United States Department of Agriculture

NRCS

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, Cleveland Soil and Water Conservation District, and Cleveland County Board of Commissioners

# Soil Survey of Cleveland 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.

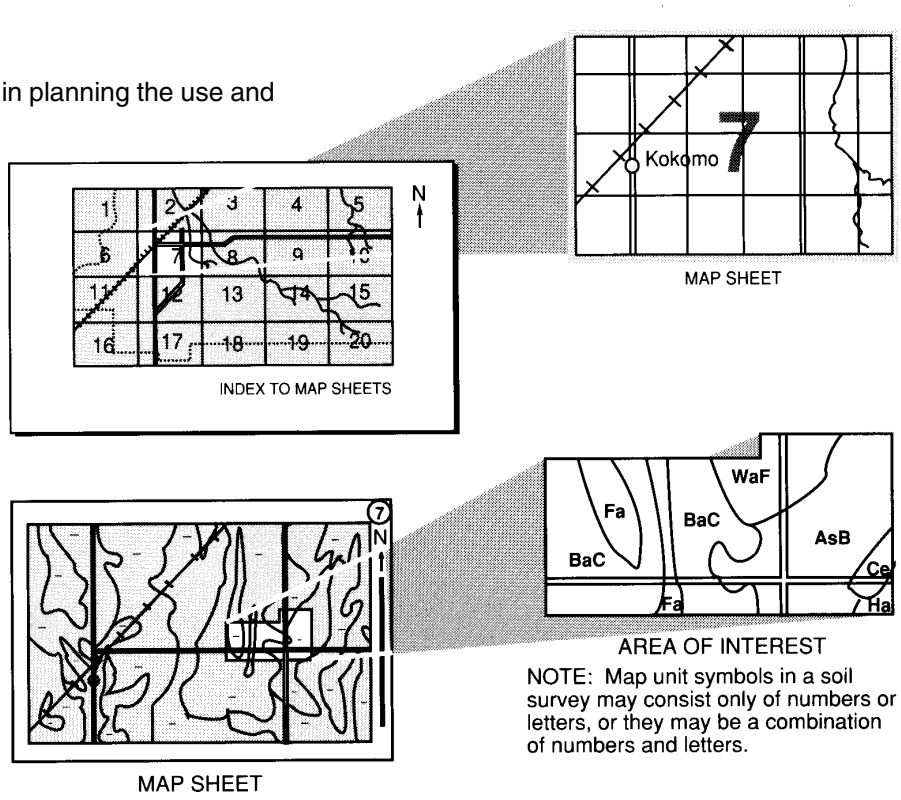
### Detailed Soil Maps

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.




NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

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 (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in May 1999. Soil names and descriptions were approved in September 1998. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1998. 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 Cleveland Soil and Water Conservation District, and the Cleveland County Board of Commissioners. The survey is part of the technical assistance furnished to the Cleveland Soil and Water Conservation District. The Cleveland 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.



**Cover: Cotton is a common crop on upland soils in Cleveland County, such as Appling and Cecil soils.**

*Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is http://www.nrcs.usda.gov.*

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# Foreword

This soil survey contains information that can be used in land-planning programs in Cleveland 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.

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State Conservationist
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# Soil Survey of
# Cleveland County, North Carolina

By Kent Clary and Tim Harlan, Natural Resources Conservation Service

Soils surveyed by Kent Clary, Tim Harlan, Milton Martinez, 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, Cleveland Soil and Water Conservation District, and Cleveland County Board of Commissioners

Cleveland County is located in the western Piedmont area of North Carolina (fig. 1). It is bounded on the south by South Carolina. The surrounding North Carolina counties are Rutherford County to the west, Burke County to the north, and Lincoln and Gaston Counties to the east. In 1990, the population of Cleveland County was 84,714. In 1997, Shelby, the county seat, had a population of 19,464.

The land area of the county is 298,440 acres, or about 466 square miles, including 2,900 acres of water in areas less than 40 acres in size. The county also includes Moss Lake, which is 1,329 acres in size. According to data compiled by the North Carolina Agricultural Statistics Division in 1993, more than 126,000 acres are used for cropland and pasture and about 131,000 acres are forested. Most of the remaining acreage is in urban uses.

This soil survey updates the survey of Cleveland County published in 1916 *(13)*. It provides additional information and has larger maps, which show the soils in greater detail.

## General Nature of the County

This section provides general information about Cleveland County. It describes the history and economic development; physiography, relief, and drainage; water resources; mineral resources; and climate.

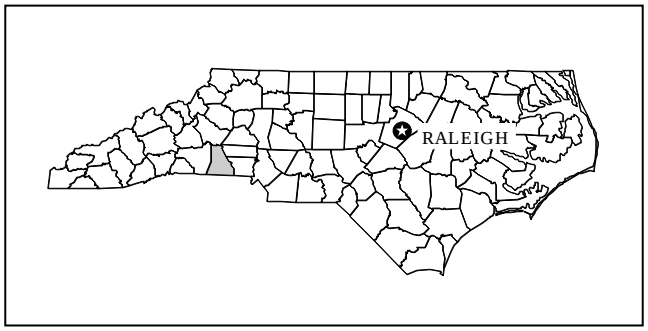


**Figure 1.—Location of Cleveland County in North Carolina.**

## History and Economic Development

Cleveland County was established on January 11, 1841, by the North Carolina Legislature. It was formed from parts of Lincoln and Rutherford Counties. The county was named after Colonel Benjamin Cleveland, a Patriot leader at the Battle of Kings Mountain during the Revolutionary War. The land used for the establishment of Shelby, the county seat, was donated mainly by James Love, a prominent area landowner of the time. The town of Shelby was chartered in 1843. It was named after Colonel Isaac Shelby, a prominent Revolutionary War hero and one of the commanders at the Battle of Kings Mountain *(12)*.

The Cherokee and Catawba Indians were the main inhabitants of the survey area before the first European settlers arrived. The first settlers were mainly Scotch-Irish and Germans who moved south from Pennsylvania *(21)*.

In the early development of the county, agriculture was the main enterprise. The main crops grown were corn, cotton, soybeans, and wheat. Cotton became the principal source of farm income when several textile mills were opened after the Civil War. As late as the 1940's, Cleveland County was the largest cotton-producing county in North Carolina. Cotton production, however, has subsequently fallen dramatically, primarily due to increasing boll weevil infestation and several years of adverse weather *(12)*.

As a reaction to this major agricultural change, industrial development expanded rapidly. Today, Cleveland County's economy is based on diverse industrial, agricultural, and retail enterprises. Products manufactured in the county include corrugated containers, ready-mix concrete, fabricated steel, crushed stone, kaolin clay products, glass, and textiles. The mining industry is also a major employer in the county *(12)*.

Mountain scenery and mild climate have encouraged tourism in Cleveland County. The Moss Lake, Broad River, and South Mountain areas are important tourist attractions. In addition to tourism, Cleveland County is in a part of the state that is increasing in residential and industrial development due to its proximity to both Charlotte, North Carolina, and Spartanburg, South Carolina.

## Physiography, Relief, and Drainage

Cleveland County is almost entirely within the Southern Piedmont physiographic region of North Carolina. The extreme northwestern corner of the county lies within the South Mountain Range, an eastern-trending spur of the Southern Appalachian Mountains.

The southern two-thirds of the county is characterized by broad, gently rolling plateaus. Northward, the county becomes more rolling and ultimately mountainous. Elevation ranges from 600 feet along Buffalo Creek at the South Carolina State line to 2,880 feet at the summit of Benn Knob near the northwestern corner of the county.

Cleveland County lies entirely within the Broad River drainage basin. The main channel of the Broad River enters the county near the southwestern corner, flows a few miles east, and then flows southward into South Carolina. The eastern and northern boundaries of the county form the divide between the Broad River basin and the Catawba River basin. The First Broad River, which drains most of the county, flows through the center of the county and joins the Broad River about 2 miles north of the South Carolina boundary *(10)*.

## Water Resources

Cleveland County has an abundant supply of water from rivers, creeks, lakes, and ground water. The Broad River, the First Broad River, and Moss Lake are the only reliable sources capable of supplying large quantities of water for domestic and industrial use. The city of Shelby draws its water supply from the First Broad River. The city of Kings Mountain draws its water supply from Moss Lake, which is situated on Buffalo Creek. Most of the domestic supplies come from drilled wells which range from about 20 to 60 feet in depth. The average yield of wells is about 24 gallons per minute *(10)*.

## Mineral Resources

The mining industry in Cleveland County is an important component of the county's economy (fig. 2). The area between Kings Mountain and Grover, on the eastern side of the geologic formation known as Cherryville Granite, is the most significant area of mining activity. Granite pegmatite, a very coarse-grained igneous rock, occurs in elongated bodies, called dikes, which cut across the Cherryville Granite formation. It formed from the minerals of fluids and gases escaping from the cooling granitic magma. Granite pegmatite is the source of several economically important minerals, including spodumene, mica, and feldspar *(5)*. In fact, Cleveland County is a national and world leader in the production of these minerals *(12)*.

Spodumene ore is the main source of lithium. Approximately half of the world's lithium supply is produced in Cleveland County. Lithium is used in nuclear reactors, special alloys, batteries, and drugs. The county also leads the Nation in the production of mica and feldspar. Mica is used in paints, electronics, plastics, and rubber products. Feldspar is used in ceramic and glass production *(12)*.

## Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Shelby, North Carolina, in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last

**Figure 2.—The mining industry has long been an important part of the economy of Cleveland County.**

freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 41.1 degrees F and the average daily minimum temperature is 29.5 degrees. The lowest temperature on record, which occurred on January 31, 1966, was -11 degrees. In summer, the average temperature is 75.5 degrees and the average daily maximum temperature is 87.0 degrees. The highest temperature, which occurred on July 30, 1952, was 107 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 (50 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 average annual total precipitation is 48.09 inches. Of this, about 28 inches, or 58 percent, usually falls in April through October. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 5.82 inches on August 11, 1928. Thunderstorms occur on about 41 days each year, and most occur between May and August.

The average seasonal snowfall is 7.3 inches. The greatest snow depth at any one time during the period of record was 14 inches, recorded on December 17, 1930. On the average, 3 days of the year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 14.0 inches, recorded on January 8, 1988.

The average relative humidity in midafternoon is about 54 percent. Humidity is higher at night, and the average at dawn is about 83 percent. The sun shines 67 percent of the time possible in summer and 57 percent in winter. The prevailing wind is from the southwest for much of the year, except during September and October, when it is from the northeast. Average windspeed is highest, around 9 miles per hour, in March and April.

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in Cleveland 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” *(15, 18)*.

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, Fort Worth, Texas; and the North Carolina State University Soils Laboratory, Raleigh, North Carolina. Commonly used laboratory procedures were followed *(16)*.

The results of the analyses of selected soils are given in table 18. In addition to the selected data published in this survey, similar data were collected on many of the soils by the soil scientists. For some of these soils, only a few horizons were analyzed.

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.

## 1. Uwharrie-Montonia-Tatum

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

### *Setting*

*Location in the survey area:* Southeastern part of the county
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 2 to 60 percent

### *Extent and Composition*

*Percent of the survey area:* 4
Uwharrie soils—40 percent
Montonia soils—18 percent
Tatum soils—20 percent
Minor inclusions (including Chewacla, Helena, and Worsham soils, Udorthents, and Urban land)—22 percent

### *Soil Characteristics*

**Uwharrie**

*Surface layer:* Yellowish brown silt loam
*Subsurface layer:* Reddish yellow silt loam
*Subsoil:* Upper part—red silty clay loam; middle part—red silty clay; lower part—red silty clay loam with very pale brown iron accumulations
*Underlying material:* Multicolored silt loam saprolite
*Depth class:* Very deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 2 to 15 percent
*Parent material:* Residuum weathered from fine-grained rocks

**Montonia**

*Surface layer:* Yellowish brown very channery silt loam
*Subsurface layer:* Strong brown channery silt loam
*Subsoil:* Yellowish red channery clay loam
*Bedrock:* Weathered sericite schist
*Depth class:* Moderately deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 2 to 60 percent
*Parent material:* Residuum weathered from fine-grained rocks

**Tatum**

*Surface layer:* Brown gravelly silt loam
*Subsoil:* Upper part—yellowish red gravelly silty clay loam; middle part—red silty clay loam; lower part—yellowish red silty clay loam with red iron accumulations
*Underlying material:* Light reddish brown and yellowish red channery silt loam saprolite
*Bedrock:* Weathered sericite schist
*Depth class:* Deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 2 to 30 percent
*Parent material:* Residuum weathered from fine-grained rocks

**Minor inclusions**

- Somewhat poorly drained Chewacla soils on flood plains
- Moderately well drained Helena soils along drainageways and at the head of drains
- Poorly drained Worsham soils along drainageways and at the head of drains
- Random areas of Udorthents in which the natural soils have been greatly altered by excavation or intensive grading or covered by earthy fill material
- Random areas of Urban land where the surface is covered by streets, parking lots, driveways, or buildings

### *Use and Management*

Major Uses: Woodland, pasture, hayland, cropland, and urban development

### *Agricultural Development*

**Cropland**

*Management concerns:* Uwharrie—erodibility and soil fertility; Montonia—erodibility, equipment use in the steeper areas, rooting depth, and soil fertility; Tatum—erodibility, equipment use in the steeper areas, and soil fertility

**Pasture and hayland**

*Management concerns:* Uwharrie and Tatum—erodibility, equipment use in the steeper areas, and soil fertility; Montonia—erodibility, equipment use in the steeper areas, rooting depth, and soil fertility

**Woodland**

*Management concerns:* Uwharrie—seedling survival; Montonia—erodibility and equipment use in the steeper areas, seedling survival, and windthrow hazard; Tatum—erodibility and equipment use in the steeper areas and seedling survival

### *Urban Development*

**Dwellings**

*Management concerns:* Uwharrie—erodibility, shrink-swell potential, and corrosivity; Montonia—erodibility and slope in the steeper areas and depth to rock; Tatum—erodibility, shrink-swell potential, corrosivity, and slope in the steeper areas

**Septic tank absorption fields**

*Management concerns:* Uwharrie and Tatum—restricted permeability and slope in the steeper areas; Montonia—depth to rock and slope in the steeper areas

**Local roads and streets**

*Management concerns:* Uwharrie and Tatum—low strength and slope in the steeper areas; Montonia—slope in the steeper areas

## 2. Hulett-Madison-Grover

*Gently sloping to steep, very deep, well drained soils that have a loamy surface layer and a clayey or loamy subsoil with a high content of mica; on uplands (fig. 3)*

### *Setting*

*Location in the survey area:* Southeastern part of the county
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 2 to 60 percent

### *Extent and Composition*

*Percent of the survey area:* 12
Hulett soils—37 percent
Madison soils—33 percent
Grover soils—16 percent
Minor soils (including Bethlehem, Chewacla, Helena, Saw, Wehadkee, Dogue, and Worsham soils)—14 percent

### *Soil Characteristics*

**Hulett**

*Surface layer:* Yellowish brown gravelly sandy loam
*Subsoil:* Upper part—strong brown clay with yellowish red and reddish yellow iron accumulations and many flakes of mica; middle part—yellowish red clay with red, reddish yellow, and yellowish brown iron accumulations; lower part—yellowish red clay loam with reddish yellow, strong brown, and red iron accumulations and many flakes of mica
*Underlying material:* Upper part—reddish yellow sandy clay loam saprolite with red and strong brown iron accumulations and many flakes of mica; lower part—reddish yellow sandy loam saprolite with red and strong brown iron accumulations
*Depth class:* Very deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 2 to 15 percent
*Parent material:* Residuum weathered from felsic igneous rock with a high content of mica

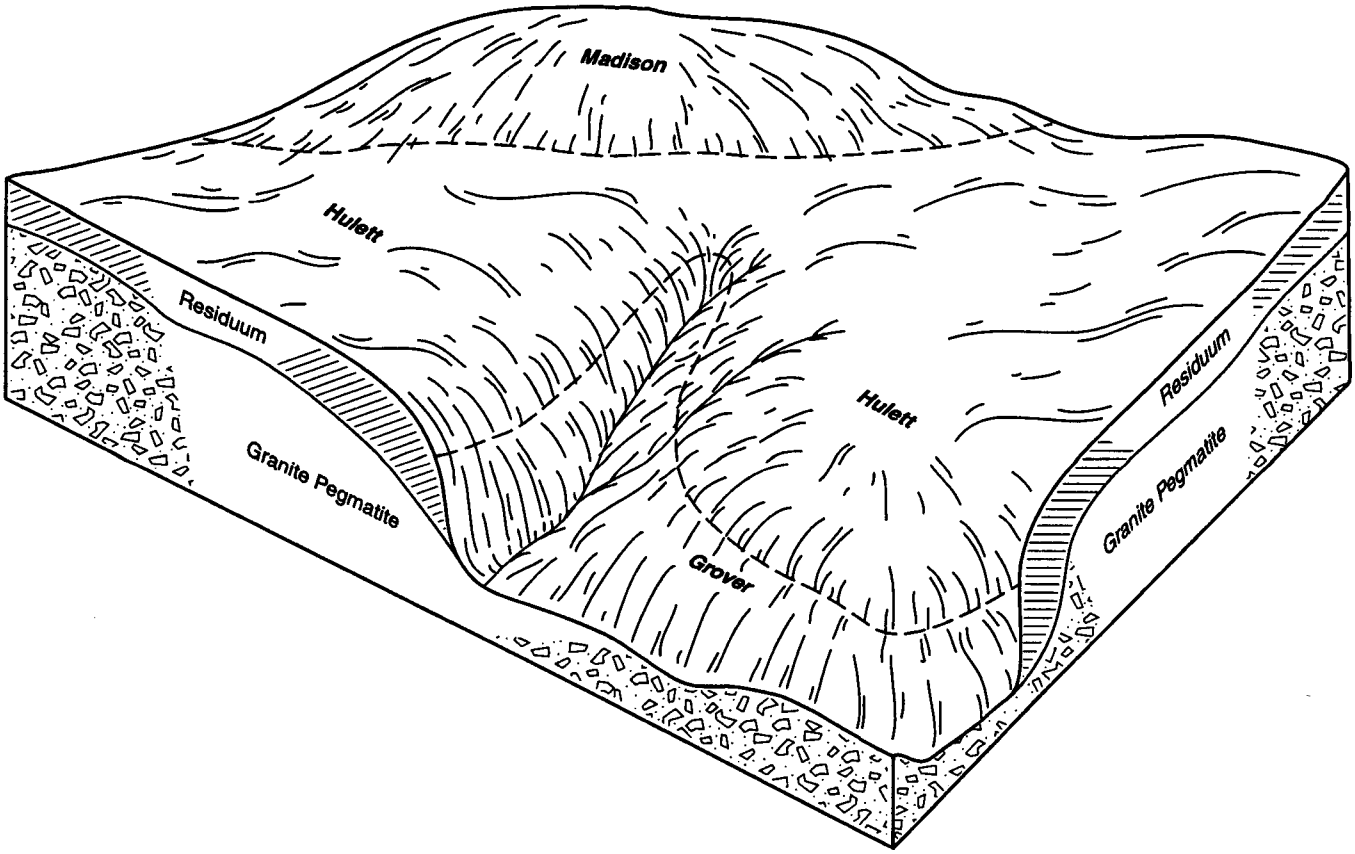


**Figure 3.—The relationship between soils, landform, and parent material in the Hulett-Madison-Grover general soil map unit. The clayey Hulett and Madison soils occur on ridgetops. The loamy Grover soils are on the adjacent side slopes.**

### Madison

*Surface layer:* Strong brown gravelly sandy clay loam
*Subsoil:* Upper part—red clay with reddish yellow iron accumulations and common flakes of mica; middle part—red clay with reddish yellow iron accumulations and many flakes of mica; lower part—red sandy clay loam with reddish yellow and reddish brown iron accumulations and many flakes of mica
*Underlying material:* Reddish yellow sandy loam with yellowish red, reddish brown, and brownish yellow iron accumulations and many flakes of mica
*Depth class:* Very deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 2 to 15 percent
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock

### Grover

*Surface layer:* Yellowish brown gravelly sandy loam with many flakes of mica
*Subsurface layer:* Brownish yellow sandy loam with many flakes of mica
*Subsoil:* Upper part—strong brown sandy clay loam with many flakes of mica; lower part—reddish yellow sandy loam with many flakes of mica
*Underlying material:* Upper part—brownish yellow sandy loam with many flakes of mica; lower part—very pale brown and brownish yellow sandy loam with many flakes of mica
*Depth class:* Very deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 15 to 60 percent
*Parent material:* Residuum weathered from felsic igneous rock with a high content of mica

### Minor soils

- Moderately deep Bethlehem soils on convex interfluves
- Somewhat poorly drained Chewacla soils on flood plains

• Moderately well drained Helena soils along drainageways and at the head of drains
• Moderately deep Saw soils near areas of rock outcrop
• Poorly drained Wehadkee soils on flood plains
• Moderately well drained Dogue soils on low stream terraces
• Poorly drained Worsham soils along drainageways and at the head of drains

### *Use and Management*

Major Uses: Woodland, pasture, hayland, and cropland

### *Agricultural Development*

**Cropland**

*Management concerns:* Hulett—erodibility and equipment use in the steeper areas and soil fertility; Madison—erodibility, equipment use, and soil fertility; Grover—equipment use

**Pasture and hayland**

*Management concerns:* Hulett—equipment use in the steeper areas and soil fertility; Madison—erodibility, equipment use in the steeper areas, and soil fertility; Grover—equipment use and soil fertility

**Woodland**

*Management concerns:* Hulett—no significant limitations; Madison—equipment use and seedling survival; Grover—erodibility and equipment use

### *Urban Development*

**Dwellings**

*Management concerns:* Hulett and Madison—erodibility, slope in the steeper areas, and corrosivity; Grover—slope

**Septic tank absorption fields**

*Management concerns:* Hulett and Madison—restricted permeability and slope in the steeper areas; Grover—slope

**Local roads and streets**

*Management concerns:* Hulett and Madison—low strength and slope in the steeper areas; Grover—slope and low strength

## 3. Madison-Bethlehem

*Gently sloping and strongly sloping, moderately deep to very deep, well drained soils that have a loamy surface layer and a clayey subsoil with a high content of mica; on uplands*

### *Setting*

*Location in the survey area:* Southeastern part of the county
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 2 to 15 percent

### *Extent and Composition*

*Percent of the survey area:* 4
Madison soils—58 percent
Bethlehem soils—27 percent
Minor soils (including Chewacla, Grover, Helena, Hulett, Toccoa, Wehadkee, and Worsham soils)—15 percent

### *Soil Characteristics*

**Madison**

*Surface layer:* Strong brown gravelly sandy clay loam with few flakes of mica
*Subsoil:* Upper part—red clay with reddish yellow iron accumulations and common flakes of mica; middle part—red clay with reddish yellow iron accumulations and many flakes of mica; lower part—red sandy clay loam with reddish yellow and reddish brown iron accumulations and many flakes of mica
*Underlying material:* Reddish yellow sandy loam with yellowish red, reddish brown, and brownish yellow iron accumulations and many flakes of mica
*Depth class:* Very deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 2 to 15 percent
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock with a high content of mica

**Bethlehem**

*Surface layer:* Brown gravelly sandy clay loam
*Subsoil:* Upper part—red clay with reddish yellow iron accumulations; lower part—red gravelly sandy clay loam with reddish yellow iron accumulations
*Bedrock:* Weathered mica schist
*Depth class:* Moderately deep

*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 2 to 15 percent
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock with a high content of mica

**Minor soils**

- Somewhat poorly drained Chewacla soils on flood plains
- Grover soils, which have less clay in the subsoil than the major soils; on moderately steep side slopes
- Moderately well drained Helena soils along drainageways and at the head of drains
- Random areas of Hulett soils, which have yellow or brown subsoils
- Well drained Toccoa soils on flood plains
- Poorly drained Wehadkee soils on flood plains
- Poorly drained Worsham soils along drainageways and at the head of drains

### *Use and Management*

Major Uses: Pasture, hayland, and cropland

### *Agricultural Development*

**Cropland**

*Management concerns:* Erodibility, equipment use, and soil fertility

**Pasture and hayland**

*Management concerns:* Erodibility, equipment use, and soil fertility

**Woodland**

*Management concerns:* Madison—equipment use and seedling survival; Bethlehem—equipment use, seedling survival, and windthrow hazard

### *Urban Development*

**Dwellings**

*Management concerns:* Madison—erodibility, corrosivity, and slope in the steeper areas; Bethlehem—erodibility, depth to rock, corrosivity, and slope in the steeper areas

