kind	Depth to top	Initial	Total		Uncoated steel	Concrete
		In	In	In			
FbF:							
Fannin	---	---	0	---	Moderate	Moderate	Moderate
Chestnut	Bedrock (paralithic)	20-40	0	---	Moderate	Low	High
FvA:							
Fluvaquents	---	---	0	---	None	High	Moderate
Udifluvents	---	---	0	---	None	High	Moderate
GaC:							
Greenlee	---	---	0	---	Low	Low	High
Tate	---	---	0	---	Moderate	Moderate	Moderate
GaD:							
Greenlee	---	---	0	---	Low	Low	High
Tate	---	---	0	---	Moderate	Moderate	Moderate
GbF:							
Greenlee	---	---	0	---	Low	Low	High
Tate	---	---	0	---	Moderate	Moderate	Moderate
GrE:							
Grover	---	---	0	---	None	Moderate	Moderate
HaC2:							
Hayesville	---	---	0	---	Moderate	Moderate	Moderate
HaD2:							
Hayesville	---	---	0	---	Moderate	Moderate	Moderate
HeB:							
Helena	---	---	0	---	None	High	High
Worsham	---	---	0	---	None	High	Moderate
HsB2:							
Hiwassee	---	---	0	---	None	Moderate	Moderate
HsC2:							
Hiwassee	---	---	0	---	None	Moderate	Moderate
IoA:							
Iotla	---	---	0	---	Moderate	Low	Moderate
MaC2:							
Madison	---	---	0	---	None	High	Moderate
MaD2:							
Madison	---	---	0	---	None	High	Moderate
PaC2:							
Pacolet	---	---	0	---	None	High	High
PaD2:							
Pacolet	---	---	0	---	None	High	High

Table 17.—Soil Features--Continued

Map symbol and soil name	Restrictive layer		Subsidence		Potential frost action	Risk of corrosion	
	Kind	Depth to top	Initial	Total		Uncoated steel	Concrete
		In	In	In			
PbB2:							
Pacolet-----------	---	---	0	---	None	High	High
Bethlehem---------	Bedrock (paralithic)	20-40	0	---	None	Moderate	High
PbC2:							
Pacolet-----------	---	---	0	---	None	High	High
Bethlehem---------	Bedrock (paralithic)	20-40	0	---	None	Moderate	High
PbD2:							
Pacolet-----------	---	---	0	---	None	High	High
Bethlehem---------	Bedrock (paralithic)	20-40	0	---	None	Moderate	High
PsB2:							
Pacolet-----------	---	---	0	---	None	High	High
Saw---------------	Bedrock (lithic)	20-40	0	---	None	Moderate	Moderate
PsC2:							
Pacolet-----------	---	---	0	---	None	High	High
Saw---------------	Bedrock (lithic)	20-40	0	---	None	Moderate	Moderate
PsD2:							
Pacolet-----------	---	---	0	---	None	High	High
Saw---------------	Bedrock (lithic)	20-40	0	---	None	Moderate	Moderate
Qp. Pits							
RaE:							
Rion--------------	---	---	0	---	None	Moderate	High
RcF:							
Rion--------------	---	---	0	---	None	Moderate	High
Ashlar------------	Bedrock (lithic)	20-40	0	---	None	Low	High
Rock outcrop.							
RnE:							
Rion--------------	---	---	0	---	None	Moderate	High
Cliffside---------	Bedrock (lithic)	20-40	0	---	None	Moderate	High
RsC:							
Rock outcrop.							
Ashlar------------	Bedrock (lithic)	20-40	0	---	None	Low	High
RxF:							
Rock outcrop.							
Cleveland---------	Bedrock (lithic)	10-20	0	---	Moderate	Low	High