**Septic tank absorption fields**

*Management concerns:* Madison—restricted permeability and slope in the steeper areas; Bethlehem—depth to rock and slope in the steeper areas

**Local roads and streets**

*Management concerns:* Low strength and slope in the steeper areas

## 4. Cecil-Pacolet

*Gently sloping and strongly sloping, very deep, well drained soils that have a loamy surface layer and a clayey subsoil; on uplands (fig. 4)*

### *Setting*

*Location in the survey area:* Areas scattered throughout the county; largest areas in northeastern, southern, and western parts
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Cecil—interfluves; Pacolet—side slopes
*Slope range:* 2 to 15 percent

### *Extent and Composition*

*Percent of the survey area:* 38
Cecil soils—48 percent
Pacolet soils—36 percent
Minor soils (including Appling, Bethlehem, Buncombe, Chewacla, Helena, Saw, Toccoa, Wehadkee, and Worsham soils)—16 percent

### *Soil Characteristics*

**Cecil**

*Surface layer:* Yellowish red sandy clay loam
*Subsoil:* Upper part—red clay with reddish yellow iron accumulations; lower part—red sandy clay loam with reddish yellow iron accumulations
*Underlying material:* Red sandy loam with reddish yellow and reddish brown iron accumulations
*Depth class:* Very deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 2 to 8 percent
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock

**Pacolet**

*Surface layer:* Yellowish red sandy clay loam
*Subsoil:* Upper part—red clay with reddish yellow iron accumulations; lower part—red sandy clay loam with reddish yellow and pink iron accumulations
*Underlying material:* Yellowish red sandy loam saprolite with reddish yellow and dark reddish brown iron accumulations

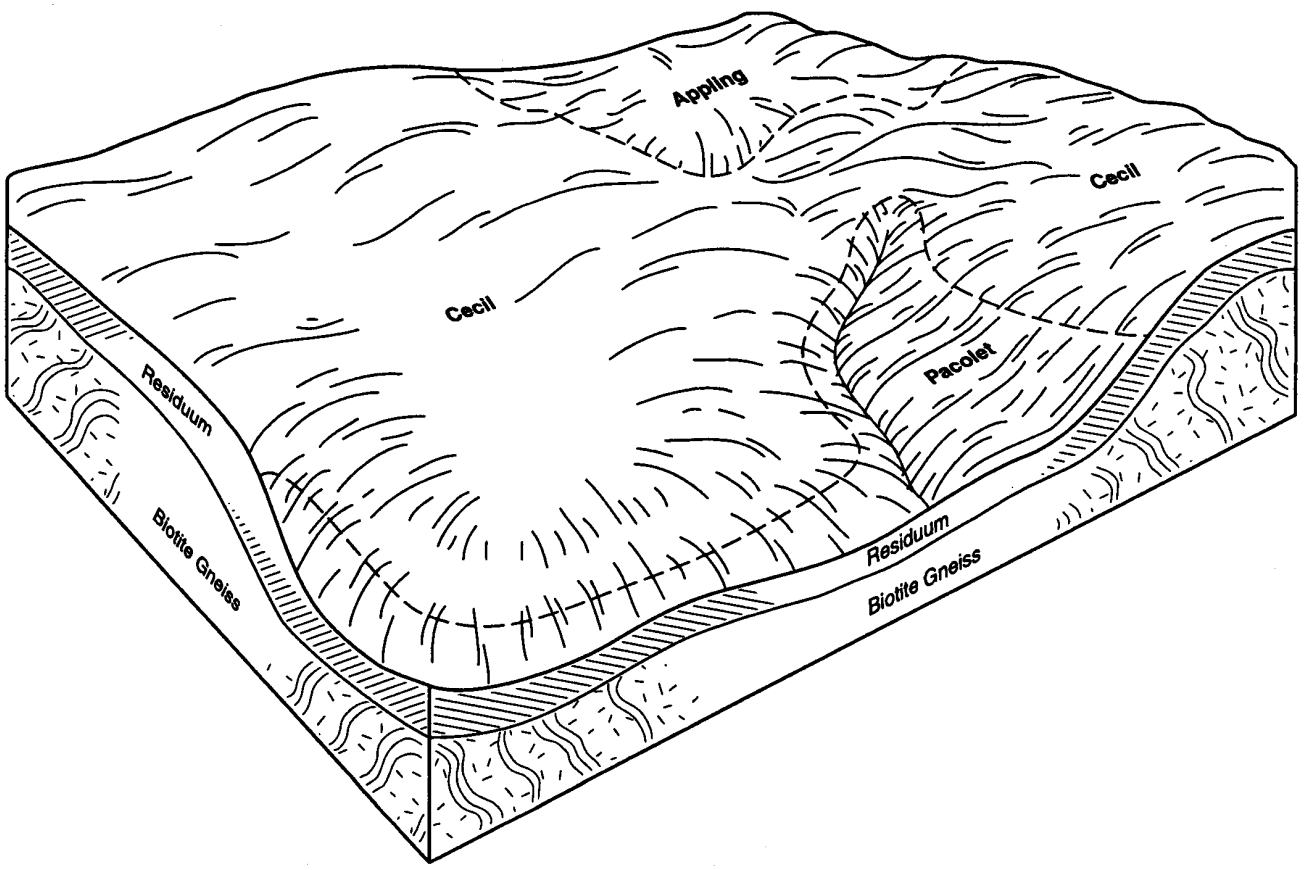


**Figure 4.—The relationship between soils and parent material in the Cecil-Pacolet general soil map unit.**

*Depth class:* Very deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 8 to 15 percent
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock

**Minor soils**

- Random areas of Appling soils, which have yellow or brown subsoils
- Random areas of moderately deep Bethlehem soils
- Excessively drained Buncombe soils on flood plains
- Somewhat poorly drained Chewacla soils on flood plains
- Moderately well drained Helena soils along drainageways and at the head of drains
- Moderately deep Saw soils on the steeper side slopes
- Well drained Toccoa soils on flood plains
- Poorly drained Wehadkee soils on flood plains
- Poorly drained Worsham soils along drainageways and at the head of drains

## *Use and Management*

Major Uses: Cropland, pasture, and hayland

## *Agricultural Development*

**Cropland**

*Management concerns:* Erodibility, tilth, and soil fertility

**Pasture and hayland**

*Management concerns:* Cecil—soil fertility; Pacolet—erodibility, equipment use, and soil fertility

**Woodland**

*Management concerns:* Equipment use and seedling survival

## *Urban Development*

**Dwellings**

*Management concerns:* Cecil—erodibility and

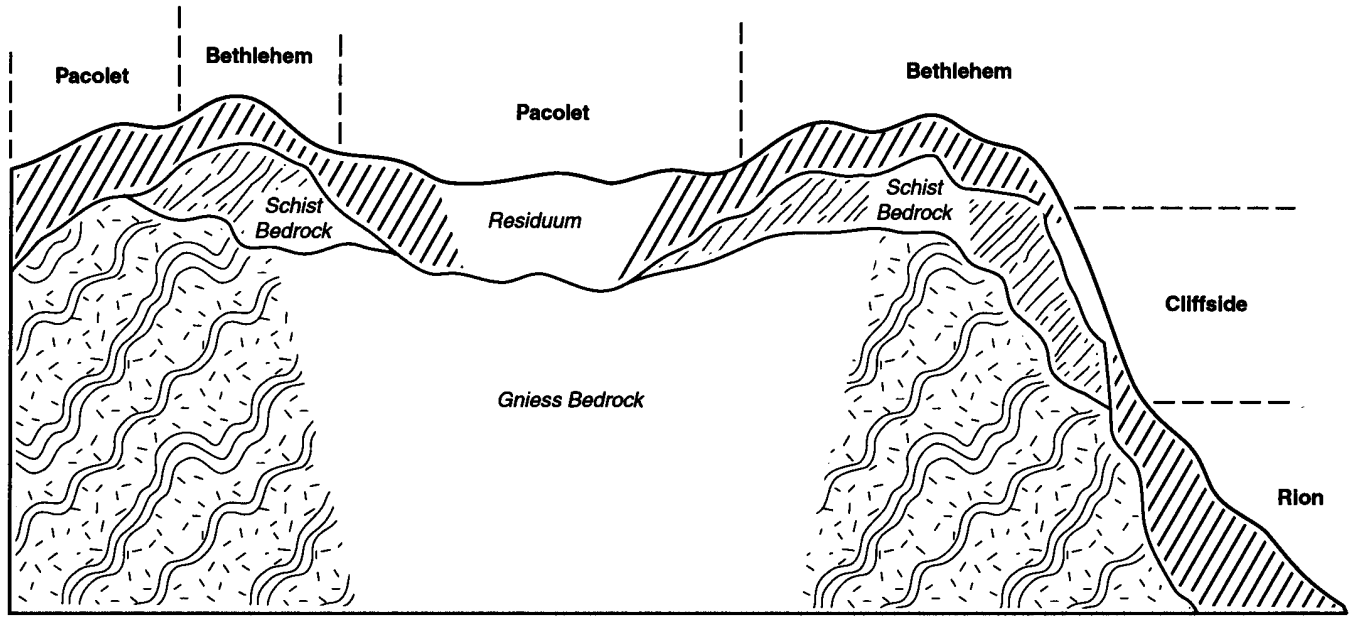


**Figure 5.—The relationship between soils, landform, and parent material in the Pacolet-Bethlehem general soil map unit. The very deep Pacolet soils are in concave landform positions. They formed in residuum derived from schist or gneiss bedrock. The moderately deep Bethlehem soils are in convex landform positions. They formed in residuum derived from schist bedrock.**

corrosivity; Pacolet—erodibility, slope, and corrosivity

### Septic tank absorption fields

*Management concerns:* Cecil—restricted permeability; Pacolet—restricted permeability and slope

### Local roads and streets

*Management concerns:* Low strength and slope in the steeper areas

## 5. Pacolet-Bethlehem

*Gently sloping to moderately steep, moderately deep to very deep, well drained soils that have a loamy surface layer and a clayey subsoil; on uplands (figs. 5 and 6)*

### *Setting*

*Location in the survey area:* Scattered areas throughout the county; largest areas in northwestern, southwestern, and southern parts
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 2 to 30 percent

### *Extent and Composition*

*Percent of the survey area:* 24
Pacolet soils—48 percent
Bethlehem soils—33 percent
Minor soils (including Buncombe, Cliffside, Chewacla, Helena, Rion, Toccoa, Wehadkee, and Worsham soils)—19 percent

### *Soil Characteristics*

#### Pacolet

*Surface layer:* Yellowish red sandy clay loam
*Subsoil:* Upper part—red clay with reddish yellow iron accumulations; lower part—red sandy clay loam with reddish yellow and pink iron accumulations
*Underlying material:* Yellowish red sandy loam saprolite with reddish yellow and dark reddish brown iron accumulations
*Depth class:* Very deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 8 to 15 percent
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock

#### Bethlehem

*Surface layer:* Brown gravelly sandy clay loam
*Subsoil:* Upper part—red clay with reddish yellow iron

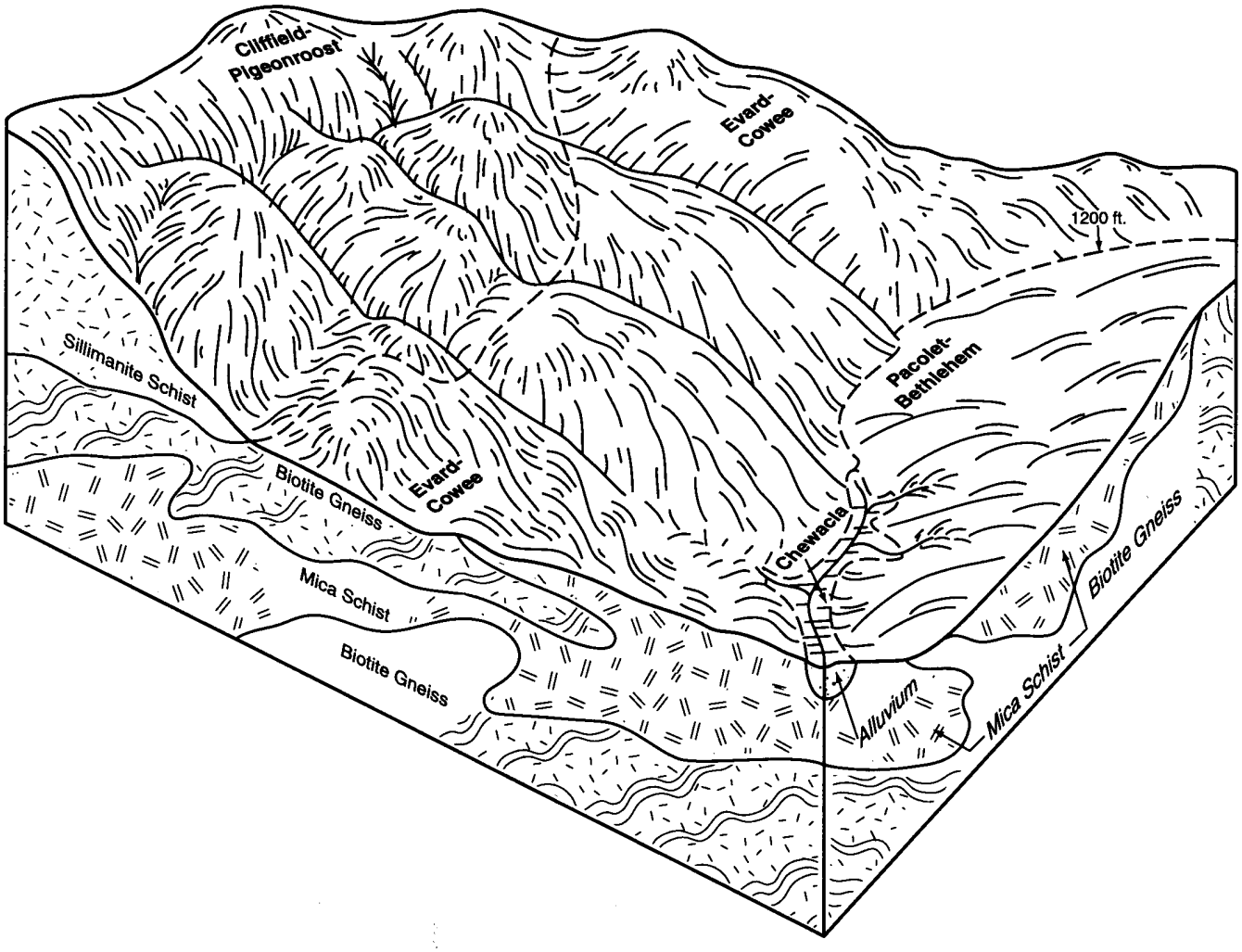


**Figure 6.—The relationship between soils and parent material in the Pacolet-Bethlehem, Evard-Cowee, and Cliffield-Pigeonroost general soil map units.**

accumulations; lower part—red gravelly sandy clay loam with reddish yellow iron accumulations

*Bedrock:* Upper part—weathered mica schist; lower part—unweathered mica schist

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Slope range:* 2 to 30 percent

*Parent material:* Residuum weathered from felsic high-grade metamorphic rock

### Minor soils

- Excessively drained Buncombe soils on flood plains
- Cliffside soils, which have more rock fragments in the subsoil than the major soils; in the steeper areas
- Somewhat poorly drained Chewacla soils on flood plains
- Moderately well drained Helena soils along drainageways and at the head of drains
- Rion soils, which have less clay in the subsoil than the major soils; in the steeper areas
- Well drained Toccoa soils on flood plains
- Poorly drained Wehadkee soils on flood plains
- Poorly drained Worsham soils along drainageways and at the head of drains

## *Use and Management*

Major Uses: Cropland, pasture, and hayland

## *Agricultural Development*

### Cropland

*Management concerns:* Pacolet—erodibility, equipment use, tilth, and soil fertility; Bethlehem—

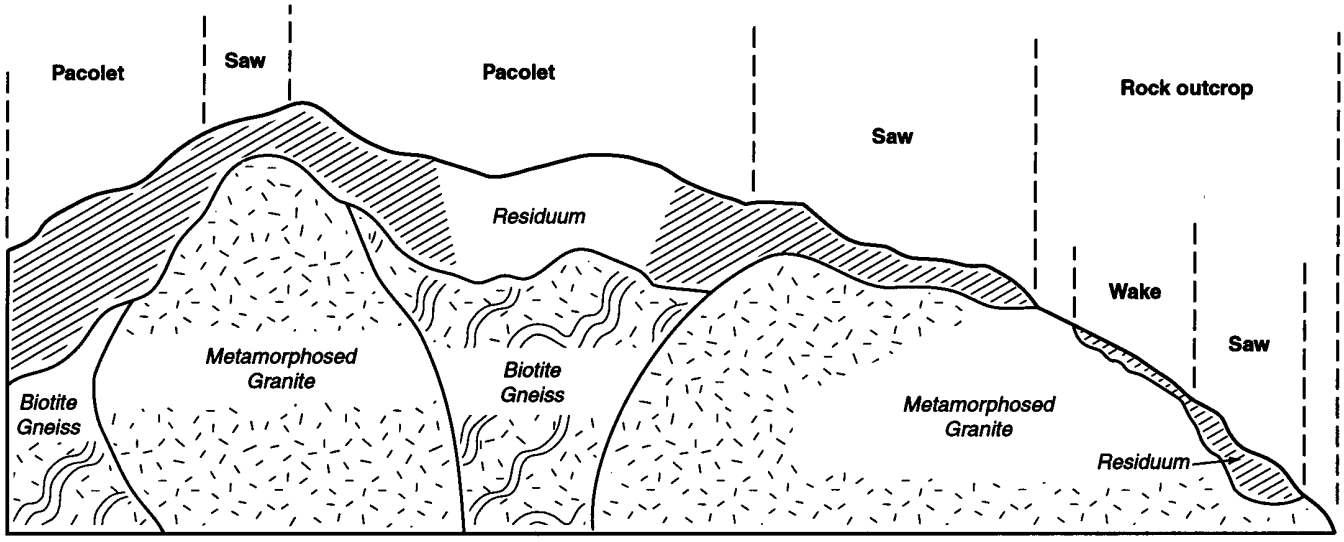


**Figure 7.—The relationship between soils and parent material in the Pacolet-Saw general soil map unit. The very deep Pacolet soils occur in areas away from stones, boulders, and rock outcrops. They formed in residuum from biotite gneiss and metamorphosed granite bedrock. The moderately deep Saw soils occur in stony or bouldery areas or near rock outcrops. They formed from residuum from metamorphosed granite bedrock.**

erodibility, equipment use, tilth, rooting depth, and soil fertility

**Pasture and hayland**

*Management concerns:* Pacolet—erodibility, soil fertility, and equipment use in the steeper areas; Bethlehem—erodibility, rooting depth, soil fertility, and equipment use in the steeper areas

**Woodland**

*Management concerns:* Pacolet—equipment use, seedling survival, and erodibility in the steeper areas; Bethlehem—equipment use, windthrow hazard, seedling survival, and erodibility in the steeper areas

### *Urban Development*

**Dwellings**

*Management concerns:* Pacolet—erodibility, corrosivity, and slope in the steeper areas; Bethlehem—erodibility, depth to rock, corrosivity, and slope in the steeper areas

**Septic tank absorption fields**

*Management concerns:* Pacolet—restricted permeability and slope in the steeper areas; Bethlehem—depth to rock, restricted permeability, and slope in the steeper areas

**Local roads and streets**

*Management concerns:* Low strength and slope in the steeper areas

## 6. Pacolet-Saw

*Gently sloping to moderately steep, moderately deep to very deep, well drained soils that have a loamy surface layer and a clayey subsoil; on uplands (fig. 7)*

### *Setting*

*Location in the survey area:* Scattered areas throughout the county; largest areas in northeastern and western parts
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 2 to 30 percent

### *Extent and Composition*

*Percent of the survey area:* 15
Pacolet soils—58 percent
Saw soils—23 percent
Minor soils (including Appling, Buncombe, Cecil, Chewacla, Helena, Toccoa, Wake, Wehadkee, and Worsham soils)—19 percent

### *Soil Characteristics*

**Pacolet**

*Surface layer:* Yellowish red sandy clay loam
*Subsoil:* Upper part—red clay with reddish yellow iron accumulations; lower part—red sandy clay loam with reddish yellow and pink iron accumulations
*Underlying material:* Yellowish red sandy loam saprolite with reddish yellow and dark reddish brown iron accumulations
*Depth class:* Very deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 8 to 15 percent
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock

**Saw**

*Surface layer:* Yellowish red gravelly sandy clay loam
*Subsoil:* Upper part—red clay; lower part—red clay loam with yellowish red iron accumulations
*Bedrock:* Unweathered granite
*Depth class:* Moderately deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 2 to 30 percent
*Parent material:* Residuum weathered from felsic igneous rock

**Minor soils**

- Random areas of Appling soils, which have yellow or brown subsoils
- Excessively drained Buncombe soils on flood plains
- Random areas of Cecil soils, which have thicker subsoils than the major soils
- Somewhat poorly drained Chewacla soils on flood plains
- Moderately well drained Helena soils along drainageways and at the head of drains
- Well drained Toccoa soils on flood plains
- Shallow Wake soils near areas of rock outcrop
- Poorly drained Wehadkee soils on flood plains
- Poorly drained Worsham soils along drainageways and at the head of drains

### *Use and Management*

Major Uses: Woodland, pasture, and hayland

### *Agricultural Development*

**Cropland**

*Management concerns:* Pacolet—erodibility, tilth, soil fertility, and equipment use in the steeper areas; Saw—erodibility, tilth, rooting depth, soil fertility, and equipment use in the steeper areas

**Pasture and hayland**

*Management concerns:* Pacolet—erodibility, soil fertility, and equipment use in the steeper areas; Saw—erodibility, rooting depth, soil fertility, and equipment use in the steeper areas

**Woodland**

*Management concerns:* Pacolet—equipment use, seedling survival, and erodibility in the steeper areas; Saw—equipment use, windthrow hazard, seedling survival, and erodibility in the steeper areas

### *Urban Development*

**Dwellings**

*Management concerns:* Pacolet—erodibility, corrosivity, and slope in the steeper areas; Saw—erodibility, depth to rock, corrosivity, and slope in the steeper areas

**Septic tank absorption fields**

*Management concerns:* Pacolet—restricted permeability and slope in the steeper areas; Saw—depth to rock and slope in the steeper areas

**Local roads and streets**

*Management concerns:* Pacolet—low strength and slope in the steeper areas; Saw—low strength, depth to rock, and slope in the steeper areas

## 7. Evard-Cowee

*Moderately steep to very steep, moderately deep to very deep, well drained mountain upland soils that have a loamy subsoil; formed in residuum from felsic high-grade metamorphic rocks (fig. 6)*

### *Setting*

*Location in the survey area:* Northwestern corner and west-central area of county
*Landscape:* Low mountains
*Landform:* Mountain slopes
*Landform position:* Convex summits and side slopes
*Slope range:* 15 to 85 percent

### *Extent and Composition*

*Percent of the survey area:* 2
Evard soils—49 percent

Cowee soils—35 percent
Minor inclusions (including Cliffield and Pigeonroost soils and Rock outcrop)—16 percent

### *Soil Characteristics*

**Evard**

*Surface layer:* Reddish brown sandy loam
*Subsoil:* Upper part—red sandy clay loam; lower part—red sandy clay loam
*Underlying material:* Red sandy loam saprolite
*Depth class:* Very deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 15 to 85 percent
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock

**Cowee**

*Surface layer:* Dark brown gravelly sandy loam
*Subsurface layer:* Strong brown gravelly sandy loam
*Subsoil:* Red sandy clay loam
*Bedrock:* Soft weathered gneiss
*Depth class:* Moderately deep
*Drainage class:* Well drained
*Depth to seasonal 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

**Minor inclusions**

- Moderately deep Cliffield soils that are loamy-skeletal and have brown subsoils
- Moderately deep Pigeonroost soils that have brown subsoils
- Areas of Rock outcrop that have little or no soil material

### *Use and Management*

Major Uses: Woodland

### *Agricultural Development*

**Cropland**

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

**Pasture and hayland**

*Management concerns:* Evard—equipment use and erodibility; Cowee—equipment use and droughtiness

**Orchard and ornamental crops**

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

**Woodland**

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

### *Urban Development*

**Dwellings**

*Management concerns:* Evard—slope; Cowee—slope and depth to rock

**Septic tank absorption fields**

*Management concerns:* Evard—slope; Cowee—depth to rock and slope

**Local roads and streets**

*Management concerns:* Evard—slope and frost action; Cowee—depth to rock, slope, and frost action

### *Recreational Development*

**Camp areas**

*Management concerns:* Evard—slope; Cowee—slope and rock fragment content

**Picnic areas**

*Management concerns:* Slope and erodibility

**Playgrounds**

*Management concerns:* Slope and erodibility

**Paths and trails**

*Management concerns:* Slope and erodibility

## 8. Cliffield-Pigeonroost

*Moderately steep to very steep, moderately deep, well drained mountain upland soils that have a loamy subsoil; formed in residuum from felsic high-grade metamorphic rocks (fig. 6)*

### *Setting*

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

### *Extent and Composition*

*Percent of the survey area:* 1
Cliffield soils—50 percent
Pigeonroost soils—35 percent
Minor inclusions (including Evard and Cowee soils and Rock outcrop)—15 percent

### *Soil Characteristics*

**Cliffield**

*Surface layer:* Dark yellowish brown very cobbly sandy loam
*Subsoil:* Upper part—strong brown very gravelly loam; lower part—strong brown very cobbly loam
*Bedrock:* Slightly fractured sillimanite-mica schist
*Depth class:* Moderately deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 15 to 95 percent
*Parent material:* Residuum weathered mostly from felsic high-grade metamorphic or igneous rock

**Pigeonroost**

*Surface layer:* Yellowish brown gravelly sandy loam
*Subsurface layer:* Brown gravelly sandy loam
*Subsoil:* Strong brown gravelly loam
*Bedrock:* Upper part—weathered sillimanite-mica schist; lower part—unweathered sillimanite schist
*Depth class:* Moderately deep
*Drainage class:* Well drained
*Depth to seasonal high water table:* More than 6.0 feet
*Slope range:* 15 to 50 percent
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock

**Minor inclusions**

- Very deep Evard soils that have redder subsoils than the major soils
- Moderately deep Cowee soils that have redder subsoils than the major soils
- Areas of Rock outcrop that have little or no soil material

### *Use and Management*

Major Uses: Woodland

### *Agricultural Development*

**Cropland**

*Management concerns:* Cliffield—equipment use, tilth, droughtiness, and frost action; Pigeonroost—equipment use, droughtiness, and erodibility

**Pasture and hayland**

*Management concerns:* Cliffield—equipment use, droughtiness, tilth, and erodibility; Pigeonroost—equipment use and droughtiness

**Woodland**

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

### *Urban Development*

**Dwellings**

*Management concerns:* Slope and depth to rock

**Septic tank absorption fields**

*Management concerns:* Depth to rock and slope

**Local roads and streets**

*Management concerns:* Depth to rock 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. Other included soils and miscellaneous areas, however, 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, moderately 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 complexes. A *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. Evard-Cowee complex, 50 to 85 percent slopes, rocky, 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:* Ridges
*Landform position:* Interfluves and side slopes
*Shape of areas:* Irregular
*Size of areas:* 10 to 250 acres

### *Composition*

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

### *Typical Profile*

*Surface layer:*
0 to 9 inches—yellowish brown sandy loam

*Subsoil:*
9 to 29 inches—yellowish brown clay that has reddish yellow iron accumulations
29 to 37 inches—yellowish brown clay that has reddish yellow and yellowish red iron accumulations
37 to 56 inches—strong brown and yellowish red sandy clay loam that has reddish brown and pink iron accumulations

*Underlying material:*
56 to 72 inches—yellowish red and reddish brown loam saprolite that has strong brown and pink iron accumulations

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Nearly level or gently sloping
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Moderate
*Soil reaction:* Very strongly acid or strongly acid throughout the profile, except in limed areas
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
- Moderately well drained Helena soils in the lower landform positions and in concave areas

*Similar:*
- Random areas of Cecil soils that have red subsoils

### *Land Use*

**Dominant Uses:** Cropland, pasture, hayland, and woodland

### *Agricultural Development*

**Cropland**

*Suitability:* Well suited
*Management concerns:* Soil fertility and erodibility
*Management measures and considerations:*
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- 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.

**Pasture and hayland**

*Suitability:* Well suited
*Management concerns:* Soil fertility and erodibility
*Management measures and considerations:*
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
- Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increases germination.
- Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

**Woodland**

*Suitability:* Well suited
*Management concerns:* Competition from undesirable plants
*Management measures and considerations:*
• Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

**Dwellings**

*Suitability:* Well suited
*Management concerns:* Corrosivity
*Management measures and considerations:*
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Suited
*Management concerns:* Restricted permeability
*Management measures and considerations:*
• Installing the distribution lines of septic systems during periods when the soil is not wet helps to prevent the smearing and sealing of trench walls.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Low strength
*Management measures and considerations:*
• Incorporating sand and gravel into the soil 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:* Ridges and side slopes
*Landform position:* Interfluves
*Shape of areas:* Irregular
*Size of areas:* 5 to 50 acres

### *Composition*

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

### *Typical Profile*

*Surface layer:*
0 to 9 inches—yellowish brown sandy loam

*Subsoil:*
9 to 29 inches—yellowish brown clay that has reddish yellow iron accumulations
29 to 37 inches—yellowish brown clay that has reddish yellow and yellowish red iron accumulations
37 to 56 inches—strong brown and yellowish red sandy clay loam that has reddish brown and pink iron accumulations

*Underlying material:*
56 to 72 inches—yellowish red and reddish brown loam saprolite that has strong brown and pink iron accumulations

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Gently sloping or strongly sloping
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Soil reaction:* Very strongly acid or strongly acid throughout the profile, except in limed areas
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
• Random areas of Saw soils that have hard bedrock at a depth of less than 40 inches
• Random areas of soils that have hard bedrock between depths of 40 and 60 inches

*Similar:*
• Cecil and Pacolet soils that have red subsoils
• Soils that have thinner subsoils than the Appling soil
• Soils that have less clay in the subsoil than the Appling soil

### *Land Use*

**Dominant Uses:** Cropland, pasture, and hayland

### *Agricultural Development*

**Cropland**

*Suitability:* Suited
*Management concerns:* Erodibility 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, 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 pasture:* Well suited
*Suitability for hayland:* Suited
*Management concerns:* Erodibility, equipment use, and soil fertility
*Management measures and considerations:*
• Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increases germination.
• The slope may limit equipment use in the steeper areas when harvesting hay crops.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and 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:* Erodibility, slope, and corrosivity
*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 on site.
• Grading or shaping land prior to construction helps to reduce damage from surface water and prevents soil erosion.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Suited
*Management concerns:* Restricted permeability and slope
*Management measures and considerations:*
• Installing the distribution lines of septic systems during periods when the soil is not wet helps to prevent the smearing and sealing of trench walls.
• Raking trench walls helps to reduce the sealing of soil pores which may occur during the excavation of septic tank absorption fields.
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Slope and low strength
*Management measures and considerations:*
• Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
• Incorporating sand and gravel into the soil and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

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

## BuB—Buncombe loamy sand, 1 to 5 percent slopes, rarely flooded

### *Setting*

*Landscape:* Piedmont
*Landform:* Flood plains
*Landform position:* Slightly convex slopes adjacent to stream channels
*Shape of areas:* Elongated
*Size of areas:* 10 to 100 acres

### *Composition*

Buncombe soil: 90 percent
Dissimilar inclusions: 10 percent

### *Typical Profile*

*Surface layer:*
0 to 4 inches—dark yellowish brown loamy sand

*Subsoil:*
4 to 10 inches—yellowish brown sand
10 to 29 inches—light yellowish brown sand
29 to 43 inches—dark yellowish brown loamy sand
43 to 60 inches—dark yellowish brown sand that has pale brown iron depletions

*Underlying material:*
60 to 72 inches—dark yellowish brown sandy loam that has very pale brown iron depletions

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Excessively drained
*Permeability:* Rapid
*Available water capacity:* Low
*Depth to seasonal high water table:* More than 6 feet
*Shrink-swell potential:* Low
*Slope class:* Nearly level or gently sloping
*Flooding:* Rare
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Slight
*Soil reaction:* Very strongly acid to slightly acid throughout the profile
*Parent material:* Sandy alluvium derived mainly from felsic high-grade metamorphic or igneous rock
*Depth to bedrock:* More than 10 feet

### *Inclusions*

*Dissimilar:*
• Somewhat poorly drained Chewacla soils in the slightly lower-lying positions or in depressional areas
• Well drained Toccoa soils in the slightly lower-lying areas commonly farther from the stream channel

### *Land Use*

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

### *Agricultural Development*

**Cropland**

*Suitability:* Suited
*Management concerns:* Droughtiness, flooding, and soil fertility
*Management measures and considerations:*
• Leaving crop residue on the soil surface helps to conserve soil moisture.
• Using supplemental irrigation and crop varieties adapted to droughty conditions helps to increase crop production.
• Harvesting row crops as soon as possible helps to reduce the risk of damage from possible flooding.
• 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
*Management concerns:* Droughtiness, flooding, and soil fertility
*Management measures and considerations:*
• Planting drought-tolerant species helps to increase productivity.
• Harvesting hay crops as soon as possible helps to reduce the risk of damage from flooding.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

**Woodland**

*Suitability:* Suited
*Management concerns:* Equipment use and seedling mortality
*Management measures and considerations:*
• Using tracked or low-pressure ground equipment helps to minimize rutting and root compaction during harvesting.
• Planting seedlings during wet, cool periods helps to increase plant survival rates.
• Planting high-quality seedlings in a shallow furrow helps to increase plant survival rates.

### *Urban Development*

**Dwellings**

*Suitability:* Poorly suited
*Management concerns:* Flooding
*Management measures and considerations:*
• Building structures on the highest part of the landform helps to reduce the risk of damage from flooding.
• Constructing dwellings on elevated, well-compacted

fill material helps to minimize damage from floodwaters.

**Septic tank absorption fields**

*Suitability:* Unsuited
*Management concerns:* Flooding and poor filtering capacity
*Management measures and considerations:*
• This map unit is severely limited for septic tank absorption fields because of the flooding and poor filtering capacity. The local Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Flooding
*Management measures and considerations:*
• Using well-compacted fill material as a road base may help to elevate roads above the level of flooding.

### *Interpretive Groups*

*Land capability classification:* 3s
*Woodland ordination symbol:* 9S based on yellow-poplar as the indicator species

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

### *Setting*

*Landscape:* Piedmont
*Landform:* Broad ridges
*Landform position:* Interfluves
*Shape of areas:* Irregular
*Size of areas:* 10 to 250 acres

### *Composition*

Cecil soil and similar soils: 100 percent

### *Typical Profile*

*Surface layer:*
0 to 6 inches—yellowish red sandy clay loam

*Subsoil:*
6 to 39 inches—red clay that has reddish yellow iron accumulations
39 to 65 inches—red sandy clay loam that has reddish yellow iron accumulations

*Underlying material:*
65 to 72 inches—red sandy loam that has reddish yellow and reddish brown iron accumulations

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Gently sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Soil reaction:* Strongly acid or very strongly acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Similar:*
• Appling soils that have yellow or brown subsoils; in the slightly lower or nearly level landform positions
• Random areas of Pacolet soils that have thinner subsoils than the Cecil soil

### *Land Use*

**Dominant Uses:** Cropland, pasture, and hayland (fig. 8)
**Other Uses:** Woodland

### *Agricultural Development*

**Cropland**

*Suitability:* Well suited
*Management concerns:* Erodibility, tilth, 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.
• 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 minimize 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.

**Figure 8.—Silage being harvested in an area of Cecil sandy clay loam, 2 to 8 percent slopes, moderately eroded.**

### Pasture and hayland

*Suitability:* Well suited
*Management concerns:* Soil fertility
*Management measures and considerations:*
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
- Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

### Woodland

*Suitability:* Suited
*Management concerns:* Equipment use, seedling survival, and competition from undesirable plants
*Management measures and considerations:*
- Restricting logging operations to periods when the soil is not wet helps to prevent rutting of the soil surface and possible root damage from compaction.
- Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
- Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.
- Using improved varieties of loblolly pine helps to increase productivity.
- 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:* Well suited
*Management concerns:* Corrosivity and erodibility
*Management measures and considerations:*
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.
• Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.

**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 the smearing and sealing of trench walls.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Low strength
*Management measures and considerations:*
• Incorporating sand and gravel into the soil and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* 3e
*Woodland ordination symbol:* 7C based on loblolly pine as the indicator species

## CeB—Cecil-Urban land complex, 2 to 8 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Broad ridges
*Landform position:* Interfluves
*Shape of areas:* Irregular
*Size of areas:* 50 to 200 acres

### *Composition*

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

### *Typical Profile*

**Cecil**

*Surface layer:*
0 to 6 inches—yellowish red sandy clay loam

*Subsoil:*
6 to 39 inches—red clay that has reddish yellow iron accumulations
39 to 65 inches—red sandy clay loam that has reddish yellow iron accumulations

*Underlying material:*
65 to 72 inches—red sandy loam that has reddish yellow and reddish brown iron accumulations

**Urban land**

Urban land consists of areas that are covered by streets, parking lots, driveways, buildings, or runways. A typical profile is not given.

### *Soil Properties and Qualities of the Cecil Soil*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Gently sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Soil reaction:* Strongly acid or very strongly acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
• Cut and fill areas where the natural soils have been altered or covered and the slope modified

*Similar:*
• Random areas of Pacolet soils

### *Land Use*

**Dominant Uses:** Urban development

### *Agricultural Development*

**Cropland**

*Suitability:* Poorly suited

*Management concerns:* Limited size of areas
*Management measures and considerations:*
• This map unit is difficult to manage for crop production because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.

**Pasture and hayland**

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
• This map unit is difficult to manage for the production of pasture and hay crops because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.

**Woodland**

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
• This map unit is difficult to manage for timber production because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.
• Although timber production is rarely feasible in this map unit, planting trees has aesthetic benefits.

### *Urban Development*

**Dwellings**

*Suitability:* Cecil—well suited; Urban land—none assigned
*Management concerns:* Cecil—erodibility and corrosivity; Urban land—excessive surface water runoff
*Management measures and considerations:*
• Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.
• Water-control structures, such as diversions and storm drains, are needed to control the increased surface water runoff.

**Septic tank absorption fields**

*Suitability:* Cecil—suited; Urban land—none assigned
*Management concerns:* Restricted soil 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 the smearing and sealing of trench walls.

**Local roads and streets**

*Suitability:* Cecil—suited; Urban land—none assigned
*Management concerns:* Low soil strength
*Management measures and considerations:*
• Incorporating sand and gravel into the soil and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* Cecil—3e; Urban land—none assigned
*Woodland ordination symbol:* Cecil—7C 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
*Size of areas:* 10 to 200 acres

### *Composition*

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

### *Typical Profile*

*Surface layer:*
0 to 6 inches—dark yellowish brown loam

*Subsoil:*
6 to 15 inches—strong brown silty clay loam
15 to 19 inches—strong brown silty clay loam that has light brownish gray iron depletions
19 to 39 inches—dark yellowish brown silt loam that has light brownish gray iron depletions and strong brown iron accumulations
39 to 50 inches—gray loam that has brown and reddish brown iron accumulations

*Underlying material:*
50 to 72 inches—light gray sandy loam that has strong brown iron accumulations

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Somewhat poorly drained
*Permeability:* Moderate
*Available water capacity:* High
*Seasonal high water table (depth, period):* 0.5 foot to 1.5 feet from November through April

*Shrink-swell potential:* Low
*Slope class:* Nearly level
*Flooding (frequency, period, duration):* Occasional from November through April for 2 to 7 days
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Slight
*Soil reaction:* Very strongly acid to slightly acid, except where surface layers have been limed
*Parent material:* Alluvium derived mainly from felsic high-grade metamorphic or igneous rock
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
- Excessively drained Buncombe soils in the higher positions typically closest to the stream channel
- Well drained Toccoa soils in the slightly higher positions typically closer to the stream channel
- Poorly drained Wehadkee soils in depressions and on toeslopes adjacent to uplands

*Similar:*
- Random areas of soils that have less clay in the subsoil than the Chewacla soil

### *Land Use*

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

### *Agricultural Development*

#### Cropland

*Suitability:* Poorly suited
*Management concerns:* Flooding and wetness
*Management measures and considerations:*
- This map unit is difficult to manage for cropland because of the potential for flooding during the growing season.
- Using open ditches and diversions to divert water helps to improve soil productivity.
- Delaying spring planting helps to minimize clodding and rutting by equipment due to wetness caused by the seasonal high water table.

#### Pasture and hayland

*Suitability:* Poorly suited
*Management concerns:* Flooding and wetness
*Management measures and considerations:*
- Harvesting hay crops as soon as possible helps to reduce the risk of damage from flooding.
- Flooding may pose a hazard to livestock.
- Preventing overgrazing or preventing grazing when the soil is too wet helps to prevent soil compaction, decreased productivity, and a rough soil surface.

#### Woodland

*Suitability:* Suited
*Management concerns:* Equipment use, windthrow hazard, and competition from undesirable plants
*Management measures and considerations:*
- Restricting the use of standard wheeled and tracked equipment to dry periods helps to prevent the rutting and soil compaction that occur when the soil is saturated.
- Harvesting timber during summer helps to reduce the risk of damage from flooding.
- Periodically harvesting windthrown trees that result from high winds and a limited rooting depth helps to increase productivity.
- Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.

### *Urban Development*

#### Dwellings

*Suitability:* Unsuited
*Management concerns:* Flooding and wetness
*Management measures and considerations:*
- This map unit is severely limited for dwellings because of the flooding and wetness. A site should be selected on better suited soils.

#### Septic tank absorption fields

*Suitability:* Unsuited
*Management concerns:* Flooding and wetness
*Management measures and considerations:*
- This map unit is severely limited for septic tank absorption fields because of the flooding and wetness. The local Health Department should be contacted for guidance in developing sanitary facilities.

#### Local roads and streets

*Suitability:* Unsuited
*Management concerns:* Flooding and wetness
*Management measures and considerations:*
- This map unit is severely limited for roads and streets because of the flooding and wetness. 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

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

### *Setting*

*Landscape:* Mountains
*Landform:* Narrow ridges
*Landform position:* Summits and shoulder slopes
*Shape of areas:* Elongated or irregular
*Size of areas:* 10 to 50 acres

### *Composition*

Cliffield soil and similar soils: 50 percent
Pigeonroost soil and similar soils: 35 percent
Dissimilar soils: 15 percent

### *Typical Profile*

**Cliffield**

*Surface layer:*
0 to 4 inches—dark yellowish brown very cobbly sandy loam

*Subsoil:*
4 to 16 inches—strong brown very gravelly loam
16 to 30 inches—strong brown very cobbly loam

*Bedrock:*
30 inches—unweathered, slightly fractured sillimanite schist

**Pigeonroost**

*Surface layer:*
0 to 5 inches—yellowish brown gravelly sandy loam

*Subsurface layer:*
5 to 10 inches—brown gravelly sandy loam

*Subsoil:*
10 to 24 inches—strong brown gravelly loam

*Bedrock:*
24 to 43 inches—weathered sillimanite schist
43 inches—unweathered, slightly fractured sillimanite schist

### *Soil Properties and Qualities*

*Depth class:* Cliffield—moderately deep to hard bedrock; Pigeonroost—moderately deep to soft bedrock
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Low
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Moderately steep
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Rock fragments on the surface:* About 1 to 3 percent stones and cobbles that average about 10 to 14 inches in diameter and 15 to 25 feet apart
*Potential frost action:* Moderate
*Soil reaction:* Very strongly acid to moderately acid throughout the profile
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Depth to bedrock:* Cliffield—20 to 40 inches to hard bedrock; Pigeonroost—20 to 40 inches to soft bedrock and 40 to 60 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
- Random areas of very deep Evard soils
- Random areas of very deep soils that have more mica in the subsoil than the Cliffield and Pigeonroost soils
- Random areas of soils that have hard bedrock at a depth of less than 20 inches

*Similar:*
- Random areas of Cowee soils that have red subsoils

### *Land Use*

**Dominant Uses:** Woodland

### *Agricultural Development*

**Cropland**

*Suitability:* Unsuited
*Management concerns:* Equipment use, tilth, frost action, and limited size of areas
*Management measures and considerations:*
- This map unit is severely limited for crop production. A site should be selected on better suited soils.

**Pasture and hayland**

*Suitability for pasture:* Suited
*Suitability for hayland:* Poorly suited
*Management concerns:* Equipment use and limited size of areas
*Management measures and considerations:*
- The slope limits equipment use in the steeper areas.
- This map unit is difficult to manage for the production of pasture and hay crops because of the small size of its areas.

**Woodland**

*Suitability:* Suited
*Management concerns:* Limited size of areas,

erodibility, equipment use, seedling survival, and windthrow hazard

*Management measures and considerations:*

- This map unit is difficult to manage for timber production because of the small size of its areas.
- Establishing permanent plant cover on roads and landings after logging operations helps to minimize soil erosion and the siltation of streams.
- Using cable logging methods helps to overcome limited road and trail construction resulting from the large number of stones on the soil surface.
- Maintaining surface litter helps to increase the infiltration of water and reduces seedling mortality rates.
- Planting shallow-rooted trees, such as shortleaf pine and Virginia pine, helps to increase plant survival rates.

### *Urban Development*

#### Dwellings

*Suitability:* Poorly suited
*Management concerns:* Slope and corrosivity
*Management measures and considerations:*

- Designing structures so that they conform to the natural slope helps to improve soil performance.
- Using corrosion-resistant materials for foundations and basements helps to reduce the risk of damage to concrete.

#### Septic tank absorption fields

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

- Locating and using the deeper soil inclusions within the map unit may improve the performance of filter fields.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

#### Local roads and streets

*Suitability:* Poorly suited
*Management concerns:* Slope
*Management measures and considerations:*

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

### *Interpretive Groups*

*Land capability classification:* Cliffield—6s; Pigeonroost—6e
*Woodland ordination symbol:* Cliffield—2R based on scarlet oak as the indicator species; Pigeonroost—12R based on chestnut oak as the indicator species

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

### *Setting*

*Landscape:* Mountains
*Landform:* Narrow ridges
*Landform position:* Side slopes
*Shape of areas:* Irregular
*Size of areas:* 25 to 150 acres

### *Composition*

Cliffield soil and similar soils: 60 percent
Pigeonroost soil and similar soils: 30 percent
Dissimilar soils: 10 percent

### *Typical Profile*

#### Cliffield

*Surface layer:*
0 to 4 inches—dark yellowish brown very cobbly sandy loam

*Subsoil:*
4 to 16 inches—strong brown very gravelly loam
16 to 30 inches—strong brown very cobbly loam

*Bedrock:*
30 inches—unweathered, slightly fractured sillimanite schist

#### Pigeonroost

*Surface layer:*
0 to 5 inches—yellowish brown gravelly sandy loam

*Subsurface layer:*
5 to 10 inches—brown gravelly sandy loam

*Subsoil:*
10 to 24 inches—strong brown gravelly loam

*Bedrock:*
24 to 43 inches—weathered sillimanite schist
43 inches—unweathered, slightly fractured sillimanite schist

### *Soil Properties and Qualities*

*Depth class:* Cliffield—moderately deep to hard bedrock; Pigeonroost—moderately deep to soft bedrock
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Low
*Depth to seasonal high water table:* More than 6.0 feet

*Shrink-swell potential:* Low
*Slope class:* Steep
*Flooding:* None
*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 1 to 3 percent stones and cobbles that average about 10 to 14 inches in diameter and 10 to 25 feet apart
*Potential frost action:* Moderate
*Soil reaction:* Very strongly acid to moderately acid throughout the profile
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Depth to bedrock:* Cliffield—20 to 40 inches to hard bedrock; Pigeonroost—20 to 40 inches to soft bedrock and 40 to 60 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
- Random areas of very deep Evard soils
- Very deep soils in coves

*Similar:*
- Random areas of Cowee soils that have red subsoils

### *Land Use*

**Dominant Uses:** Woodland

### *Agricultural Development*

#### Cropland

*Suitability:* Unsuited
*Management concerns:* Equipment use
*Management measures and considerations:*
- This map unit is severely limited for crop production because of the slope. A site should be selected on better suited soils.

#### Pasture and hayland

*Suitability for pasture:* Poorly suited
*Suitability for hayland:* Unsuited
*Management concerns:* Equipment use
*Management measures and considerations:*
- Constructing trails helps to encourage livestock to graze in areas where access is limited.
- Application of lime, fertilizer, seed, and herbicides by hand helps to increase productivity in the steeper areas.