Table 17.—Soil Features--Continued

Map symbol and soil name	Restrictive layer		Subsidence		Potential frost action	Risk of corrosion	
	Kind	Depth to top	Initial	Total		Uncoated steel	Concrete
		In	In	In			
SkB:							
Skyuka	---	---	0	---	None	High	Moderate
TaC:							
Tate	---	---	0	---	Moderate	Moderate	Moderate
TbC:							
Tate	---	---	0	---	Moderate	Moderate	Moderate
Greenlee	---	---	0	---	Low	Low	High
TbD:							
Tate	---	---	0	---	Moderate	Moderate	Moderate
Greenlee	---	---	0	---	Low	Low	High
ToA:							
Toccoa	---	---	0	---	None	Low	Moderate
TtD:							
Toecane	---	61-99	0	---	Low	High	High
Tusquitee	---	---	0	---	Moderate	Moderate	Moderate
UdC, UoA. Udorthents							
UpA. Udorthents-Pits							
Ur. Urban land							
WeA:							
Wehadkee	---	---	0	---	None	High	Moderate

Table 18.—Classification of the Soils

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Appling	Fine, kaolinitic, thermic Typic Kanhapludults
Ashe	Coarse-loamy, mixed, semiactive, mesic Typic Dystrochrepts
Ashlar	Coarse-loamy, mixed, semiactive, thermic Typic Dystrochrepts
Bandana	Coarse-loamy, mixed, active, nonacid, mesic Aeric Fluvaquents
Bethlehem	Fine, kaolinitic, thermic Typic Kanhapludults
Buncombe	Mixed, thermic Typic Udipsamments
Cecil	Fine, kaolinitic, thermic Typic Kanhapludults
Chestnut	Coarse-loamy, mixed, active, mesic Typic Dystrochrepts
Chewacla	Fine-loamy, mixed, semiactive, thermic Fluvaquentic Dystrochrepts
Cleveland	Loamy, mixed, subactive, mesic Lithic Dystrochrepts
Cliffield	Loamy-skeletal, mixed, subactive, mesic Typic Hapludults
Cliffside	Loamy-skeletal, mixed, semiactive, thermic Typic Hapludults
Cowee	Fine-loamy, parasesquic, mesic Typic Hapludults
Dogue	Fine, mixed, semiactive, thermic Aquic Hapludults
Edneyville	Coarse-loamy, mixed, active, mesic Typic Dystrochrepts
Evard	Fine-loamy, oxidic, mesic Typic Hapludults
Fannin	Fine-loamy, micaceous, mesic Typic Hapludults
Fluvaquents	Fluvaquents
Greenlee	Loamy-skeletal, mixed, semiactive, mesic Typic Dystrochrepts
Grover	Fine-loamy, micaceous, thermic Typic Hapludults
Hayesville	Fine, kaolinitic, mesic Typic Kanhapludults
Helena	Fine, mixed, semiactive, thermic Aquic Hapludults
*Hiwassee	Fine, kaolinitic, thermic Rhodic Kanhapludults
Iotla	Coarse-loamy, mixed, active, nonacid, mesic Aquic Udifluvents
Madison	Fine, kaolinitic, thermic Typic Kanhapludults
Ostin	Sandy-skeletal, mixed, semiactive, mesic Typic Udifluvents
Pacolet	Fine, kaolinitic, thermic Typic Kanhapludults
Pigeonroost	Fine-loamy, mixed, active, mesic Typic Hapludults
Rion	Fine-loamy, mixed, semiactive, thermic Typic Hapludults
Saw	Fine, kaolinitic, thermic Typic Kanhapludults
Skyuka	Fine, mixed, semiactive, thermic Ultic Hapludalfs
Tate	Fine-loamy, mixed, semiactive, mesic Typic Hapludults
Toccoa	Coarse-loamy, mixed, semiactive, nonacid, thermic Typic Udifluvents
Toecane	Loamy-skeletal, mixed, mesic Humic Hapludults
Tusquitee	Coarse-loamy, isotic, mesic Umbric Dystrochrepts
Udifluvents	Udifluvents
Udorthents	Udorthents
Wehadkee	Fine-loamy, mixed, semiactive, nonacid, thermic Typic Fluvaquents
Worsham	Fine, mixed, active, thermic Typic Endoaquults