#### Woodland

*Suitability:* Suited
*Management concerns:* Erodibility, equipment use, seedling survival, and windthrow hazard
*Management measures and considerations:*
- Reforesting immediately after harvest using minimal site preparation and recommended tree species helps to control erosion and the siltation of streams.
- Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, use of skid trails, and disturbance of the forest floor by heavy machinery.
- Using cable logging methods helps to overcome limited road and trail construction resulting from the large number of stones on the soil surface.
- Maintaining surface litter helps to increase the infiltration of water and reduces seedling mortality rates.
- Planting shallow-rooted trees, such as shortleaf pine and Virginia pine, helps to increase plant survival rates.

### *Urban Development*

#### Dwellings

*Suitability:* Unsuited
*Management concerns:* Slope
*Management measures and considerations:*
- This map unit is severely limited for urban development because of the slope. A site should be selected on better suited soils.

#### Septic tank absorption fields

*Suitability:* Unsuited
*Management concerns:* Slope
*Management measures and considerations:*
- This map unit is severely limited for septic tank absorption fields because of the slope. The local Health Department should be contacted for guidance in developing sanitary facilities.

#### Local roads and streets

*Suitability:* Unsuited
*Management concerns:* Slope
*Management measures and considerations:*
- This map unit is severely limited for roads and streets because of the slope. A site should be selected on better suited soils.

### *Interpretive Groups*

*Land capability classification:* Cliffield—7s; Pigeonroost—7e
*Woodland ordination symbol:* Cliffield—2R based on scarlet oak as the indicator species; Pigeonroost—12R based on chestnut oak as the indicator species

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

### *Setting*

*Landscape:* Mountains
*Landform:* Narrow ridges
*Landform position:* Side slopes
*Shape of areas:* Irregular
*Size of areas:* 25 to 250 acres

### *Composition*

Cliffield soil: 65 percent
Rock outcrop: 25 percent
Dissimilar soils: 10 percent

### *Typical Profile*

**Cliffield**

*Surface layer:*
0 to 4 inches—dark yellowish brown very cobbly sandy loam

*Subsoil:*
4 to 16 inches—strong brown very gravelly loam
16 to 30 inches—strong brown very cobbly loam

*Bedrock:*
30 inches—unweathered, slightly fractured sillimanite schist

**Rock outcrop**

Rock outcrop consists of areas of exposed hard bedrock.

### *Soil Properties and Qualities of the Cliffield Soil*

*Depth class:* Moderately deep to hard bedrock
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Low
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Very steep
*Flooding:* None
*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 1 to 3 percent stones and cobbles that average about 10 to 14 inches in diameter and 10 to 25 feet apart
*Extent of rock outcrops:* About 25 percent rock outcrops on the soil surface that average about 2 to 4 feet in length, 3 to 6 feet in width, and 20 to 60 feet apart
*Potential frost action:* Moderate
*Soil reaction:* Very strongly acid or strongly acid throughout the profile
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Depth to bedrock:* 20 to 40 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
• Random areas of soils that have hard bedrock at a depth of less than 20 inches

### *Land Use*

**Dominant Uses:** Woodland

### *Agricultural Development*

**Cropland**

*Suitability:* Unsuited
*Management concerns:* Equipment use
*Management measures and considerations:*
• This map unit is severely limited for crop production. A site should be selected on better suited soils.

**Pasture and hayland**

*Suitability:* Unsuited
*Management concerns:* Equipment use
*Management measures and considerations:*
• This map unit is severely limited for the production of pasture and hay crops. A site should be selected on better suited soils.

**Woodland**

*Suitability:* Poorly suited
*Management concerns:* Erodibility, equipment use, and windthrow hazard
*Management measures and considerations:*
• Reforesting immediately after harvest using minimal site preparation and recommended tree species helps to control erosion and the siltation of streams.
• Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, use of skid trails, and disturbance of the forest floor by heavy machinery.
• Using cable logging methods helps to overcome limited road and trail construction resulting from the large amount of rock outcrops.
• Planting shallow-rooted trees, such as shortleaf pine and Virginia pine, helps to increase plant survival rates.

### *Urban Development*

**Dwellings**

*Suitability:* Unsuited
*Management concerns:* Slope
*Management measures and considerations:*
• This map unit is severely limited for dwellings. A site should be selected on better suited soils.

**Septic tank absorption fields**

*Suitability:* Unsuited
*Management concerns:* Slope
*Management measures and considerations:*
• This map unit is severely limited for 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:* Slope
*Management measures and considerations:*
• This map unit is severely limited for roads and streets. A site should be selected on better suited soils.

### *Interpretive Groups*

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

## DAM—Dam

This map unit is made up of several earthen dams. The dams obstruct the flow of water from small creeks and streams to form lakes and reservoirs throughout the county, including Kings Mountain City Lake, John H. Moss Reservoir, and Yates Houser Lake.

## DoB—Dogue sandy loam, 2 to 8 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 4 inches—dark yellowish brown sandy loam

*Subsurface layer:*
4 to 7 inches—light olive brown sandy loam

*Subsoil:*
7 to 25 inches—strong brown clay loam that has light olive brown iron depletions
25 to 36 inches—brownish yellow clay loam that has strong brown iron accumulations and light gray iron depletions
36 to 50 inches—brownish yellow sandy loam that has strong brown iron accumulations and light gray iron depletions

*Underlying material:*
50 to 60 inches—brownish yellow coarse sandy loam

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Moderately well drained
*Permeability:* Moderately slow
*Available water capacity:* High
*Seasonal high water table (depth, period):* 1.5 to 3.0 feet from January through March
*Flooding:* Rare
*Shrink-swell potential:* Moderate
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Slope class:* Gently sloping
*Rock fragments on the surface:* Less than 0.01 percent coverage
*Potential frost action:* Low
*Soil reaction:* Strongly acid to extremely acid; ranging to slightly acid in the upper part of the soil in limed areas
*Depth to bedrock:* More than 72 inches

### *Minor Components*

*Dissimilar:*
• Poorly drained soils in depressions
• The loamy, occasionally flooded Chewacla soils near stream channels

*Similar:*
• Dogue soils that have surface layers of moderately eroded 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, 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 its 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 its 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 the rutting and soil compaction that occur 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 material helps to strengthen buildings and prevents damage caused by shrinking and swelling.
• Building structures on the highest part of the landform and using artificial drainage systems help to reduce the risk of damage from wetness and flooding.
• Installing a subsurface drainage system helps to lower the seasonal high water table.

**Septic tank absorption fields**

*Suitability:* Poorly suited
*Management concerns:* Restricted permeability and wetness
*Management measures and considerations:*
• Using suitable fill material to raise the filter field a sufficient distance above the seasonal high water table helps to improve the performance of septic systems.
• Onsite waste disposal systems may require special design. The local Health Department should be contacted for additional guidance.

**Local roads and streets**

*Suitability:* Poorly suited
*Management concerns:* Low strength and wetness
*Management measures and considerations:*
• Incorporating sand and gravel into the soil and compacting roadbeds help to improve soil strength.
• Constructing roads on raised, well compacted fill material helps to overcome the wetness limitation.

### *Interpretive Groups*

*Land capability classification:* 2e
*Woodland ordination symbol:* 9A based on loblolly pine as the indicator species

## 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 250 acres

### *Composition*

*Note: Areas of Evard and Cowee soils are too small in size and too intricately mixed to be mapped separately.*

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

### *Typical Profile*

**Evard**

*Surface layer:*
1 inch to 0—semi-decomposed deciduous litter
0 to 6 inches—reddish brown sandy loam

*Subsoil:*
6 to 31 inches—red sandy clay loam
31 to 43 inches—red sandy clay loam

*Underlying material:*
43 to 61 inches—red sandy loam saprolite

**Cowee**

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

*Subsoil:*
5 to 10 inches—strong brown gravelly sandy loam
10 to 28 inches—red sandy clay loam
28 to 35 inches—red sandy clay loam

*Bedrock:*
35 inches—soft gneiss

### *Soil Properties and Qualities*

*Depth class:* Evard—very deep; Cowee—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Evard—moderate; Cowee—low
*Depth to seasonal 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 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—strongly 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 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:*
- 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 brown subsoils

### *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 which control erosion and maintain 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 soil 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.
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Cowee soil helps to increase productivity.

### *Urban Development*

**Dwellings**

*Suitability:* Poorly suited
*Management concerns:* Evard—slope; Cowee—slope and depth to rock
*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 improve soil performance.
• Special excavation equipment may be needed to increase the 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 on site.

**Septic tank absorption fields**

*Suitability:* Poorly suited
*Management concerns:* Evard—restricted permeability and slope; Cowee—restricted permeability, slope, and depth to rock
*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 additional guidance.

**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 prevents excessive soil erosion.
• Using suitable subgrade or base material helps to minimize damage caused by frost heaving.

### *Interpretive Groups*

*Land capability classification:* 6e
*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 8R in areas of the Evard soil and 3R 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*

*Note: Areas of Evard and Cowee soils are too small in size and too intricately mixed to be mapped separately.*

Evard soil and similar inclusions: 70 percent
Cowee soil and similar inclusions: 20 percent
Dissimilar soils: 10 percent

### *Typical Profile*

**Evard**

*Surface layer:*
1 inch to 0—semi-decomposed deciduous litter
0 to 6 inches—reddish brown sandy loam

*Subsoil:*
6 to 31 inches—red sandy clay loam
31 to 43 inches—red sandy clay loam

*Underlying material:*
43 to 61 inches—red sandy loam saprolite

**Cowee**

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

*Subsoil:*
5 to 10 inches—strong brown gravelly sandy loam
10 to 28 inches—red sandy clay loam
28 to 35 inches—red sandy clay loam

*Bedrock:*
35 inches—soft gneiss

### *Soil Properties and Qualities*

*Depth class:* Evard—very deep; Cowee—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Evard—moderate; Cowee—low
*Depth to seasonal 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 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—strongly 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 areas of small rock outcrops
- Cliffield 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 and Cowee soils but have brown subsoils
- Soils that are similar to the Evard soil but have clayey subsoils

### *Land Use*

**Dominant Uses:** Woodland

### *Agricultural Development*

#### Cropland

*Suitability:* Unsuited
*Management concerns:*
- This map unit is severely limited for crop production because of the slope. 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.
- Application of 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.
- Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Cowee soil helps to increase productivity.
- 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 rock
*Management measures and considerations:*
- Sites should be selected in areas where the slope is least restrictive to construction and equipment use.
- The need for special design of dwellings or high excavation costs can be expected.
- Special excavation equipment may be needed to increase the depth of the Cowee soil.

#### Septic tank absorption fields

*Suitability:* Evard—poorly suited; Cowee—unsuited
*Management concerns:* Evard—slope; Cowee—slope and depth to rock

*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 damage caused by frost heaving.

### *Interpretive Groups*

*Land capability classification:* 7e
*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 8R in areas of the Evard soil and 3R 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*

*Note: Areas of Evard and Cowee soils are too small in size and too intricately mixed to be mapped separately.*

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

### *Typical Profile*

**Evard**

*Surface layer:*
1 inch to 0—semi-decomposed deciduous litter
0 to 6 inches—reddish brown sandy loam

*Subsoil:*
6 to 31 inches—red sandy clay loam
31 to 43 inches—red sandy clay loam

*Underlying material:*
43 to 61 inches—red sandy loam saprolite

**Cowee**

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

*Subsoil:*
5 to 10 inches—strong brown gravelly sandy loam
10 to 28 inches—red sandy clay loam
28 to 35 inches—red sandy clay loam

*Bedrock:*
35 inches—soft gneiss

### *Soil Properties and Qualities*

*Depth class:* Evard—very deep; Cowee—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Evard—moderate; Cowee—low
*Depth to seasonal 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 coverage
*Extent of rock outcrops:* 1 to 3 percent surface coverage
*Potential frost action:* Moderate
*Soil reaction:* Evard—moderately acid to very strongly acid; Cowee—strongly 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 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 and Cowee soils but have brown subsoils

### *Land Use*

**Dominant Uses:** Woodland

### *Agricultural Development*

**Cropland**

*Suitability:* Unsuited

*Management concerns:*
• This map unit is severely limited for crop production because of the slope and rockiness. A site should be selected on better suited soils.

**Pasture and hayland**

*Suitability:* Unsuited
*Management concerns:*
• This map unit is severely limited for the production of pasture and hay crops because of the slope and rockiness. 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 equipment limitations and prevents the acceleration of erosion caused by road construction and skid trails.
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Cowee soil helps to increase productivity.
• These soils are best reforested by managing for natural regeneration of hardwoods.

### *Urban Development*

**Dwellings**

*Suitability:* Unsuited
*Management concerns:*
• This map unit is severely limited for dwellings. A site should be selected on better suited soils.

**Septic tank absorption fields**

*Suitability:* Unsuited
*Management concerns:*
• This map unit is severely limited for septic tank absorption fields because of the slope and depth to rock. The local Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Unsuited
*Management concerns:*
• This map unit is severely limited for local roads and streets because of the slope and rockiness. 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, 8R in areas of the Evard soil and 3R in areas of the Cowee soil

## GrD—Grover gravelly sandy loam, 15 to 30 percent slopes, rocky

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes
*Shape of areas:* Elongated or irregular
*Size of areas:* 15 to 75 acres

### *Composition*

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

### *Typical Profile*

*Surface layer:*
0 to 5 inches—yellowish brown gravelly sandy loam that has many flakes of mica

*Subsurface layer:*
5 to 13 inches—brownish yellow sandy loam that has many flakes of mica

*Subsoil:*
13 to 27 inches—strong brown sandy clay loam that has many flakes of mica
27 to 35 inches—reddish yellow sandy loam that has many flakes of mica

*Underlying material:*
35 to 57 inches—brownish yellow sandy loam that has many flakes of mica
57 to 72 inches—very pale brown and brownish yellow loamy sand that has many flakes of mica

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Moderately steep
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Very severe
*Soil reaction:* Moderately acid to very strongly acid
*Rock fragments on the surface:* About 1 to 3 percent

stones and cobbles that average about 10 to 14 inches in diameter and 15 to 25 feet apart
*Extent of rock outcrops:* Few scattered rock outcrops that are about 3 to 5 feet in length, 2 to 4 feet in width, and 300 feet apart
*Parent material:* Residuum weathered from felsic igneous rock with a high content of mica
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
• Madison soils that have moderately eroded surface layers and clayey subsoils; on the outer edger of map units
• Saw soils that have hard bedrock at a depth of less than 40 inches; near areas of rock outcrop

*Similar:*
• Random areas of Grover soils that have thicker subsoils
• Random areas of Hulett soils that have clayey subsoils

### *Land Use*

**Dominant Uses:** Woodland
**Other Uses:** Pasture and hayland

### *Agricultural Development*

**Cropland**

*Suitability:* Unsuited
*Management concerns:* Equipment use
*Management measures and considerations:*
• This map unit is severely limited for crop production because of the slope and rockiness. A site should be selected on better suited soils.

**Pasture and hayland**

*Suitability for pasture:* Suited
*Suitability for hayland:* Poorly suited
*Management concerns:* Equipment use and soil fertility
*Management measures and considerations:*
• The slope limits equipment use in the steeper areas.
• This map unit is difficult to manage for pasture and hayland because of the areas of rock outcrop.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.

**Woodland**

*Suitability:* Suited
*Management concerns:* Erodibility and equipment use
*Management measures and considerations:*
• Establishing permanent plant cover on roads and landings after logging operations helps to minimize soil erosion and the siltation of streams.
• Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
• Roads and skid trails should be constructed on the contour and around rock outcrops, where possible.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

**Dwellings**

*Suitability:* Poorly suited
*Management concerns:* Slope
*Management measures and considerations:*
• Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.

**Septic tank absorption fields**

*Suitability:* Poorly suited
*Management concerns:* Slope
*Management measures and considerations:*
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Poorly suited
*Management concerns:* Slope and low strength
*Management measures and considerations:*
• Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.
• Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* 6e
*Woodland ordination symbol:* 8R based on shortleaf pine as the indicator species

## GvE—Grover gravelly sandy loam, 30 to 60 percent slopes, very stony

### *Setting*

*Landscape:* Piedmont
*Landform:* Divides
*Landform position:* Side slopes
*Shape of areas:* Irregular
*Size of areas:* 15 to 100 acres

### *Composition*

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

### *Typical Profile*

*Surface layer:*
0 to 5 inches—yellowish brown gravelly sandy loam that has many flakes of mica

*Subsurface layer:*
5 to 13 inches—brownish yellow sandy loam that has many flakes of mica

*Subsoil:*
13 to 27 inches—strong brown sandy clay loam that has many flakes of mica
27 to 35 inches—reddish yellow sandy loam that has many flakes of mica

*Underlying material:*
35 to 57 inches—brownish yellow sandy loam that has many flakes of mica
57 to 72 inches—very pale brown and brownish yellow loamy sand that has many flakes of mica

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal 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:* About 1 to 3 percent stones and cobbles that average about 10 to 14 inches in diameter and 10 to 25 feet apart
*Potential frost action:* Low
*Soil reaction:* Moderately acid to very strongly acid
*Depth to bedrock:* More than 60 inches

### *Minor Components*

*Dissimilar:*
- Randomly scattered areas of small rock outcrops
- Ashlar soils that have hard bedrock at a depth of less than 40 inches; in stony or bouldery areas or near small rock outcrops
- 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 clayey subsoils

### *Land Use*

**Dominant Uses:** Woodland
**Other Uses:** Pasture

### *Agricultural Development*

**Cropland**

*Suitability:* Unsuited
*Management concerns:*
- This map unit is severely limited for crop production because of the slope. 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.
- Application of 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:*
• This map unit is severely limited for dwellings because of the slope. A site should be selected on better suited soils.

**Septic tank absorption fields**

*Suitability:* Unsuited
*Management concerns:*
• This map unit is severely limited for septic tank absorption fields because of the slope. The local Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Unsuited
*Management concerns:*
• This map unit is severely limited for roads and streets because of the slope and low strength. 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

## HeB—Helena-Worsham complex, 1 to 6 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Upland drainageways and the head of drains
*Landform position:* Footslopes and toeslopes
*Shape of areas:* Elongated
*Size of areas:* 5 to 50 acres

### *Composition*

Helena soil and similar soils: 70 percent
Worsham soil and similar soils: 25 percent
Dissimilar soils: 5 percent

### *Typical Profile*

**Helena**

*Surface layer:*
0 to 7 inches—brown sandy loam

*Subsurface layer:*
7 to 14 inches—yellowish brown sandy loam

*Subsoil:*
14 to 26 inches—light yellowish brown sandy clay that has light brownish gray iron depletions and strong brown iron accumulations
26 to 50 inches—light yellowish brown clay that has light brownish gray iron depletions and strong brown and red iron accumulations
50 to 56 inches—light gray sandy clay that has strong brown iron accumulations
56 to 60 inches—gray sandy clay loam that has light yellowish brown and strong brown iron accumulations

**Worsham**

*Surface layer:*
0 to 5 inches—dark grayish brown sandy loam that has yellowish red iron accumulations
5 to 12 inches—grayish brown sandy loam that has yellowish red iron accumulations

*Subsoil:*
12 to 20 inches—gray clay that has dark gray iron depletions and yellowish red iron accumulations
20 to 55 inches—gray clay that has dark gray iron depletions and yellowish red iron accumulations
55 to 60 inches—gray sandy clay loam that has white and dark gray iron depletions

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Helena—moderately well drained; Worsham—poorly drained
*Permeability:* Helena—slow; Worsham—slow or very slow
*Available water capacity:* Helena—moderate or high; Worsham—high or very high
*Seasonal high water table (depth, period):* Helena—1.5 to 2.5 feet from January through April; Worsham—0 to 1.0 foot from November through April
*Shrink-swell potential:* Helena—high; Worsham—moderate
*Slope class:* Nearly level or gently sloping
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Helena—slight or moderate; Worsham—slight
*Soil reaction:* Helena—extremely acid to strongly acid throughout the profile, except where surface layers have been limed; Worsham—very strongly acid or strongly acid throughout the profile

*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
- Well drained soils on the outer edge of map units

*Similar:*
- Random areas of somewhat poorly drained soils
- Random areas of soils that are similar to the Helena soil but have less clay in the subsoil

### *Land Use*

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

### *Agricultural Development*

#### Cropland

*Suitability:* Helena—well suited; Worsham—poorly suited
*Management concerns:* Wetness and soil fertility
*Management measures and considerations:*
- Planting wetness-tolerant species in undrained areas helps to improve soil productivity.
- Installing a drainage system that includes open ditches, perforated tile, or land shaping helps to increase soil productivity.
- 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:* Helena—well suited; Worsham—poorly suited
*Management concerns:* Wetness and soil fertility
*Management measures and considerations:*
- Preventing overgrazing or preventing grazing when the soils are too wet helps to prevent soil compaction, decreased productivity, and a rough soil surface.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
- Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

#### Woodland

*Suitability:* Helena—well suited; Worsham—suited
*Management concerns:* Helena—competition from undesirable plants; Worsham—equipment use, seedling survival, and competition from undesirable plants
*Management measures and considerations:*
- Using low-pressure ground equipment helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Maintaining drainageways and planting trees that are tolerant of wetness help to increase seedling survival rates.
- Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

#### Dwellings

*Suitability:* Poorly suited
*Management concerns:* Helena—wetness, shrink-swell potential, and corrosivity; Worsham—wetness and corrosivity
*Management measures and considerations:*
- Building structures on the highest part of the landform and using artificial drainage systems help to reduce the risk of damage from wetness.
- Reinforcing foundations or backfilling with coarse material helps to strengthen buildings and prevents damage caused by shrinking and swelling.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

#### Septic tank absorption fields

*Suitability:* Poorly suited
*Management concerns:* Restricted permeability and wetness
*Management measures and considerations:*
- Using suitable fill material to raise the filter field a sufficient distance above the seasonal high water table helps to improve the performance of septic systems.
- Accessing public sewage system outlets eliminates the need to use these severely limited soils for septic tank systems.
- The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

#### Local roads and streets

*Suitability:* Poorly suited
*Management concerns:* Helena—shrink-swell potential, wetness, and low strength; Worsham—wetness and low strength

*Management measures and considerations:*
• Removing as much of the shrink-swell clay as possible and increasing the thickness of the base aggravate help to improve soil performance.
• Installing geotextile fabric between the base aggravate and the final surface of the road helps to improve soil performance.
• Constructing roads on raised, well compacted fill material helps to overcome the wetness limitation.
• Incorporating sand and gravel into the soils and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* Helena—2e; Worsham—4w
*Woodland ordination symbol:* Helena—8A based on loblolly pine as the indicator species; Worsham—9W based on yellow-poplar as the indicator species

## HhB—Hulett gravelly sandy loam, 2 to 8 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Broad ridges
*Landform position:* Interfluves
*Shape of areas:* Irregular
*Size of areas:* 10 to 250 acres

### *Composition*

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

### *Typical Profile*

*Surface layer:*
0 to 8 inches—yellowish brown gravelly sandy loam

*Subsoil:*
8 to 19 inches—strong brown clay that has yellowish red and reddish yellow iron accumulations and many flakes of mica
19 to 27 inches—yellowish red clay that has red, reddish yellow, and yellowish brown iron accumulations and many flakes of mica
27 to 37 inches—yellowish red clay loam that has reddish yellow, strong brown, and red iron accumulations

*Underlying material:*
37 to 56 inches—reddish yellow sandy clay loam saprolite that has red and strong brown iron accumulations
56 to 72 inches—reddish yellow sandy loam saprolite that has red and strong brown iron accumulations

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Gently sloping
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Moderate
*Soil reaction:* Very strongly acid to moderately acid in the surface layer, except in limed areas, and very strongly acid or strongly acid in the subsoil and underlying material
*Parent material:* Residuum weathered from felsic igneous rock with a high content of mica
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
• Madison soils that have moderately eroded surface layers and red subsoils; on the outer edge of map units
• Saw soils that have hard bedrock at a depth of less than 40 inches; near small areas of rock outcrop

*Similar:*
• Random areas of Hulett soils that have less gravel in the surface layer
• Random areas of Hulett soils that have thicker subsoils

### *Land Use*

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

### *Agricultural Development*

**Cropland**

*Suitability:* Well suited
*Management concerns:* Soil fertility
*Management measures and considerations:*
• Using conservation tillage, winter cover crops, crop residue management, and crop rotations which include grasses and legumes helps to increase the available water capacity and improve soil fertility.
• 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
*Management concerns:* Soil fertility
*Management measures and considerations:*
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and 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:* Well suited
*Management concerns:* Erodibility and corrosivity
*Management measures and considerations:*
• Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**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 the smearing and sealing of trench walls.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Low strength
*Management measures and considerations:*
• Incorporating sand and gravel into the soil 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

## HtC—Hulett gravelly sandy loam, 8 to 15 percent slopes, stony

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Shape of areas:* Irregular
*Size of areas:* 10 to 100 acres

### *Composition*

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

### *Typical Profile*

*Surface layer:*
0 to 8 inches—yellowish brown gravelly sandy loam

*Subsoil:*
8 to 19 inches—strong brown clay that has yellowish red and reddish yellow iron accumulations and many flakes of mica
19 to 27 inches—yellowish red clay that has red, reddish yellow, and yellowish brown iron accumulations and many flakes of mica
27 to 37 inches—yellowish red clay loam that has reddish yellow, strong brown, and red iron accumulations

*Underlying material:*
37 to 56 inches—reddish yellow sandy clay loam saprolite that has red and strong brown iron accumulations
56 to 72 inches—reddish yellow sandy loam saprolite that has red and strong brown iron accumulations

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Strongly sloping
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe

*Rock fragments on the surface:* Widely scattered stones and cobbles that average about 8 to 14 inches in diameter and 30 to 60 feet apart
*Soil reaction:* Very strongly acid to moderately acid in the surface layer, except in limed areas, and very strongly acid or strongly acid in the subsoil and underlying material
*Parent material:* Residuum weathered from felsic igneous rock with a high content of mica
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
• Random areas of moderately eroded Hulett soils that have surface layers of sandy clay loam

*Similar:*
• Random areas of Grover soils that have less clay in the subsoil

### *Land Use*

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

### *Agricultural Development*

#### Cropland

*Suitability:* Suited
*Management concerns:* Erodibility, equipment use, 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, control surface runoff, and maximize the infiltration of water.
• Removing the larger stones and limiting equipment use to the larger open areas help to improve workability of this soil.
• Using resource management systems that emphasize minimum tillage or no-till should be considered to reduce equipment deterioration and to increase the available water capacity.
• 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
*Management concerns:* Equipment use and soil fertility
*Management measures and considerations:*
• Removing the larger stones or limiting equipment use to the larger open areas may be needed.
• The slope may limit equipment use in the steeper areas when harvesting hay crops.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

#### Woodland

*Suitability:* Well suited
*Management concerns:* Equipment use
*Management measures and considerations:*
• Restricting logging operations to periods when the soil is not wet helps to prevent rutting of the soil surface and possible root damage from compaction.
• 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:* Erodibility, slope, and corrosivity
*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 on site.
• Designing structures so that they conform to the natural slope helps to improve soil performance.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

#### 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 the smearing and sealing of trench walls.
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Low strength and slope
*Management measures and considerations:*
• Incorporating sand and gravel into the soil 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.

### *Interpretive Groups*

*Land capability classification:* 4e
*Woodland ordination symbol:* 8A based on loblolly pine as the indicator species

## HuC—Hulett-Saw complex, 4 to 15 percent slopes, very rocky

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Shape of areas:* Irregular
*Size of areas:* 10 to 30 acres

### *Composition*

Hulett soil and similar soils: 70 percent
Saw soil and similar soils: 20 percent
Dissimilar soils: 10 percent

### *Typical Profile*

**Hulett**

*Surface layer:*
0 to 8 inches—yellowish brown gravelly sandy loam

*Subsoil:*
8 to 19 inches—strong brown clay that has yellowish red and reddish yellow iron accumulations and many flakes of mica
19 to 27 inches—yellowish red clay that has red, reddish yellow, and yellowish brown iron accumulations and many flakes of mica
27 to 37 inches—yellowish red clay loam that has reddish yellow, strong brown, and red iron accumulations

*Underlying material:*
37 to 56 inches—reddish yellow sandy clay loam saprolite that has red and strong brown iron accumulations
56 to 72 inches—reddish yellow sandy loam saprolite that has red and strong brown iron accumulations

**Saw**

*Surface layer:*
0 to 5 inches—yellowish red gravelly sandy clay loam

*Subsoil:*
5 to 21 inches—red clay
21 to 31 inches—red clay loam that has yellowish red iron accumulations

*Bedrock:*
31 inches—unweathered, moderately fractured granite

### *Soil Properties and Qualities*

*Depth class:* Hulett—very deep; Saw—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Gently sloping or strongly sloping
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Soil reaction:* Hulett—very strongly acid to moderately acid in the A horizon and very strongly acid or strongly acid in the B and C horizons; Saw—very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Extent of rock outcrops:* About 5 percent rock outcrops on the soil surface that average about 4 feet in length, 3 feet in width, and 20 to 100 feet apart
*Parent material:* Residuum weathered from felsic high-grade metamorphic and igneous rock
*Depth to bedrock:* Hulett—60 to more than 72 inches; Saw—20 to 40 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
• Wake soils that have hard bedrock at a depth of less than 20 inches; near areas of rock outcrop
• Bethlehem soils that have soft bedrock at a depth of less than 40 inches; near areas underlain by high-grade metamorphic rock
• Soils that have hard bedrock between depths of 40 and 60 inches

*Similar:*
• Grover soils that have less clay in the subsoil than the Hulett and Saw soils

• Soils that are similar to the Saw soil but have less clay in the subsoil

## *Land Use*

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

## *Agricultural Development*

### Cropland

*Suitability:* Suited
*Management concerns:* Erodibility, equipment use, 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, control surface runoff, and maximize the infiltration of water.
• This map unit is difficult to manage for cropland because of the areas of rock outcrop.
• Using resource management systems that emphasize minimum tillage or no-till should be considered to reduce equipment deterioration and to increase the available water capacity.
• 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
*Management concerns:* Equipment use and soil fertility
*Management measures and considerations:*
• The slope may limit equipment use in the steeper areas when harvesting hay crops.
• This map unit is difficult to manage for pasture and hayland because of the areas of rock outcrop.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

### Woodland

*Suitability:* Well suited
*Management concerns:* Hulett—no significant limitations; Saw—windthrow hazard
*Management measures and considerations:*
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Saw soil helps to increase productivity.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

## *Urban Development*

### Dwellings

*Suitability:* Hulett—suited; Saw—poorly suited
*Management concerns:* Hulett—erodibility, slope, and corrosivity; Saw—erodibility, slope, depth to rock, and corrosivity
*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 on site.
• Grading or shaping land prior to construction helps to reduce damage from surface water and prevents soil erosion.
• Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of the Saw soil.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

### Septic tank absorption fields

*Suitability:* Hulett—suited; Saw—poorly suited
*Management concerns:* Hulett—restricted permeability and slope; Saw—depth to rock and slope
*Management measures and considerations:*
• Installing the distribution lines of septic systems during periods when the soils are not wet helps to prevent the smearing and sealing of trench walls.
• Raking trench walls helps to reduce the sealing of soil pores which may occur during the excavation of septic tank absorption fields.
• Locating and using areas of the deeper Hulett soil may improve the performance of filter fields.
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

### Local roads and streets

*Suitability:* Hulett—suited; Saw—poorly suited
*Management concerns:* Hulett—low strength and slope; Saw—depth to bedrock, low strength, and slope

*Management measures and considerations:*
• Incorporating sand and gravel into the soils 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 in areas of the Saw soil.

### *Interpretive Groups*

*Land capability classification:* Hulett—4e; Saw—3e
*Woodland ordination symbol:* Hulett—8A based on loblolly pine as the indicator species; Saw—6D based on shortleaf pine as the indicator species

## HwB—Hulett-Urban land complex, 2 to 8 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Broad ridges
*Landform position:* Interfluves
*Shape of areas:* Irregular
*Size of areas:* 10 to 100 acres

### *Composition*

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

### *Typical Profile*

**Hulett**

*Surface layer:*
0 to 8 inches—yellowish brown gravelly sandy loam

*Subsoil:*
8 to 19 inches—strong brown clay that has yellowish red and reddish yellow iron accumulations and many flakes of mica
19 to 27 inches—yellowish red clay that has red, reddish yellow, and yellowish brown iron accumulations and many flakes of mica
27 to 37 inches—yellowish red clay loam that has reddish yellow, strong brown, and red iron accumulations

*Underlying material:*
37 to 56 inches—reddish yellow sandy clay loam saprolite that has red and strong brown iron accumulations
56 to 72 inches—reddish yellow sandy loam saprolite that has red and strong brown iron accumulations

**Urban land**

Urban land consists of areas that are covered by streets, parking lots, driveways, or buildings. A typical profile is not given.

### *Soil Properties and Qualities of the Hulett Soil*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Gently sloping
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Moderate
*Soil reaction:* Very strongly acid to moderately acid in the surface layer, except in limed areas, and very strongly acid or strongly acid in the subsoil and underlying material
*Parent material:* Residuum weathered from felsic igneous rock with a high content of mica
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
• Cut and fill areas where the natural soils have been altered or covered and the slope modified
• Random areas of Hulett soils that have a moderately eroded surface layer

*Similar:*
• Random areas of Hulett soils that have thicker subsoils

### *Land Use*

**Dominant Uses:** Urban development

### *Agricultural Development*

**Cropland**

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
• This map unit is difficult to manage for crop production because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.

**Pasture and hayland**

*Suitability:* Poorly suited

*Management concerns:* Limited size of areas
*Management measures and considerations:*
• This map unit is difficult to manage for the production of pasture and hay crops because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.

**Woodland**

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
• This map unit is difficult to manage for timber production because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.
• Although timber production is rarely feasible in this map unit, planting trees has aesthetic benefits.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

**Dwellings**

*Suitability:* Hulett—well suited; Urban land—variable
*Management concerns:* Hulett—erodibility and corrosivity; Urban land—excessive surface water runoff
*Management measures and considerations:*
• Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.
• Water-control structures, such as diversions and storm drains, are needed to control the increased surface water runoff from Urban land.

**Septic tank absorption fields**

*Suitability:* Hulett—suited; Urban land—variable
*Management concerns:* Restricted permeability in areas of the Hulett soil
*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.
• Onsite investigation is needed before planning the use and management of this map unit for septic tank absorption fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Hulett—suited; Urban land—none assigned
*Management concerns:* Low soil strength
*Management measures and considerations:*
• Incorporating sand and gravel into the soils and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

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

## MaB2—Madison gravelly sandy clay loam, 2 to 8 percent slopes, moderately eroded

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves
*Shape of areas:* Irregular
*Size of areas:* 10 to 100 acres

### *Composition*

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

### *Typical Profile*

*Surface layer:*
0 to 6 inches—strong brown gravelly sandy clay loam that has few flakes of mica

*Subsoil:*
6 to 24 inches—red clay that has reddish yellow iron accumulations and common flakes of mica
24 to 37 inches—red clay that has reddish yellow iron accumulations and many flakes of mica
37 to 50 inches—red sandy clay loam that has reddish yellow and reddish brown iron accumulations and many flakes of mica

*Underlying material:*
50 to 72 inches—reddish yellow sandy loam that has yellowish red, reddish brown, and brownish yellow iron accumulations and many flakes of mica

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate

*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Gently sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Soil reaction:* Very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock with a high content of mica
*Depth to bedrock:* More than 60 inches

### *Minor Components*

*Dissimilar:*
• Random areas of Cecil soils that have less mica in the subsoil than the Madison soil
• Bethlehem soils that have soft bedrock at a depth of less than 40 inches; on the outer edge of map units

*Similar:*
• Random areas of Madison soils that have less gravel in the surface layer
• Hulett soils which have yellow or brown subsoils; in the slightly lower-lying positions

### *Land Use*

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

### *Agricultural Development*

#### Cropland

*Suitability:* Well suited
*Management concerns:* Erodibility, equipment use, tilth, 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.
• Using resource management systems that emphasize minimum tillage or no-till should be considered to reduce equipment deterioration and to increase the available water capacity.
• 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.
• 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
*Management concerns:* Erodibility and soil fertility
*Management measures and considerations:*
• Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and 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
*Management measures and considerations:*
• Restricting logging operations to periods when the soil is not wet helps to prevent rutting of the soil surface and possible root damage from compaction.
• Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

#### Dwellings

*Suitability:* Well suited
*Management concerns:* Erodibility and corrosivity
*Management measures and considerations:*
• Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

#### 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 the smearing and sealing of trench walls.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Low strength
*Management measures and considerations:*
• Incorporating sand and gravel into the soil and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* 3e
*Woodland ordination symbol:* 6C based on shortleaf pine as the indicator species

## MaC2—Madison gravelly sandy clay loam, 8 to 15 percent slopes, moderately eroded

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes
*Shape of areas:* Irregular or elongated
*Size of areas:* 10 to 50 acres

### *Composition*

Madison soil and similar soils: 95 percent
Dissimilar soils: 5 percent

### *Typical Profile*

*Surface layer:*
0 to 6 inches—strong brown gravelly sandy clay loam that has few flakes of mica

*Subsoil:*
6 to 24 inches—red clay that has reddish yellow iron accumulations and common flakes of mica
24 to 37 inches—red clay that has reddish yellow iron accumulations and many flakes of mica
37 to 50 inches—red sandy clay loam that has reddish yellow and reddish brown iron accumulations and many flakes of mica

*Underlying material:*
50 to 72 inches—reddish yellow sandy loam that has yellowish red, reddish brown, and brownish yellow iron accumulations and many flakes of mica

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Strongly sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Very severe
*Soil reaction:* Very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Rock fragments on the surface:* Widely scattered stones and cobbles that average about 8 to 10 inches in diameter and 30 to 50 feet apart
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock with a high content of mica
*Depth to bedrock:* More than 60 inches

### *Minor Components*

*Dissimilar:*
• Random areas of Bethlehem soils that have soft bedrock at a depth of less than 40 inches

*Similar:*
• Hulett soils that have yellow or brown subsoils
• Grover soils that have yellow or brown subsoils and less clay in the subsoil than the Madison soil

### *Land Use*

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

### *Agricultural Development*

**Cropland**

*Suitability:* Suited
*Management concerns:* Erodibility, equipment use, and soil fertility
*Management measures and considerations:*
• Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to reduce further soil erosion by stabilizing the soil, controlling surface runoff, and maximizing the infiltration of water.
• Removing the larger stones and limiting equipment use to the larger open areas help to improve workability of this soil.
• Using resource management systems that emphasize minimum tillage or no-till should be considered to reduce equipment deterioration and to increase the available water capacity.
• 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
*Management concerns:* Erodibility, equipment use, and soil fertility
*Management measures and considerations:*
• Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increases germination.
• Removing the larger stones or limiting equipment use to the larger open areas may be needed.
• The slope may limit equipment use in the steeper areas when harvesting hay crops.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.

**Woodland**

*Suitability:* Suited
*Management concerns:* Equipment use and seedling survival
*Management measures and considerations:*
• Restricting logging operations to periods when the soil is not wet helps to prevent rutting of the soil surface and possible root damage from compaction.
• Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
• 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:* Erodibility, slope, and corrosivity
*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 on site.
• Grading or shaping land prior to construction helps to reduce damage from surface water and prevents soil erosion.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Suited
*Management concerns:* Restricted permeability and slope
*Management measures and considerations:*
• Installing the distribution lines of septic systems during periods when the soil is not wet helps to prevent the smearing and sealing of trench walls.
• Raking trench walls helps to reduce the sealing of soil pores which may occur during the excavation of septic tank absorption fields.
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Low strength and slope
*Management measures and considerations:*
• Incorporating sand and gravel into the soil and compacting roadbeds help to improve soil strength.
• Designing roads on the contour and providing adequate water-control structures, such as culverts, helps to maintain soil stability.

### *Interpretive Groups*

*Land capability classification:* 4e
*Woodland ordination symbol:* 7A based on shortleaf pine as the indicator species

## MbB2—Madison-Bethlehem complex, 2 to 8 percent slopes, stony, moderately eroded

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Madison—plane to slightly convex shoulder slopes and summits; Bethlehem—convex summits
*Shape of areas:* Irregular
*Size of areas:* 15 to 300 acres

### *Composition*

Madison soil and similar soils: 70 percent
Bethlehem soil and similar soils: 15 percent
Dissimilar soils: 15 percent

### *Typical Profile*

**Madison**

*Surface layer:*
0 to 6 inches—strong brown gravelly sandy clay loam that has few flakes of mica

*Subsoil:*
6 to 24 inches—red clay that has reddish yellow iron accumulations and common flakes of mica
24 to 37 inches—red clay that has reddish yellow iron accumulations and many flakes of mica
37 to 50 inches—red sandy clay loam that has reddish yellow and reddish brown iron accumulations and many flakes of mica

*Underlying material:*
50 to 72 inches—reddish yellow sandy loam that has yellowish red, reddish brown, and brownish yellow iron accumulations and many flakes of mica

**Bethlehem**

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

*Subsoil:*
8 to 30 inches—red clay that has reddish yellow iron accumulations
30 to 34 inches—red gravelly sandy clay loam that has reddish yellow iron accumulations

*Bedrock:*
34 to 45 inches—weathered mica schist
45 inches—unweathered mica schist

### *Soil Properties and Qualities*

*Depth class:* Madison—very deep; Bethlehem—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Madison—moderate; Bethlehem—low
*Depth to seasonal high water table:* More than 6.0 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
*Hazard of water erosion:* Severe
*Soil reaction:* Very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Rock fragments on the surface:* Widely scattered stones and cobbles that average about 10 to 12 inches in diameter and 30 to 50 feet apart
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock with a high content of mica
*Depth to bedrock:* Madison—more than 72 inches; Bethlehem—20 to 40 inches to soft bedrock

### *Minor Components*

*Dissimilar:*
- Random areas of Grover soils that have less clay in the subsoil than the Madison and Bethlehem soils
- Random areas of Hulett soils that have yellow or brown subsoils

*Similar:*
- Eroded Madison soils
- Eroded Bethlehem soils

### *Land Use*

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

### *Agricultural Development*

**Cropland**

*Suitability:* Suited
*Management concerns:* Erodibility and equipment use
*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.
- Removing the larger stones and limiting equipment use to the larger open areas helps to improve workability of these soils.
- Using resource management systems that emphasize minimum tillage or no-till should be considered to reduce equipment deterioration and to increase the available water capacity.

**Pasture and hayland**

*Suitability:* Well suited
*Management concerns:* Equipment use and soil fertility
*Management measures and considerations:*
- Removing the larger stones or limiting equipment use to the larger open areas may be needed.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.

**Woodland**

*Suitability:* Suited

*Management concerns:* Madison—equipment use and seedling survival; Bethlehem—equipment use, seedling survival, and windthrow hazard
*Management measures and considerations:*
• Restricting logging operations to periods when the soils are not wet helps to prevent rutting of the soil surface and possible root damage from compaction.
• Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Bethlehem soil helps to increase productivity.

### *Urban Development*

#### Dwellings

*Suitability for dwellings without basements:* Well suited
*Suitability for dwellings with basements:* Madison—well suited; Bethlehem—suited
*Management concerns:* Madison—erodibility and corrosivity; Bethlehem—depth to rock, erodibility, and corrosivity
*Management measures and considerations:*
• Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.
• Because of the depth to weathered bedrock in the Bethlehem soil, increased difficulty with excavation can be expected.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

#### Septic tank absorption fields

*Suitability:* Madison—suited; Bethlehem—poorly suited
*Management concerns:* Madison—restricted permeability; Bethlehem—depth to rock
*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 prevent the smearing and sealing of trench walls.
• Locating and using areas of the deeper Madison soil may improve the performance of filter fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

#### Local roads and streets

*Suitability:* Suited
*Management concerns:* Low strength
*Management measures and considerations:*
• Incorporating sand and gravel into the soil and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* 3e
*Woodland ordination symbol:* Based on shortleaf pine as the indicator species, 6C in areas of the Madison soil and 7D in areas of the Bethlehem soil

## McC2—Madison-Bethlehem complex, 8 to 15 percent slopes, very stony, moderately eroded

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes
*Shape of areas:* Elongated or irregular
*Size of areas:* 10 to 100 acres

### *Composition*

Madison soil and similar soils: 60 percent
Bethlehem soil and similar soils: 25 percent
Dissimilar soils: 15 percent

### *Typical Profile*

#### Madison

*Surface layer:*
0 to 6 inches—strong brown gravelly sandy clay loam that has few flakes of mica

*Subsoil:*
6 to 24 inches—red clay that has reddish yellow iron accumulations and common flakes of mica
24 to 37 inches—red clay that has reddish yellow iron accumulations and many flakes of mica
37 to 50 inches—red sandy clay loam that has reddish yellow and reddish brown iron accumulations and many flakes of mica

*Underlying material:*
50 to 72 inches—reddish yellow sandy loam that has yellowish red, reddish brown, and brownish yellow iron accumulations and many flakes of mica

#### Bethlehem

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

*Subsoil:*
8 to 30 inches—red clay that has reddish yellow iron accumulations
30 to 34 inches—red gravelly sandy clay loam that has reddish yellow iron accumulations

*Bedrock:*
34 to 45 inches—weathered mica schist
45 inches—unweathered mica schist

### *Soil Properties and Qualities*

*Depth class:* Madison—very deep; Bethlehem—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Madison—moderate; Bethlehem—low
*Depth to seasonal high water table:* More than 6.0 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
*Hazard of water erosion:* Very severe
*Soil reaction:* Very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Rock fragments on the surface:* About 1 to 3 percent stones and cobbles that average about 10 to 14 inches in diameter and 15 to 25 feet apart
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock with a high content of mica
*Depth to bedrock:* Madison—more than 72 inches; Bethlehem—20 to 40 inches to soft bedrock

### *Minor Components*

*Dissimilar:*
- Random areas of Hulett soils that have yellow or brown subsoils; on the outer edge of map units
- Random areas of Saw soils that have hard bedrock at a depth of less than 40 inches; on the outer edge of map units

*Similar:*
- Eroded Madison soils
- Eroded Bethlehem soils

### *Land Use*

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

### *Agricultural Development*

#### Cropland

*Suitability:* Suited
*Management concerns:* Erodibility and equipment use
*Management measures and considerations:*
- Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to reduce further soil erosion by stabilizing the soil, controlling surface runoff, and maximizing the infiltration of water.
- Removing the larger stones and limiting equipment use to the larger open areas help to improve workability of these soils.
- Using resource management systems that emphasize minimum tillage or no-till should be considered to reduce equipment deterioration and to increase the available water capacity.

#### Pasture and hayland

*Suitability for pasture:* Well suited
*Suitability for hayland:* Suited
*Management concerns:* Erodibility, equipment use, and soil fertility
*Management measures and considerations:*
- Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increases germination.
- Removing the larger stones or limiting equipment use to the larger open areas may be needed.
- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.

#### Woodland

*Suitability:* Suited
*Management concerns:* Madison—equipment use and seedling survival; Bethlehem—equipment use, seedling survival, and windthrow hazard
*Management measures and considerations:*
- Restricting logging operations to periods when the soils are not wet helps to prevent rutting of the soil surface and possible root damage from compaction.
- Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
- Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Bethlehem soil helps to increase productivity.

### *Urban Development*

#### Dwellings

*Suitability:* Suited
*Management concerns:* Madison—slope, erodibility, and corrosivity; Bethlehem—depth to rock, slope, erodibility, and corrosivity
*Management measures and considerations:*
- Grading or shaping land prior to construction helps

to reduce damage from surface water and prevents soil erosion.
• Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.
• Because of the depth to weathered bedrock in the Bethlehem soil, increased difficulty with excavation can be expected.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Madison—suited; Bethlehem—poorly suited
*Management concerns:* Madison—restricted permeability and slope; Bethlehem—depth to rock
*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 prevent the smearing and sealing of trench walls.
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
• Locating and using areas of the deeper Madison soil may improve the performance of filter fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Low strength and slope
*Management measures and considerations:*
• Incorporating sand and gravel into the soils 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 soil stability.

### *Interpretive Groups*

*Land capability classification:* Madison—6e; Bethlehem—3e
*Woodland ordination symbol:* Based on shortleaf pine as the indicator species, 6C in areas of the Madison soil and 7D in areas of the Bethlehem soil

## MnB—Madison-Bethlehem-Urban land complex, 2 to 8 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Madison—plane interfluves; Bethlehem—convex interfluves and nose slopes; Urban land—variable
*Shape of areas:* Irregular
*Size of areas:* 10 to 250 acres

### *Composition*

Madison soil and similar soils: 35 percent
Bethlehem soil and similar soils: 30 percent
Urban land: 25 percent
Dissimilar soils: 10 percent

### *Typical Profile*

**Madison**

*Surface layer:*
0 to 6 inches—strong brown gravelly sandy clay loam

*Subsoil:*
6 to 24 inches—red clay that has common flakes of mica
24 to 37 inches—red clay that has many flakes of mica
37 to 50 inches—red sandy clay loam that has many flakes of mica

*Underlying material:*
50 to 72 inches—reddish yellow sandy loam that has many flakes of mica

**Bethlehem**

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

*Subsoil:*
5 to 18 inches—red clay that has reddish yellow and weak red iron accumulations
18 to 27 inches—red clay that has weak red and reddish yellow iron accumulations

*Bedrock:*
27 to 60 inches—multicolored weathered mica schist
60 inches—unweathered mica schist

**Urban land**

Urban land consists of areas that are covered by streets, parking lots, driveways, or buildings. A typical profile is not given.

### *Soil Properties and Qualities of the Madison and Bethlehem Soils*

*Depth class:* Madison—very deep; Bethlehem—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Madison—moderate; Bethlehem—low

*Depth to seasonal high water table:* More than 6.0 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
*Hazard of water erosion:* Severe
*Soil reaction:* Very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Rock fragments on the surface:* Widely scattered stones and cobbles that average about 10 to 12 inches in diameter and 30 to 50 feet apart
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock with a high content of mica
*Depth to bedrock:* Madison—more than 72 inches; Bethlehem—20 to 40 inches to soft bedrock

### *Minor Components*

*Dissimilar:*
- Random areas of Udorthents in which the natural soils have been greatly altered by excavation or intensive grading or covered by earthy fill material
- Random areas of soils that have soft bedrock between depths of 40 and 60 inches

*Similar:*
- Slightly eroded Madison soils
- Slightly eroded Bethlehem soils

### *Land Use*

**Dominant Uses:** Urban development

### *Agricultural Development*

#### Cropland

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
- This map unit is difficult to manage for crop production because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.

#### Pasture and hayland

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
- This map unit is difficult to manage for the production of pasture and hay crops because of the small size of its areas.

#### Woodland

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
- This map unit is difficult to manage for timber production because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.
- Although timber production is rarely feasible in this map unit, planting trees has aesthetic benefits.
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

#### Dwellings

*Suitability for dwellings without basements:* Madison and Bethlehem—well suited; Urban land—none assigned
*Suitability for dwellings with basements:* Madison—well suited; Bethlehem—suited; Urban land—none assigned
*Management concerns:* Madison—erodibility and corrosivity; Bethlehem—erodibility, depth to rock, and corrosivity; Urban land—excessive surface water runoff
*Management measures and considerations:*
- Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.
- In areas of the Bethlehem soil, which is moderately deep to soft bedrock, increased difficulty with excavation can be expected when constructing dwellings with basements.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.
- Water-control structures, such as diversions and storm drains, are needed to control the increased surface water runoff from Urban land.

#### Septic tank absorption fields

*Suitability:* Madison—suited; Bethlehem—poorly suited; Urban land—none assigned
*Management concerns:* Restricted permeability in areas of the Madison soil and depth to rock and restricted permeability in areas of the Bethlehem soil
*Management measures and considerations:*
- Locating and using areas of the deeper Madison soil may improve the performance of filter fields.
- Raking trench walls and installing distribution lines during periods when the soils are not wet help to reduce sealing of soil pores during excavation of septic tank absorption fields.

• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Madison and Bethlehem—suited; Urban land—none assigned
*Management concerns:* Low soil strength
*Management measures and considerations:*
• Incorporating sand and gravel into the soils and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* Madison and Bethlehem—3e; Urban land—none assigned
*Woodland ordination symbol:* Based on shortleaf pine as the indicator species, 6C in areas of the Madison soil and 7D in areas of the Bethlehem soil; Urban land—none assigned

## MoE—Montonia very channery silt loam, 25 to 60 percent slopes, very stony

### *Setting*

*Landscape:* Piedmont
*Landform:* Hillslopes
*Landform position:* Summits and shoulder slopes
*Shape of areas:* Elongated or irregular
*Size of areas:* 10 to 300 acres

### *Composition*

Montonia soil and similar soils: 80 percent
Dissimilar soils: 20 percent

### *Typical Profile*

*Surface layer:*
0 to 3 inches—yellowish brown very channery silt loam
3 to 8 inches—strong brown channery silt loam

*Subsoil:*
8 to 19 inches—yellowish red channery clay loam
19 to 29 inches—yellowish red channery clay loam

*Bedrock:*
29 to 42 inches—weathered sericite schist
42 inches—unweathered sericite schist

### *Soil Properties and Qualities*

*Depth class:* Moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Low
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Steep
*Flooding:* None
*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 40 percent stones and cobbles that average about 18 to 21 inches in diameter and 10 to 20 feet apart
*Soil reaction:* Very strongly acid to moderately acid, except where surface layers have been limed
*Parent material:* Residuum weathered from fine-grained rocks
*Depth to bedrock:* 20 to 40 inches to soft bedrock and 40 to 60 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
• Random areas of Uwharrie soils that have hard bedrock at a depth of more than 60 inches
• Soils that have hard bedrock at a depth of less than 20 inches; on the lower side slopes

*Similar:*
• Random areas of soils that have more clay in the subsoil than the Montonia soil

### *Land Use*

**Dominant Uses:** Woodland
**Other Uses:** Pasture and hayland

### *Agricultural Development*

**Cropland**

*Suitability:* Unsuited
*Management concerns:* Erodibility and equipment use
*Management measures and considerations:*
• This map unit is severely limited for crop production because of the slope. A site should be selected on better suited soils.

**Pasture and hayland**

*Suitability for pasture:* Poorly suited
*Suitability for hayland:* Unsuited
*Management concerns:* Equipment use
*Management measures and considerations:*
• This map unit is severely limited for the production of pasture and hay crops because of the slope. A site should be selected on better suited soils.

**Woodland**

*Suitability:* Suited
*Management concerns:* Erodibility, equipment use, seedling survival, 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.
- Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, use of skid trails, and disturbance of the forest floor by heavy machinery.
- Maintaining surface litter helps to increase the infiltration of water and reduces seedling mortality rates.
- Periodically harvesting windthrown trees that result from high winds and a limited rooting depth helps to increase productivity.
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

**Dwellings**

*Suitability:* Unsuited
*Management concerns:* Slope
*Management measures and considerations:*
- This map unit is severely limited for dwellings because of the slope. A site should be selected on better suited soils.

**Septic tank absorption fields**

*Suitability:* Unsuited
*Management concerns:* Slope
*Management measures and considerations:*
- This map unit is severely limited for septic tank absorption fields because of the slope. The local Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Unsuited
*Management concerns:* Slope
*Management measures and considerations:*
- This map unit is severely limited for roads and streets because of the slope. 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

## PaC2—Pacolet sandy clay loam, 8 to 15 percent slopes, moderately eroded

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Shape of areas:* Irregular
*Size of areas:* 10 to 100 acres

### *Composition*

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

### *Typical Profile*

*Surface layer:*
0 to 7 inches—yellowish red sandy clay loam

*Subsoil:*
7 to 28 inches—red clay that has reddish yellow iron accumulations
28 to 44 inches—red sandy clay loam that has reddish yellow and pink iron accumulations

*Underlying material:*
44 to 60 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations
60 to 72 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Strongly sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Very severe
*Soil reaction:* Very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil and underlying material
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
• Bethlehem soils that have soft bedrock at a depth of less than 40 inches; on the outer edge of map units
• Saw soils that have hard bedrock at a depth of less than 40 inches; on the outer edge of map units

*Similar:*
• Cecil soils that have thicker subsoils than the Pacolet soil; on broad ridges
• Random areas of Madison soils that have more mica in the subsoil than the Pacolet soil

### *Land Use*

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

### *Agricultural Development*

#### Cropland

*Suitability:* Suited
*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, control surface runoff, and maximize 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 minimize clodding and crusting and increase 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
*Management concerns:* Erodibility, equipment use, and soil fertility
*Management measures and considerations:*
• Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increases germination.
• The slope may limit equipment use in the steeper areas when harvesting hay crops.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and 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
*Management measures and considerations:*
• Restricting logging operations to periods when the soil is not wet helps to prevent rutting of the soil surface and possible root damage from compaction.
• Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
• 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 and corrosivity
*Management measures and considerations:*
• Designing structures so that they conform to the natural slope helps to improve soil performance.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

#### 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 the 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:*
• Incorporating sand and gravel into the soil 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.

### *Interpretive Groups*

*Land capability classification:* 6e
*Woodland ordination symbol:* 6C based on loblolly pine as the indicator species

## PaD2—Pacolet sandy clay loam, 15 to 25 percent slopes, moderately eroded

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes
*Shape of areas:* Elongated
*Size of areas:* 10 to 50 acres

### *Composition*

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

### *Typical Profile*

*Surface layer:*
0 to 7 inches—yellowish red sandy clay loam

*Subsoil:*
7 to 28 inches—red clay that has reddish yellow iron accumulations
28 to 44 inches—red sandy clay loam that has reddish yellow and pink iron accumulations

*Underlying material:*
44 to 60 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations
60 to 72 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Moderately steep
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Very severe
*Soil reaction:* Very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil and underlying material
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
• Random areas of Saw soils that have hard bedrock at a depth of less than 40 inches

*Similar:*
• Pacolet soils that have surface layers of sandy loam
• Pacolet soils that have surface layers of gravelly sandy loam
• Madison soils that have more mica in the subsoil than the Pacolet soil
• Soils that are similar to the Pacolet soil but have yellow or brown subsoils

### *Land Use*

**Dominant Uses:** Woodland
**Other Uses:** Pasture and hayland

### *Agricultural Development*

**Cropland**

*Suitability:* Poorly suited
*Management concerns:* Erodibility, equipment use, 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, control surface runoff, and maximize the infiltration of water.
• This map unit is difficult to manage for cultivated crops because the slope limits equipment use.
• 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.
• 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:* Suited
*Suitability for hayland:* Poorly suited
*Management concerns:* Erodibility, equipment use, and soil fertility
*Management measures and considerations:*
• Preparing seedbeds on the contour or across the

slope helps to reduce the hazard of erosion and increases germination.
• The slope limits equipment use in the steeper areas.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

**Woodland**

*Suitability:* Suited
*Management concerns:* Erodibility, equipment use, and seedling survival
*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.
• Reforesting immediately after harvest using minimal site preparation and recommended tree species helps to control erosion and the siltation of streams.
• Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
• Restricting logging operations to periods when the soil is not wet helps to prevent rutting of the soil surface and possible root damage from compaction.
• Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

**Dwellings**

*Suitability:* Poorly suited
*Management concerns:* Erodibility, slope, and corrosivity
*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 on site.
• Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Poorly suited
*Management concerns:* Slope
*Management measures and considerations:*
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Poorly suited
*Management concerns:* Low strength, erodibility, and slope
*Management measures and considerations:*
• Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
• Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soil and prevents excessive soil erosion.
• Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.

### *Interpretive Groups*

*Land capability classification:* 7e
*Woodland ordination symbol:* 6R based on loblolly pine as the indicator species

## PbB2—Pacolet-Bethlehem complex, 2 to 8 percent slopes, moderately eroded

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Pacolet—plane or slightly concave interfluves; Bethlehem—convex interfluves and nose slopes
*Shape of areas:* Irregular
*Size of areas:* 10 to 100 acres

### *Composition*

Pacolet soil and similar soils: 55 percent
Bethlehem soil and similar soils: 40 percent
Dissimilar soils: 5 percent

### *Typical Profile*

**Pacolet**

*Surface layer:*
0 to 7 inches—yellowish red sandy clay loam

*Subsoil:*
7 to 28 inches—red clay that has reddish yellow iron accumulations
28 to 44 inches—red sandy clay loam that has reddish yellow and pink iron accumulations

*Underlying material:*
44 to 60 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations
60 to 72 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations

**Bethlehem**

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

*Subsoil:*
8 to 30 inches—red clay that has reddish yellow iron accumulations
30 to 34 inches—red gravelly sandy clay loam that has reddish yellow iron accumulations

*Bedrock:*
34 to 45 inches—weathered mica schist
45 inches—unweathered mica schist

### *Soil Properties and Qualities*

*Depth class:* Pacolet—very deep; Bethlehem—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Gently sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Soil reaction:* Pacolet—very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil and underlying material; Bethlehem—very strongly acid to moderately acid, except in limed areas
*Depth to bedrock:* Pacolet—60 to more than 72 inches; Bethlehem—20 to 40 inches to soft bedrock and 40 to 60 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
- Random areas of soils that have soft bedrock at a depth of less than 20 inches
- Random areas of soils that have soft bedrock between depths of 40 and 60 inches
- Random areas of Madison soils that have more mica in the subsoil than the Pacolet and Bethlehem soils

*Similar:*
- Cecil soils that have thicker subsoils than the Pacolet and Bethlehem soils

### *Land Use*

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

### *Agricultural Development*

**Cropland**

*Suitability:* Suited
*Management concerns:* Pacolet—erodibility, equipment use, tilth, and soil fertility; Bethlehem—erodibility, equipment use, tilth, rooting depth, 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.
- Using resource management systems that emphasize minimum tillage or no-till should be considered to reduce equipment deterioration and to increase the available water capacity.
- 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.
- Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Bethlehem soil.
- 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
*Management concerns:* Pacolet—erodibility and soil fertility; Bethlehem—erodibility, rooting depth, and soil fertility
*Management measures and considerations:*
- Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
- Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting

shallow-rooted crops helps to overcome the moderately deep rooting depth of the Bethlehem soil.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

**Woodland**

*Suitability:* Suited
*Management concerns:* Pacolet—equipment use and seedling survival; Bethlehem—equipment use, seedling survival, and windthrow hazard
*Management measures and considerations:*
• Restricting logging operations to periods when the soils are not wet helps to prevent rutting of the soil surface and possible root damage from compaction.
• Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Bethlehem soil helps to increase productivity.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

**Dwellings**

*Suitability for dwellings without basements:* Well suited
*Suitability for dwellings with basements:* Pacolet—well suited; Bethlehem—suited
*Management concerns:* Pacolet—erodibility and corrosivity; Bethlehem—erodibility, depth to rock, and corrosivity
*Management measures and considerations:*
• Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.
• In areas of the Bethlehem soil, which is moderately deep to soft bedrock, increased difficulty with excavation can be expected when constructing dwellings with basements.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Pacolet—suited; Bethlehem—poorly suited
*Management concerns:* Pacolet—restricted permeability; Bethlehem—depth to rock and restricted permeability
*Management measures and considerations:*
• Locating and using areas of the deeper Pacolet soil may improve the performance of filter fields.
• Raking trench walls and installing distribution lines during periods when the soils are not wet help to reduce sealing of soil pores during excavation of septic tank absorption fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Low strength
*Management measures and considerations:*
• Incorporating sand and gravel into the soils and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* 3e
*Woodland ordination symbol:* Pacolet—6C based on loblolly pine as the indicator species; Bethlehem—7D based on shortleaf pine as the indicator species

## PbC2—Pacolet-Bethlehem complex, 8 to 15 percent slopes, moderately eroded

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Pacolet—plane or slightly concave interfluves and side slopes; Bethlehem—convex interfluves and side slopes
*Shape of areas:* Elongated or irregular
*Size of areas:* 10 to 100 acres

### *Composition*

Pacolet soil and similar soils: 55 percent
Bethlehem soil and similar soils: 40 percent
Dissimilar soils: 5 percent

### *Typical Profile*

**Pacolet**

*Surface layer:*
0 to 7 inches—yellowish red sandy clay loam

*Subsoil:*
7 to 28 inches—red clay that has reddish yellow iron accumulations

28 to 44 inches—red sandy clay loam that has reddish yellow and pink iron accumulations

*Underlying material:*
44 to 60 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations
60 to 72 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations

**Bethlehem**

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

*Subsoil:*
8 to 30 inches—red clay that has reddish yellow iron accumulations
30 to 34 inches—red gravelly sandy clay loam that has reddish yellow iron accumulations

*Bedrock:*
34 to 45 inches—weathered mica schist
45 inches—unweathered mica schist

## *Soil Properties and Qualities*

*Depth class:* Pacolet—very deep; Bethlehem—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Strongly sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Very severe
*Soil reaction:* Pacolet—very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil and underlying material; Bethlehem—very strongly acid to moderately acid, except in limed areas
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Depth to bedrock:* Pacolet—60 to more than 72 inches; Bethlehem—20 to 40 inches to soft bedrock and 40 to 60 inches to hard bedrock

## *Minor Components*

*Dissimilar:*
- Random areas of soils that have soft bedrock at a depth of less than 20 inches
- Random areas of soils that have soft bedrock between depths of 40 and 60 inches
- Random areas of Madison soils that have more mica in the subsoil than the Pacolet and Bethlehem soils

*Similar:*
- Cecil soils that have thicker subsoils than the Pacolet and Bethlehem soils

## *Land Use*

**Dominant Uses:** Pasture (fig. 9) and woodland
**Other Uses:** Cropland

## *Agricultural Development*

**Cropland**

*Suitability:* Suited
*Management concerns:* Pacolet—erodibility, equipment use, tilth, and soil fertility; Bethlehem—erodibility, equipment use, tilth, rooting depth, 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, control surface runoff, and maximize the infiltration of water.
- Using resource management systems that emphasize minimum tillage or no-till should be considered to reduce equipment deterioration and to increase the available water capacity.
- 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.
- Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Bethlehem soil.
- 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
*Management concerns:* Pacolet—erodibility, equipment use, and soil fertility; Bethlehem—erodibility, equipment use, rooting depth, and soil fertility
*Management measures and considerations:*
- Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increases germination.

**Figure 9.—Cattle grazing on fescue pasture in an area of Pacolet-Bethlehem complex, 8 to 15 percent slopes, moderately eroded.**

- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Bethlehem soil.
- Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.

### Woodland

*Suitability:* Suited
*Management concerns:* Pacolet—equipment use and seedling survival; Bethlehem—equipment use, seedling survival, and windthrow hazard
*Management measures and considerations:*
- Restricting logging operations to periods when the soils are not wet helps to prevent rutting of the soil surface and possible root damage from compaction.
- Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
- Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Bethlehem soil helps to increase productivity.
- 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:* Pacolet—erodibility, slope,

and corrosivity; Bethlehem—erodibility, slope, depth to rock, and corrosivity
*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 on site.
• Grading or shaping land prior to construction helps to reduce damage from surface water and prevents soil erosion.
• In areas of the Bethlehem soil, which is moderately deep to soft bedrock, increased difficulty with excavation can be expected when constructing dwellings with basements.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Pacolet—suited; Bethlehem—poorly suited
*Management concerns:* Pacolet—restricted permeability and slope; Bethlehem—depth to rock
*Management measures and considerations:*
• Locating and using areas of the deeper Pacolet soil may improve the performance of filter fields.
• Raking trench walls and installing distribution lines during periods when the soils are not wet help to reduce sealing of soil pores during excavation of septic tank absorption fields.
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Low strength and slope
*Management measures and considerations:*
• Incorporating sand and gravel into the soils, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
• Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.

### *Interpretive Groups*

*Land capability classification:* Pacolet—6e; Bethlehem—4e
*Woodland ordination symbol:* Pacolet—6C based on loblolly pine as the indicator species; Bethlehem—7D based on shortleaf pine as the indicator species

## PbD2—Pacolet-Bethlehem complex, 15 to 25 percent slopes, moderately eroded

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes
*Shape of areas:* Elongated
*Size of areas:* 10 to 100 acres

### *Composition*

Pacolet soil and similar soils: 50 percent
Bethlehem soil and similar soils: 40 percent
Dissimilar soils: 10 percent

### *Typical Profile*

**Pacolet**

*Surface layer:*
0 to 8 inches—yellowish red gravelly sandy clay loam

*Subsoil:*
8 to 27 inches—red clay that has reddish yellow iron accumulations
27 to 50 inches—red clay loam that has reddish yellow and pink iron accumulations

*Underlying material:*
50 to 72 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations

**Bethlehem**

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

*Subsoil:*
8 to 30 inches—red clay that has reddish yellow iron accumulations
30 to 34 inches—red gravelly sandy clay loam that has reddish yellow iron accumulations

*Bedrock:*
34 to 45 inches—weathered mica schist
45 inches—unweathered mica schist

### *Soil Properties and Qualities*

*Depth class:* Pacolet—very deep; Bethlehem—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Moderately steep
*Flooding:* None

*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Very severe
*Soil reaction:* Pacolet—very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil and underlying material; Bethlehem—very strongly acid to moderately acid, except in limed areas
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Depth to bedrock:* Pacolet—more than 60 inches; Bethlehem—20 to 40 inches to soft bedrock and 40 to 60 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
• Cliffside soils that have more rock fragments in the subsoil than the Pacolet and Bethlehem soils; on shoulder slopes

*Similar:*
• Cecil soils that have thicker subsoils than the Pacolet and Bethlehem soils

### *Land Use*

**Dominant Uses:** Woodland
**Other Uses:** Pasture and hayland

### *Agricultural Development*

**Cropland**

*Suitability:* Poorly suited
*Management concerns:* Pacolet—erodibility, equipment use, tilth, and soil fertility; Bethlehem—erodibility, equipment use, tilth, rooting depth, 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, control surface runoff, and maximize the infiltration of water.
• This map unit is difficult to manage for cultivated crops because the slope limits equipment use.
• 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.
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Bethlehem soil.
• 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:* Suited
*Suitability for hayland:* Poorly suited
*Management concerns:* Pacolet—erodibility, equipment use, and soil fertility; Bethlehem—erodibility, equipment use, rooting depth, and soil fertility
*Management measures and considerations:*
• Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increase germination.
• The slope limits equipment use in the steeper areas.
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Bethlehem soil.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

**Woodland**

*Suitability:* Suited
*Management concerns:* Pacolet—erodibility, equipment use, and seedling survival; Bethlehem—erodibility, equipment use, seedling survival, 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.
• Reforesting immediately after harvest using minimal site preparation and recommended tree species helps to control erosion and the siltation of streams.
• Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
• Restricting logging operations to periods when the soils are not wet helps to prevent rutting of the soil surface and possible root damage from compaction.
• Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Bethlehem soil helps to increase productivity.

• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

**Dwellings**

*Suitability:* Poorly suited
*Management concerns:* Erodibility, slope, and corrosivity
*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 on site.
• Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Poorly suited
*Management concerns:* Pacolet—slope; Bethlehem—depth to rock and slope
*Management measures and considerations:*
• Locating and using areas of the deeper Pacolet soil may improve the performance of filter fields.
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Poorly suited
*Management concerns:* Low strength, erodibility, and slope
*Management measures and considerations:*
• Incorporating sand and gravel into the soils, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
• Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soils and prevents excessive soil erosion.
• Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.

### *Interpretive Groups*

*Land capability classification:* Pacolet—7e; Bethlehem—6e
*Woodland ordination symbol:* Pacolet—6R based on loblolly pine as the indicator species; Bethlehem—7R based on shortleaf pine as the indicator species

## PeD—Pacolet-Bethlehem complex, 15 to 25 percent slopes, stony

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes
*Shape of areas:* Elongated
*Size of areas:* 10 to 100 acres

### *Composition*

Pacolet soil and similar soils: 50 percent
Bethlehem soil and similar soils: 40 percent
Dissimilar soils: 10 percent

### *Typical Profile*

**Pacolet**

*Surface layer:*
0 to 8 inches—yellowish red gravelly sandy clay loam

*Subsoil:*
8 to 27 inches—red clay that has reddish yellow iron accumulations
27 to 50 inches—red clay loam that has reddish yellow and pink iron accumulations

*Underlying material:*
50 to 72 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations

**Bethlehem**

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

*Subsoil:*
8 to 30 inches—red clay that has reddish yellow iron accumulations
30 to 34 inches—red gravelly sandy clay loam that has reddish yellow iron accumulations

*Bedrock:*
34 to 45 inches—weathered mica schist
45 inches—unweathered mica schist

### *Soil Properties and Qualities*

*Depth class:* Pacolet—very deep; Bethlehem—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Moderately steep
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Very severe
*Soil reaction:* Pacolet—very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil and underlying material; Bethlehem—very strongly acid to moderately acid, except in limed areas
*Rock fragments on the surface:* Widely scattered stones and cobbles that average about 10 to 12 inches in diameter and 50 feet apart
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Depth to bedrock:* Pacolet—more than 60 inches; Bethlehem—20 to 40 inches to soft bedrock

### *Minor Components*

*Dissimilar:*
• Cliffside soils that have more rock fragments in the subsoil than the Pacolet and Bethlehem soils; on shoulder slopes and on the outer edge of map units

*Similar:*
• Cecil soils that have thicker subsoils than the Pacolet and Bethlehem soils

### *Land Use*

**Dominant Uses:** Woodland
**Other Uses:** Pasture and hayland

### *Agricultural Development*

#### Cropland

*Suitability:* Poorly suited
*Management concerns:* Pacolet—erodibility, equipment use, tilth, and soil fertility; Bethlehem—erodibility, equipment use, tilth, rooting depth, 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, control surface runoff, and maximize the infiltration of water.
• This map unit is difficult to manage for cultivated crops because the slope limits equipment use.
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Bethlehem soil.
• 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:* Suited
*Suitability for hayland:* Poorly suited
*Management concerns:* Pacolet—erodibility, equipment use, and soil fertility; Bethlehem—erodibility, equipment use, rooting depth, and soil fertility
*Management measures and considerations:*
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.
• Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increases germination.
• The slope limits equipment use in the steeper areas.
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Bethlehem soil.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.

#### Woodland

*Suitability:* Suited
*Management concerns:* Pacolet—erodibility and equipment use; Bethlehem—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.
• Reforesting immediately after harvest using minimal site preparation and recommended tree species helps to control erosion and the siltation of streams.
• Constructing roads, fire lanes, and skid trails on the contour helps to overcome the slope limitation.
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Bethlehem soil helps to increase productivity.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

**Dwellings**

*Suitability:* Poorly suited
*Management concerns:* Erodibility, slope, and corrosivity
*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 on site.
• Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Poorly suited
*Management concerns:* Pacolet—restricted permeability and slope; Bethlehem—depth to rock, restricted permeability, and slope
*Management measures and considerations:*
• Locating and using areas of the deeper included soils may improve the performance of filter fields.
• Raking trench walls and installing distribution lines during periods when the soils are not wet help to reduce sealing of soil pores during excavation of septic tank absorption fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Poorly suited
*Management concerns:* Low strength, erodibility, and slope
*Management measures and considerations:*
• Incorporating sand and gravel into the soils, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
• Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soils and prevents excessive soil erosion.
• Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.

### *Interpretive Groups*

*Land capability classification:* 6e
*Woodland ordination symbol:* Pacolet—8R based on loblolly pine as the indicator species; Bethlehem—7R based on shortleaf pine as the indicator species

## PrB—Pacolet-Bethlehem-Urban land complex, 2 to 8 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Pacolet—plane interfluves; Bethlehem—convex interfluves and nose slopes; Urban land—variable
*Shape of areas:* Irregular
*Size of areas:* 5 to 50 acres

### *Composition*

Pacolet soil and similar soils: 35 percent
Bethlehem soil and similar soils: 30 percent
Urban land: 25 percent
Dissimilar soils: 10 percent

### *Typical Profile*

**Pacolet**

*Surface layer:*
0 to 7 inches—yellowish red sandy clay loam

*Subsoil:*
7 to 28 inches—red clay that has reddish yellow iron accumulations
28 to 44 inches—red sandy clay loam that has reddish yellow and pink iron accumulations

*Underlying material:*
44 to 60 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations
60 to 72 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations

**Bethlehem**

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

*Subsoil:*
8 to 30 inches—red clay that has reddish yellow iron accumulations
30 to 34 inches—red gravelly sandy clay loam that has reddish yellow iron accumulations

*Bedrock:*
34 to 45 inches—weathered mica schist
45 inches—unweathered mica schist

**Urban land**

Urban land consists of areas that are covered by streets, parking lots, driveways, or buildings. A typical profile is not given.

### *Soil Properties and Qualities of the Pacolet and Bethlehem Soils*

*Depth class:* Pacolet—very deep; Bethlehem—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Gently sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Soil reaction:* Pacolet—very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil and underlying material; Bethlehem—very strongly acid to moderately acid, except in limed areas
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Depth to bedrock:* Pacolet—60 to more than 72 inches; Bethlehem—20 to 40 inches to soft bedrock and more than 40 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
- Random areas of Udorthents in which the natural soils have been greatly altered by excavation or intensive grading or covered by earthy fill material
- Random areas of soils that have soft bedrock between depths of 40 and 60 inches

*Similar:*
- Slightly eroded Pacolet soils
- Slightly eroded Bethlehem soils

### *Land Use*

**Dominant Uses:** Urban development

### *Agricultural Development*

#### Cropland

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
- This map unit is difficult to manage for crop production because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.

#### Pasture and hayland

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
- This map unit is difficult to manage for the production of pasture and hay crops because of the small size of its areas.

#### Woodland

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
- This map unit is difficult to manage for timber production because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.
- Although timber production is rarely feasible in this map unit, planting trees has aesthetic benefits.
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

#### Dwellings

*Suitability for dwellings without basements:* Pacolet and Bethlehem—well suited; Urban land—none assigned
*Suitability for dwellings with basements:* Pacolet—well suited; Bethlehem—suited; Urban land—none assigned
*Management concerns:* Pacolet—erodibility and corrosivity; Bethlehem—erodibility, depth to rock, and corrosivity; Urban land—excessive surface water runoff
*Management measures and considerations:*
- Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.
- In areas of the Bethlehem soil, which is moderately deep to soft bedrock, increased difficulty with excavation can be expected when constructing dwellings with basements.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.
- Water-control structures, such as diversions and storm drains, are needed to control the increased surface water runoff from Urban land.

#### Septic tank absorption fields

*Suitability:* Pacolet—suited; Bethlehem—poorly suited; Urban land—none assigned
*Management concerns:* Restricted permeability in areas of the Pacolet soil and depth to rock and restricted permeability in areas of the Bethlehem soil

*Management measures and considerations:*
- Locating and using areas of the deeper Pacolet soil may improve the performance of filter fields.
- Raking trench walls and installing distribution lines during periods when the soils are not wet help to reduce sealing of soil pores during excavation of septic tank absorption fields.
- The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Pacolet and Bethlehem—suited; Urban land—none assigned
*Management concerns:* Low soil strength
*Management measures and considerations:*
- Incorporating sand and gravel into the soils and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* Pacolet and Bethlehem—3e; Urban land—none assigned
*Woodland ordination symbol:* Pacolet—6C based on loblolly pine as the indicator species; Bethlehem—7D based on shortleaf pine as the indicator species; Urban land—none assigned

## PrC—Pacolet-Bethlehem-Urban land complex, 8 to 15 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Pacolet—plane or slightly concave interfluves and side slopes; Bethlehem—convex interfluves and side slopes; Urban land—variable
*Shape of areas:* Irregular
*Size of areas:* 20 to 100 acres

### *Composition*

Pacolet soil and similar soils: 35 percent
Bethlehem soil and similar soils: 30 percent
Urban land: 25 percent
Dissimilar soils: 10 percent

### *Typical Profile*

**Pacolet**

*Surface layer:*
0 to 7 inches—yellowish red sandy clay loam

*Subsoil:*
7 to 28 inches—red clay that has reddish yellow iron accumulations
28 to 44 inches—red sandy clay loam that has reddish yellow and pink iron accumulations

*Underlying material:*
44 to 60 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations
60 to 72 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations

**Bethlehem**

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

*Subsoil:*
8 to 30 inches—red clay that has reddish yellow iron accumulations
30 to 34 inches—red gravelly sandy clay loam that has reddish yellow iron accumulations

*Bedrock:*
34 to 45 inches—weathered mica schist
45 inches—unweathered mica schist

**Urban land**

Urban land consists of areas that are covered by streets, parking lots, driveways, or buildings. A typical profile is not given.

### *Soil Properties and Qualities of the Pacolet and Bethlehem Soils*

*Depth class:* Pacolet—very deep; Bethlehem—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Strongly sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Soil reaction:* Pacolet—very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil and underlying material; Bethlehem—very strongly acid to moderately acid, except in limed areas
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Depth to bedrock:* Pacolet—60 to more than 72 inches; Bethlehem—20 to 40 inches to soft bedrock and more than 40 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
- Random areas of Udorthents in which the natural soils have been greatly altered by excavation or intensive grading or covered by earthy fill material
- Random areas of soils that have soft bedrock between depths of 40 and 60 inches

*Similar:*
- Slightly eroded Pacolet soils
- Slightly eroded Bethlehem soils

### *Land Use*

**Dominant Uses:** Urban development

### *Agricultural Development*

#### Cropland

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
- This map unit is difficult to manage for crop production because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.

#### Pasture and hayland

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
- This map unit is difficult to manage for production of pasture and hay crops because of the small size of its areas.

#### Woodland

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
- This map unit is difficult to manage for timber production because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.
- Although timber production is rarely feasible in this map unit, planting trees has aesthetic benefits.
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

#### Dwellings

*Suitability:* Pacolet—well suited; Bethlehem—suited; Urban land—none assigned
*Management concerns:* Pacolet—erodibility, slope, and corrosivity; Bethlehem—erodibility, slope, depth to rock, and corrosivity; Urban land—excessive surface water runoff
*Management measures and considerations:*
- Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.
- Grading or shaping land prior to construction helps to reduce damage from surface water and prevents soil erosion.
- In areas of the Bethlehem soil, which is moderately deep to soft bedrock, increased difficulty with excavation can be expected when constructing dwellings with basements.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.
- Water-control structures, such as diversions and storm drains, are needed to control the increased surface water runoff from Urban land.

#### Septic tank absorption fields

*Suitability:* Pacolet—suited; Bethlehem—poorly suited; Urban land—none assigned
*Management concerns:* Restricted permeability in areas of the Pacolet soil and depth to rock and restricted permeability in areas of the Bethlehem soil
*Management measures and considerations:*
- Locating and using areas of the deeper Pacolet soil may improve the performance of filter fields.
- Raking trench walls and installing distribution lines during periods when the soils are not wet help to reduce sealing of soil pores during excavation of septic tank absorption fields.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

#### Local roads and streets

*Suitability:* Pacolet and Bethlehem—suited; Urban land—none assigned
*Management concerns:* Low soil strength and slope
*Management measures and considerations:*
- Incorporating sand and gravel into the soils 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.

### *Interpretive Groups*

*Land capability classification:* Pacolet—6e; Bethlehem—4e; Urban land—none assigned

*Woodland ordination symbol:* Pacolet—6C based on loblolly pine as the indicator species; Bethlehem—7D based on shortleaf pine as the indicator species; Urban land—none assigned

## PsB2—Pacolet-Saw complex, 2 to 8 percent slopes, moderately eroded

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves
*Shape of areas:* Irregular
*Size of areas:* 10 to 60 acres

### *Composition*

Pacolet soil and similar soils: 60 percent
Saw soil and similar soils: 30 percent
Dissimilar soils: 10 percent

### *Typical Profile*

**Pacolet**

*Surface layer:*
0 to 7 inches—yellowish red sandy clay loam

*Subsoil:*
7 to 28 inches—red clay that has reddish yellow iron accumulations
28 to 44 inches—red sandy clay loam that has reddish yellow and pink iron accumulations

*Underlying material:*
44 to 60 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations
60 to 72 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations

**Saw**

*Surface layer:*
0 to 5 inches—yellowish red gravelly sandy clay loam

*Subsoil:*
5 to 21 inches—red clay
21 to 31 inches—red clay loam that has yellowish red iron accumulations

*Bedrock:*
31 inches—unweathered, slightly fractured granite

### *Soil Properties and Qualities*

*Depth class:* Pacolet—very deep; Saw—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Gently sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Soil reaction:* Pacolet—very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil and underlying material; Saw—very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from felsic igneous rock
*Depth to bedrock:* Pacolet—60 to more than 72 inches; Saw—20 to 40 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
- Random areas of soils that have hard bedrock at a depth of less than 60 inches
- Bethlehem soils that have soft bedrock at a depth of less than 40 inches; on the outer edge of the map unit

*Similar:*
- Random areas of Cecil soils that have thicker subsoils than the Pacolet and Saw soils

### *Land Use*

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

### *Agricultural Development*

**Cropland**

*Suitability:* Suited
*Management concerns:* Pacolet—erodibility, tilth, and soil fertility; Saw—erodibility, tilth, rooting depth, and soil fertility
*Management measures and considerations:*
- Resource management systems that include conservation tillage, crop residue management, stripcropping, and sod-based rotations help to reduce further soil 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.
- Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting

shallow-rooted crops helps to overcome the moderately deep rooting depth of the Saw soil.
• 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
*Management concerns:* Pacolet—soil fertility; Saw—rooting depth and soil fertility
*Management measures and considerations:*
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Saw soil.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

**Woodland**

*Suitability:* Pacolet—well suited; Saw—suited
*Management concerns:* Pacolet—equipment use and seedling survival; Saw—equipment use, seedling survival, and windthrow hazard
*Management measures and considerations:*
• Restricting logging operations to periods when the soils are not wet helps to prevent rutting of the soil surface and possible root damage from compaction.
• Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Saw soil helps to increase productivity.
• Extra care is needed in the maintenance of roads and fire lanes because of the windthrow potential in areas of the Saw soil.

### *Urban Development*

**Dwellings**

*Suitability for dwellings without basements:* Pacolet—well suited; Saw—suited
*Suitability for dwellings with basements:* Pacolet—well suited; Saw—poorly suited
*Management concerns:* Pacolet—erodibility and corrosivity; Saw—erodibility, depth to rock, and corrosivity
*Management measures and considerations:*
• Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.
• Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of the Saw soil.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Pacolet—suited; Saw—poorly suited
*Management concerns:* Pacolet—restricted permeability; Saw—restricted permeability and depth to rock
*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 prevent the smearing and sealing of trench walls.
• Locating and using areas of the deeper Pacolet soil may improve the performance of filter fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Pacolet—low strength; Saw—depth to rock and low strength
*Management measures and considerations:*
• Incorporating sand and gravel into the soils and compacting roadbeds help to improve soil strength.
• Blasting or special grading equipment may be needed to construct roads in areas of the Saw soil.

### *Interpretive Groups*

*Land capability classification:* 3e
*Woodland ordination symbol:* Pacolet—6C based on loblolly pine as the indicator species; Saw—6D based on shortleaf pine as the indicator species

## PsC2—Pacolet-Saw complex, 8 to 15 percent slopes, moderately eroded

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Shape of areas:* Irregular or elongated
*Size of areas:* 10 to 60 acres

### Composition

Pacolet soil and similar soils: 60 percent
Saw soil and similar soils: 30 percent
Dissimilar soils: 10 percent

### Typical Profile

**Pacolet**

*Surface layer:*
0 to 8 inches—yellowish red gravelly sandy clay loam

*Subsoil:*
8 to 27 inches—red clay that has reddish yellow iron accumulations
27 to 50 inches—red clay loam that has reddish yellow and pink iron accumulations

*Underlying material:*
50 to 72 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations

**Saw**

*Surface layer:*
0 to 5 inches—yellowish red gravelly sandy clay loam

*Subsoil:*
5 to 21 inches—red clay
21 to 31 inches—red clay loam that has yellowish red iron accumulations

*Bedrock:*
31 inches—unweathered, slightly fractured granite

### Soil Properties and Qualities

*Depth class:* Pacolet—very deep; Saw—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Strongly sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Very severe
*Soil reaction:* Pacolet—very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil and underlying material; Saw—very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from felsic igneous rock
*Depth to bedrock:* Pacolet—60 to more than 72 inches; Saw—20 to 40 inches to hard bedrock

### Minor Components

*Dissimilar:*
- Random areas of soils that have hard bedrock at a depth of less than 60 inches
- Random areas of Wake soils that have soft bedrock at a depth of less than 20 inches

*Similar:*
- Random areas of Cecil soils that have thicker subsoils than the Pacolet and Saw soils

### Land Use

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

### Agricultural Development

**Cropland**

*Suitability:* Suited
*Management concerns:* Pacolet—erodibility, tilth, and soil fertility; Saw—erodibility, tilth, rooting depth, 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, control surface runoff, and maximize 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.
- Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Saw soil.
- 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
*Management concerns:* Pacolet—erodibility, equipment use, and soil fertility; Saw—erodibility, equipment use, rooting depth, and soil fertility
*Management measures and considerations:*
- Preparing seedbeds on the contour or across the slope helps to minimize erosion and increases germination.

• The slope may limit equipment use in the steeper areas when harvesting hay crops.
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Saw soil.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

**Woodland**

*Suitability:* Pacolet—well suited; Saw—suited
*Management concerns:* Pacolet—equipment use and seedling survival; Saw—equipment use, seedling survival, and windthrow hazard
*Management measures and considerations:*
• Restricting logging operations to periods when the soils are not wet helps to prevent rutting of the soil surface and possible root damage from compaction.
• Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Saw soil helps to increase productivity.
• Extra care is needed in the maintenance of roads and fire lanes because of the windthrow potential in areas of the Saw soil.

### *Urban Development*

**Dwellings**

*Suitability for dwellings without basements:* Suited
*Suitability for dwellings with basements:* Pacolet—suited; Saw—poorly suited
*Management concerns:* Pacolet—slope, erodibility, and corrosivity; Saw—slope, erodibility, depth to rock, and corrosivity
*Management measures and considerations:*
• Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
• Vegetating cleared and graded areas as soon as possible or constructing silt fences helps to maintain soil stability and keep sediments on site.
• Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of the Saw soil.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Pacolet—suited; Saw—poorly suited
*Management concerns:* Pacolet—restricted permeability and slope; Saw—restricted permeability, slope, and depth to rock
*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 prevent the smearing and sealing of trench walls.
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
• Locating and using areas of the deeper Pacolet soils may improve the performance of filter fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Pacolet—low strength and slope; Saw—low strength, depth to rock, and slope
*Management measures and considerations:*
• Incorporating sand and gravel into the soils 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 in areas of the Saw soil.

### *Interpretive Groups*

*Land capability classification:* Pacolet—6e; Saw—4e
*Woodland ordination symbol:* Pacolet— 6C based on loblolly pine as the indicator species; Saw—6D based on shortleaf pine as the indicator species

## PtD—Pacolet-Saw complex, 15 to 25 percent slopes, stony

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes
*Shape of areas:* Elongated or irregular
*Size of areas:* 10 to 150 acres

### *Composition*

Pacolet soil and similar soils: 45 percent
Saw soil and similar soils: 40 percent
Dissimilar soils: 15 percent

### *Typical Profile*

**Pacolet**

*Surface layer:*
0 to 7 inches—yellowish red sandy clay loam

*Subsoil:*
7 to 28 inches—red clay that has reddish yellow iron accumulations
28 to 44 inches—red sandy clay loam that has reddish yellow and pink iron accumulations

*Underlying material:*
44 to 60 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations
60 to 72 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations

**Saw**

*Surface layer:*
0 to 5 inches—yellowish red gravelly sandy clay loam

*Subsoil:*
5 to 21 inches—red clay
21 to 31 inches—red clay loam that has yellowish red iron accumulations

*Bedrock:*
31 inches—unweathered, slightly fractured granite

### *Soil Properties and Qualities*

*Depth class:* Pacolet—very deep; Saw—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Moderately steep
*Flooding:* None
*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:* Widely scattered stones and cobbles that average about 10 to 18 inches in diameter and 25 to 50 feet apart
*Soil reaction:* Pacolet—very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil and underlying material; Saw—very strongly acid to moderately acid throughout the profile
*Parent material:* Residuum weathered from felsic igneous rock
*Depth to bedrock:* Pacolet—60 to more than 72 inches; Saw—20 to 40 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
- Random areas of soils that have hard bedrock at a depth of less than 60 inches
- Random areas of soils that have hard bedrock at a depth of less than 20 inches

*Similar:*
- Random areas of Rion soils that have less clay in the subsoil than the Pacolet and Saw soils
- Random areas of Grover soils that have more mica in the subsoil than the Pacolet and Saw soils
- Random areas of Pacolet and Saw soils that have moderately eroded surface layers

### *Land Use*

**Dominant Uses:** Woodland
**Other Uses:** Pasture and hayland

### *Agricultural Development*

**Cropland**

*Suitability:* Poorly suited
*Management concerns:* Pacolet—erodibility, equipment use, and soil fertility; Saw—erodibility, equipment use, rooting depth, 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, control surface runoff, and maximize the infiltration of water.
- This map unit is difficult to manage for cultivated crops because the slope limits equipment use.
- Removing the larger stones and limiting equipment use to the larger open areas helps to improve workability of these soils.
- Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Saw soil.
- 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:* Suited
*Suitability for hayland:* Poorly suited
*Management concerns:* Pacolet—erodibility, equipment use, soil fertility; Saw—erodibility, equipment use, rooting depth, and soil fertility
*Management measures and considerations:*
• Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
• The slope limits equipment use in the steeper areas.
• Removing the larger stones or limiting equipment use to the larger open areas may be needed.
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Saw soil.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

**Woodland**

*Suitability:* Suited
*Management concerns:* Pacolet—erodibility, equipment use, and seedling survival; Saw—erodibility, equipment use, seedling survival, 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.
• Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Saw soil helps to increase productivity.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

**Dwellings**

*Suitability:* Poorly suited
*Management concerns:* Pacolet—erodibility, slope, and corrosivity; Saw—erodibility, slope, corrosivity, and depth to rock
*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 on site.
• Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.
• Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of the Saw soil.

**Septic tank absorption fields**

*Suitability:* Poorly suited
*Management concerns:* Pacolet—slope; Saw—depth to rock and slope
*Management measures and considerations:*
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
• Locating and using areas of the deeper Pacolet soil may improve the performance of filter fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Poorly suited
*Management concerns:* Slope
*Management measures and considerations:*
• Designing roads on the contour and providing adequate water-control structures, such as culverts, help to maintain road stability.

### *Interpretive Groups*

*Land capability classification:* 6e
*Woodland ordination symbol:* Pacolet—8R based on loblolly pine as the indicator species; Saw—6R based on shortleaf pine as the indicator species

## PuC—Pacolet-Urban land complex, 8 to 15 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes
*Shape of areas:* Elongated or irregular
*Size of areas:* 10 to 50 acres

### *Composition*

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

### *Typical Profile*

**Pacolet**

*Surface layer:*
0 to 7 inches—yellowish red sandy clay loam

*Subsoil:*
7 to 28 inches—red clay that has reddish yellow iron accumulations
28 to 44 inches—red clay loam that has reddish yellow and pink iron accumulations

*Underlying material:*
44 to 60 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations
60 to 72 inches—yellowish red sandy loam saprolite that has reddish yellow and dark reddish brown iron accumulations

**Urban land**

Urban land consists of areas that are covered by streets, parking lots, driveways, buildings, or runways. A typical profile is not given.

### *Soil Properties and Qualities of the Pacolet Soil*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Strongly sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Very severe
*Soil reaction:* Very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil and underlying material
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
- Random areas of Udorthents in which the natural soils have been greatly altered by excavation or intensive grading or covered by earthy fill material

*Similar:*
- Cecil soils that have thicker subsoils than the Pacolet soil

### *Land Use*

**Dominant Uses:** Urban development

### *Agricultural Development*

**Cropland**

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
- This map unit is difficult to manage for crop production because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.

**Pasture and hayland**

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
- This map unit is difficult to manage for the production of pasture and hay crops because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.

**Woodland**

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
- This map unit is difficult to manage for timber production because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.
- Although timber production is rarely feasible in this map unit, planting trees has aesthetic benefits.

### *Urban Development*

**Dwellings**

*Suitability:* Pacolet—well suited; Urban land—none assigned
*Management concerns:* Pacolet—erodibility, slope, and corrosivity; Urban land—excessive surface water runoff
*Management measures and considerations:*
- Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.

• Grading or shaping land prior to construction helps to reduce damage from surface water and prevents soil erosion.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.
• Water-control structures, such as diversions and storm drains, are needed to control the increased surface water runoff from Urban land.

**Septic tank absorption fields**

*Suitability:* Pacolet—suited; Urban land—none assigned
*Management concerns:* Restricted permeability and slope in areas of the Pacolet soil
*Management measures and considerations:*
• Raking trench walls and installing distribution lines during periods when the soil is not wet help to reduce sealing of soil pores during excavation of septic tank absorption fields.
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Pacolet—suited; Urban land—none assigned
*Management concerns:* Low soil strength and slope
*Management measures and considerations:*
• Incorporating sand and gravel into the soil 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.

### *Interpretive Groups*

*Land capability classification:* Pacolet—6e; Urban land—none assigned
*Woodland ordination symbol:* Pacolet—6C based on loblolly pine as the indicator species; Urban land—none assigned

## Pw—Pits, quarry

### *Setting*

*Landscape:* Variable
*Shape of areas:* Irregular
*Size of areas:* 10 to 100 acres

### *Composition*

Pits, quarry: 95 percent
Dissimilar soils: 5 percent

### *Typical Pedon*

This map unit consists of open excavations from which the soil and commonly the underlying material have been removed, exposing rock and other material that supports little vegetation. A typical pedon is not given.

### *Minor Components*

*Dissimilar:*
• Small areas of Udorthents or unexcavated soil material

### *Land Use*

**Dominant Uses:** Mining for mica, various minerals, and construction aggregate

### *Urban Development*

*Suitability:* None assigned
*Management concerns:* Slope, stoniness, exposed bedrock, and instability of pit walls
*Management measures and considerations:*
• Onsite investigation is needed before planning the use and management of this map unit for urban development.

### *Interpretive Groups*

*Land capability classification:* 8s
*Woodland ordination symbol:* None assigned

## RaE—Rion-Ashlar complex, 25 to 60 percent slopes, rocky

### *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
*Shape of areas:* Irregular
*Size of areas:* 15 to 200 acres

### *Composition*

*Note: Areas of Rion and Ashlar soils are too small in size and too intricately mixed to be mapped separately.*

Rion soil and similar soils: 45 percent
Ashlar soil and similar soils: 35 percent
Dissimilar soils: 10 percent
Small areas of rock outcrop: 10 percent

### *Typical Profile*

**Rion**

*Surface layer:*
0 to 8 inches—dark yellowish brown gravelly loamy sand

*Subsoil:*
8 to 22 inches—brown gravelly sandy clay loam
22 to 34 inches—yellowish red gravelly sandy clay loam
34 to 44 inches—strong brown gravelly clay loam that has reddish yellow iron accumulations

*Underlying material:*
44 to 60 inches—strong brown gravelly sandy loam that has reddish yellow iron accumulations

**Ashlar**

*Surface layer:*
0 to 3 inches—dark grayish brown gravelly sandy loam
3 to 6 inches—brown sandy loam

*Subsoil:*
6 to 18 inches—yellowish brown fine sandy loam that has a thin discontinuous interlayer of yellowish red loam in the lower part

*Bedrock:*
18 to 29 inches—soft, weathered granitic gneiss
29 inches—hard grantitic gneiss

### *Soil Properties and Qualities*

*Depth class:* Rion—very deep; Ashlar—moderately deep
*Drainage class:* Rion—well drained; Ashlar—excessively drained
*Permeability:* Rion—moderate; Ashlar—moderately rapid
*Available water capacity:* Rion—moderate; Ashlar—low
*Depth to seasonal 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 coverage
*Extent of rock outcrops:* 15 percent surface coverage
*Potential frost action:* Low
*Soil reaction:* Slightly acid to extremely acid
*Depth to bedrock:* Rion—more than 60 inches; Ashlar—20 to 40 inches to hard bedrock

### *Minor Components*

*Dissimilar soils:*
- Soils that have hard bedrock at a depth of less than 20 inches; in areas adjacent to rock outcrops
- Cliffside soils that have more rock fragments in the subsoil than the Rion and Ashlar soils; in similar landform positions

*Similar soils:*
- 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:* Erodibility and equipment use
- This map unit is severely limited for crop production. A site should be selected on better suited soils.

**Pasture and hayland**

*Suitability:* Unsuited
*Management concerns:* Erodibility and equipment use
- This map unit is severely limited for 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.
- Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Ashlar soil helps to increase productivity.
- Roads and skid trails should be constructed on the contour and around rock outcrops, where possible.

### *Urban Development*

**Dwellings**

*Suitability:* Unsuited
*Management concerns:* Rion—slope; Ashlar—slope and depth to rock

• This map unit is severely limited for dwellings. A site should be selected on better suited soils.

**Septic tank absorption fields**

*Suitability:* Unsuited
*Management concerns:* Rion—slope; Ashlar—slope and depth to rock
• This map unit is severely limited for septic tank absorption fields. A site should be selected on better suited soils.

**Local roads and streets**

*Suitability:* Unsuited
*Management concerns:* Slope
• This map unit is severely limited for roads and streets. A site should be selected on better suited soils.

### *Interpretive Groups*

*Land capability classification:* 7e
*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

## RnE—Rion-Cliffside complex, 25 to 60 percent slopes, very stony

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes
*Shape of areas:* Elongated
*Size of areas:* 10 to 100 acres

### *Composition*

Rion soil and similar soils: 50 percent
Cliffside soil and similar soils: 40 percent
Dissimilar soils: 10 percent

### *Typical Profile*

**Rion**

*Surface layer:*
0 to 8 inches—dark yellowish brown gravelly loamy sand

*Subsoil:*
8 to 22 inches—brown gravelly sandy clay loam
22 to 34 inches—yellowish red gravelly sandy clay loam
34 to 44 inches—strong brown gravelly clay loam that has reddish yellow iron accumulations

*Underlying material:*
44 to 60 inches—strong brown gravelly sandy loam that has reddish yellow iron accumulations

**Cliffside**

*Surface layer:*
0 to 7 inches—brown very cobbly sandy loam

*Subsurface layer:*
7 to 16 inches—strong brown very gravelly sandy loam

*Subsoil:*
16 to 30 inches—yellowish red very gravelly sandy clay loam

*Bedrock:*
30 inches—unweathered, slightly fractured sillimanite schist

### *Soil Properties and Qualities*

*Depth class:* Rion—very deep; Cliffside—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Rion—low; Cliffside—very low
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Steep
*Flooding:* None
*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 40 percent stones and cobbles that average about 10 to 18 inches in diameter and 5 to 20 feet apart
*Soil reaction:* Rion—very strongly acid to slightly acid throughout the profile; Cliffside—very strongly acid or strongly acid
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Depth to bedrock:* Rion—60 to more than 72 inches; Cliffside—20 to 40 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
• Random areas of soils that have hard bedrock at a depth of less than 60 inches

*Similar:*
• Random areas of soils that are similar to the Cliffside soil but have less rock fragments in the subsoil

### *Land Use*

**Dominant Uses:** Woodland
**Other Uses:** Pasture and hayland

### *Agricultural Development*

**Cropland**

*Suitability:* Unsuited
*Management concerns:* Erodibility and equipment use
*Management measures and considerations:*
• This map unit is severely limited for crop production because of the slope. 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:*
• Planting adapted species helps to ensure the production of high-quality forage and reduce the hazard of erosion.
• Constructing trails helps to encourage livestock to graze in areas where access is limited.
• Application of lime, fertilizer, seed, and herbicides by hand helps to increase productivity in the steeper areas.

**Woodland**

*Suitability:* Suited
*Management concerns:* Rion—erodibility and equipment use; Cliffside—erodibility, equipment use, and windthrow hazard
*Management measures and considerations:*
• Reforesting immediately after harvest using minimal site preparation and recommended tree species helps to control erosion and the siltation of streams.
• Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, use of skid trails, and disturbance of the forest floor by heavy machinery.
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Cliffside soil helps to increase productivity.

### *Urban Development*

**Dwellings**

*Suitability:* Unsuited
*Management concerns:* Rion—slope; Cliffside—slope and depth to rock
*Management measures and considerations:*
• This map unit is severely limited for dwellings because of the slope. A site should be selected on better suited soils.

**Septic tank absorption fields**

*Suitability:* Unsuited
*Management concerns:* Rion—slope; Cliffside—slope and depth to rock
*Management measures and considerations:*
• This map unit is severely limited for septic tank absorption fields because of the slope. The local Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Unsuited
*Management concerns:* Slope
*Management measures and considerations:*
• This map unit is severely limited for roads and streets because of the slope. A site should be selected on better suited soils.

### *Interpretive Groups*

*Land capability classification:* Rion—7e; Cliffside—7s
*Woodland ordination symbol:* Rion—8R based on shortleaf pine as the indicator species; Cliffside—6R based on chestnut oak as the indicator species

## SaC—Saw-Wake complex, 4 to 15 percent slopes, very rocky

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Shape of areas:* Irregular
*Size of areas:* 5 to 60 acres

### *Composition*

Saw soil and similar soils: 60 percent
Wake soil and similar soils: 30 percent
Dissimilar soils: 10 percent

### *Typical Profile*

**Saw**

*Surface layer:*
0 to 5 inches—yellowish red gravelly sandy clay loam

*Subsoil:*
5 to 21 inches—red clay
21 to 31 inches—red clay loam that has yellowish red iron accumulations

*Bedrock:*
31 inches—unweathered, slightly fractured granite

**Wake**

*Surface layer:*
0 to 7 inches—yellowish brown loamy sand

*Underlying material:*
7 to 14 inches—brownish yellow gravelly sandy loam that has reddish yellow accumulations

*Bedrock:*
14 inches—unweathered, slightly fractured granite

### *Soil Properties and Qualities*

*Depth class:* Saw—moderately deep; Wake—shallow
*Drainage class:* Saw—well drained; Wake—excessively drained
*Permeability:* Saw—moderate; Wake—rapid
*Available water capacity:* Saw—moderate; Wake—very low
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Gently sloping or strongly sloping
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Saw—moderate or severe; Wake—slight or moderate
*Extent of rock outcrops:* Few scattered rock outcrops that are about 2 to 10 feet in length, 3 to 6 feet in width, and 75 to 200 feet apart
*Soil reaction:* Very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from felsic igneous rock
*Depth to bedrock:* Saw—20 to 40 inches to hard bedrock; Wake—11 to 20 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
• Random areas of Pacolet soils that have hard bedrock at a depth of more than 60 inches

*Similar:*
• Random areas of soils that are similar to the Saw soil but have less clay in the subsoil
• Random areas of soils that are similar to the Wake soil but have more clay in the subsoil

### *Land Use*

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

### *Agricultural Development*

**Cropland**

*Suitability:* Saw—suited; Wake—poorly suited
*Management concerns:* Saw—equipment use, rooting depth, and soil fertility; Wake—equipment use, droughtiness, rooting depth, and nutrient leaching
*Management measures and considerations:*
• Because of the areas of rock outcrop, this map unit is difficult to manage for cropland.
• Areas of the Wake soil are difficult to manage for economical crop production because of the shallow rooting depth.
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Saw soil.
• Using split applications helps to increase the effectiveness of fertilizer and herbicides.
• 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:* Saw—well suited; Wake—suited
*Management concerns:* Saw—equipment use and soil fertility; Wake—equipment use, droughtiness, rooting depth, and nutrient leaching
*Management measures and considerations:*
• Because of the areas of rock outcrop, this map unit is difficult to manage for pasture and hayland.
• Areas of the Wake soil are difficult to manage for the economical production of pasture and hay crops because of the shallow rooting depth.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Using supplemental irrigation and crop varieties adapted to droughty conditions helps to increase crop production.
• Using split applications helps to increase the effectiveness of fertilizer and herbicides.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

**Woodland**

*Suitability:* Saw—well suited; Wake—suited
*Management concerns:* Saw—windthrow hazard; Wake—seedling survival and windthrow hazard

*Management measures and considerations:*
• Planting shallow-rooted trees, such as shortleaf pine and Virginia pine, helps to increase plant survival rates.
• Periodically harvesting windthrown trees that result from high winds and a limited rooting depth helps to increase productivity.
• Maintaining surface litter helps to increase the infiltration of water and reduces seedling mortality rates.
• Planting during wet periods or when the soils are moist for extended periods helps to increase seedling survival rates.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

#### Dwellings

*Suitability for dwellings without basements:* Saw—suited; Wake—poorly suited
*Suitability for dwellings with basements:* Saw—poorly suited; Wake—unsuited
*Management concerns:* Saw—erodibility, depth to rock, and slope; Wake—depth to rock
*Management measures and considerations:*
• Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.
• Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of these soils.
• Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.

#### Septic tank absorption fields

*Suitability:* Saw—poorly suited; Wake—unsuited
*Management concerns:* Depth to rock
*Management measures and considerations:*
• This map unit is severely limited for septic tank absorption fields because of the depth to rock. The local Health Department should be contacted for guidance in developing sanitary facilities.

#### Local roads and streets

*Suitability:* Saw—suited; Wake—poorly suited
*Management concerns:* Saw—depth to rock and low strength; Wake—depth to rock
*Management measures and considerations:*
• Extensive blasting, shaping, and grading are needed if roads are to be constructed on the contour.
• Incorporating sand and gravel into the soils, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* Saw—3e; Wake—4s
*Woodland ordination symbol:* Saw—6D based on shortleaf pine as the indicator species; Wake—5D based on loblolly pine as the indicator species

## SaD—Saw-Wake complex, 15 to 30 percent slopes, very rocky

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes
*Shape of areas:* Elongated
*Size of areas:* 15 to 200 acres

### *Composition*

Saw soil and similar soils: 45 percent
Wake soil and similar soils: 40 percent
Dissimilar soils: 15 percent

### *Typical Profile*

#### Saw

*Surface layer:*
0 to 5 inches—yellowish red gravelly sandy clay loam

*Subsoil:*
5 to 21 inches—red clay
21 to 31 inches—red clay loam that has yellowish red iron accumulations

*Bedrock:*
31 inches—unweathered, slightly fractured granite

#### Wake

*Surface layer:*
0 to 7 inches—yellowish brown loamy sand

*Underlying material:*
7 to 14 inches—brownish yellow gravelly sandy loam that has reddish yellow accumulations

*Bedrock:*
14 inches—unweathered, slightly fractured granite

### *Soil Properties and Qualities*

*Depth class:* Saw—moderately deep; Wake—shallow
*Drainage class:* Saw—well drained; Wake—excessively drained
*Permeability:* Saw—moderate; Wake—rapid

*Available water capacity:* Saw—moderate; Wake—very low
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low
*Slope class:* Moderately steep
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Saw—very severe; Wake—moderate
*Extent of rock outcrops:* Few scattered rock outcrops that are about 2 to 10 feet in length, 3 to 6 feet in width, and 75 to 200 feet apart
*Soil reaction:* Very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from felsic igneous rock
*Depth to bedrock:* Saw—20 to 40 inches to hard bedrock; Wake—11 to 20 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
• Random areas of Pacolet soils that have hard bedrock at a depth of more than 60 inches

*Similar:*
• Random areas of soils that are similar to the Saw soil but have less clay in the subsoil
• Random areas of soils that are similar to the Wake soil but have more clay in the subsoil

### *Land Use*

**Dominant Uses:** Woodland
**Other Uses:** Pasture and hayland

### *Agricultural Development*

#### Cropland

*Suitability:* Unsuited
*Management concerns:* Saw—erodibility, equipment use, rooting depth, and soil fertility; Wake—equipment use, droughtiness, nutrient leaching, and rooting depth
*Management measures and considerations:*
• This map unit is severely limited for crop production. A site should be selected on better suited soils.

#### Pasture and hayland

*Suitability for pasture:* Saw—suited; Wake—poorly suited
*Suitability for hayland:* Saw—poorly suited; Wake—unsuited
*Management concerns:* Saw—erodibility, equipment use, and soil fertility; Wake—equipment use, droughtiness, nutrient leaching, and rooting depth
*Management measures and considerations:*
• Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increases germination.
• The slope limits equipment use in the steeper areas.
• Because of the areas of rock outcrop, this map unit is difficult to manage for pasture and hayland.
• Planting drought-tolerant species helps to increase productivity.
• Using split applications helps to increase the effectiveness of fertilizer and herbicides.
• Areas of the Wake soil are difficult to manage for the economical production of pasture and hay crops because of the shallow rooting depth.

#### Woodland

*Suitability:* Suited
*Management concerns:* Saw—erodibility, equipment use, and windthrow hazard; Wake—erodibility, equipment use, seedling survival, 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.
• Roads and skid trails should be constructed on the contour and around rock outcrops, where possible.
• Planting during wet periods or when the soils are moist for extended periods helps to increase seedling survival rates.
• Periodically harvesting windthrown trees that result from high winds and a limited rooting depth helps to increase productivity.
• Planting shallow-rooted trees, such as shortleaf pine and Virginia pine, helps to increase plant survival rates.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

#### Dwellings

*Suitability for dwellings without basements:* Saw—poorly suited; Wake—unsuited
*Suitability for dwellings with basements:* Unsuited
*Management concerns:* Saw—depth to rock and slope; Wake—depth to rock
*Management measures and considerations:*
• This map unit is severely limited for dwellings

because of the depth to rock and slope. A site should be selected on better suited soils.

**Septic tank absorption fields**

*Suitability:* Unsuited
*Management concerns:* Saw—depth to rock and slope; Wake—depth to rock
*Management measures and considerations:*
• This map unit is severely limited for septic tank absorption fields because of the depth to rock and slope. The local Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Unsuited
*Management concerns:* Saw—slope; Wake—depth to rock and slope
*Management measures and considerations:*
• This map unit is severely limited for roads and streets because of the depth to rock and slope. A site should be selected on better suited soils.

### *Interpretive Groups*

*Land capability classification:* Saw—6e; Wake—6s
*Woodland ordination symbol:* Saw—6R based on shortleaf pine as the indicator species; Wake—5D based on loblolly pine as the indicator species

## TaB—Tatum-Montonia complex, 2 to 8 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves
*Shape of areas:* Irregular
*Size of areas:* 10 to 50 acres

### *Composition*

Tatum soil and similar soils: 55 percent
Montonia soil and similar soils: 40 percent
Dissimilar soils: 5 percent

### *Typical Profile*

**Tatum**

*Surface layer:*
0 to 4 inches—brown gravelly silt loam

*Subsoil:*
4 to 13 inches—yellowish red gravelly silty clay loam
13 to 31 inches—red silty clay loam
31 to 42 inches—yellowish red silty clay loam that has red iron accumulations

*Underlying material:*
42 to 54 inches—light reddish brown and yellowish red channery silt loam saprolite

*Bedrock:*
54 to 62 inches—weathered fine-grained sericite schist
62 inches—unweathered, slightly fractured sericite schist

**Montonia**

*Surface layer:*
0 to 3 inches—yellowish brown very channery silt loam
3 to 8 inches—strong brown channery silt loam

*Subsoil:*
8 to 19 inches—yellowish red channery clay loam
19 to 29 inches—yellowish red channery clay loam

*Bedrock:*
29 to 42 inches—multicolored weathered sericite schist
42 inches—unweathered sericite schist

### *Soil Properties and Qualities*

*Depth class:* Tatum—deep; Montonia—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Tatum—moderate; Montonia—low
*Slope class:* Gently sloping
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Moderate
*Soil reaction:* Tatum—very strongly acid or strongly acid throughout the profile, except where surface layers have been limed; Montonia—very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from fine-grained rocks
*Depth to bedrock:* Tatum—40 to 60 inches to soft bedrock and more than 60 inches to hard bedrock; Montonia—20 to 40 inches to soft bedrock and 40 to 60 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
• Random areas of Uwharrie soils that have soft bedrock at a depth of more than 60 inches

*Similar:*
• Random areas of soils that are similar to the Montonia soil but have more clay in the subsoil

## *Land Use*

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

## *Agricultural Development*

### Cropland

*Suitability:* Tatum—well suited; Montonia—suited
*Management concerns:* Tatum—equipment use, tilth, and soil fertility; Montonia—equipment use, rooting depth, tilth, 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.
• Using resource management systems that emphasize minimum tillage or no-till should be considered to reduce equipment deterioration and to increase the available water capacity.
• 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.
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Montonia soil.
• 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
*Management concerns:* Tatum—soil fertility; Montonia—rooting depth and soil fertility
*Management measures and considerations:*
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Montonia soil.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

### Woodland

*Suitability:* Well suited
*Management concerns:* Tatum—competition from undesirable plants; Montonia—seedling survival and windthrow hazard
*Management measures and considerations:*
• Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.
• Maintaining surface litter helps to increase the infiltration of water and reduces seedling mortality rates.
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Montonia soil helps to increase productivity.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

## *Urban Development*

### Dwellings

*Suitability for dwellings without basements:* Suited
*Suitability for dwellings with basements:* Tatum—suited; Montonia—poorly suited
*Management concerns:* Tatum—erodibility, shrink-swell potential, and corrosivity; Montonia—depth to rock and corrosivity
*Management measures and considerations:*
• Vegetating disturbed areas and using erosion-control structures, such as sediment fences and catch basins, help to keep eroding soil on site.
• Reinforcing foundations or backfilling with coarse material helps to strengthen buildings and prevents damage caused by shrinking and swelling.
• In areas of the Montonia soil, which is moderately deep to soft bedrock, increased difficulty with excavation can be expected when constructing dwellings with basements.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

### Septic tank absorption fields

*Suitability:* Tatum—suited; Montonia—poorly suited
*Management concerns:* Tatum—restricted permeability; Montonia—depth to rock
*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 prevent the smearing and sealing of trench walls.
• Locating and using areas of the deeper Tatum soil may improve the performance of filter fields.

• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Tatum—suited; Montonia—well suited
*Management concerns:* Tatum—low strength; Montonia—no significant limitations
*Management measures and considerations:*
• Incorporating sand and gravel into the soils and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* Tatum—2e; Montonia—3s
*Woodland ordination symbol:* Tatum—8A based on loblolly pine as the indicator species; Montonia—8D based on shortleaf pine as the indicator species

## TaC—Tatum-Montonia complex, 8 to 15 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Shape of areas:* Irregular
*Size of areas:* 10 to 50 acres

### *Composition*

Tatum soil and similar soils: 55 percent
Montonia soil and similar soils: 40 percent
Dissimilar soils: 5 percent

### *Typical Profile*

**Tatum**

*Surface layer:*
0 to 4 inches—brown gravelly silt loam

*Subsoil:*
4 to 13 inches—yellowish red gravelly silty clay loam
13 to 31 inches—red silty clay loam
31 to 42 inches—yellowish red silty clay loam that has red iron accumulations

*Underlying material:*
42 to 54 inches—light reddish brown and yellowish red channery silt loam saprolite

*Bedrock:*
54 to 62 inches—weathered fine-grained sericite schist
62 inches—unweathered, slightly fractured sericite schist

**Montonia**

*Surface layer:*
0 to 3 inches—yellowish brown very channery silt loam
3 to 8 inches—strong brown channery silt loam

*Subsoil:*
8 to 19 inches—yellowish red channery clay loam
19 to 29 inches—yellowish red channery clay loam

*Bedrock:*
29 to 42 inches—multicolored weathered sericite schist
42 inches—unweathered sericite schist

### *Soil Properties and Qualities*

*Depth class:* Tatum—deep; Montonia—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Tatum—moderate; Montonia—low
*Slope class:* Gently sloping
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Soil reaction:* Tatum—very strongly acid or strongly acid throughout the profile, except where surface layers have been limed; Montonia—very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from fine-grained rocks
*Depth to bedrock:* Tatum—40 to 60 inches to soft bedrock and more than 60 inches to hard bedrock; Montonia—20 to 40 inches to soft bedrock and 40 to 60 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
• Random areas of Uwharrie soils that have soft bedrock at a depth of more than 60 inches
• Random areas of soils that are similar to the Tatum soil but have moderately eroded surface layers of gravelly silty clay loam
• Random areas of soils that are similar to the Montonia soil but have moderately eroded surface layers of channery silty clay loam

*Similar:*
• Random areas of soils that are similar to the Montonia soil but have more clay in the subsoil

## *Land Use*

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

## *Agricultural Development*

### Cropland

*Suitability:* Suited
*Management concerns:* Tatum—erodibility, equipment use, tilth, and soil fertility; Montonia—erodibility, equipment use, tilth, rooting depth, 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, control surface runoff, and maximize the infiltration of water.
• Using resource management systems that emphasize minimum tillage or no-till should be considered to reduce equipment deterioration and to increase the available water capacity.
• 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.
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Montonia soil.
• 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
*Management concerns:* Tatum—erodibility, equipment use, and soil fertility; Montonia—erodibility, equipment use, rooting depth, and soil fertility
*Management measures and considerations:*
• Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increases germination.
• The slope may limit equipment use in the steeper areas when harvesting hay crops.
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Montonia soil.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

### Woodland

*Suitability:* Well suited
*Management concerns:* Tatum—competition from undesirable plants; Montonia—seedling survival and windthrow hazard
*Management measures and considerations:*
• Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.
• Maintaining surface litter helps to increase the infiltration of water and reduces seedling mortality rates.
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Montonia soil helps to increase productivity.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

## *Urban Development*

### Dwellings

*Suitability for dwellings without basements:* Suited
*Suitability for dwellings with basements:* Tatum—suited; Montonia—poorly suited
*Management concerns:* Tatum—erodibility, shrink-swell potential, slope, and corrosivity; Montonia—depth to rock, slope, and corrosivity
*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 on site.
• Designing structures so that they conform to the natural slope helps to improve soil performance.
• Reinforcing basements or backfilling with coarse material helps to strengthen foundations and prevents damage caused by shrinking and swelling.
• In areas of the Montonia soil, which is moderately deep to soft bedrock, increased difficulty with excavation can be expected when constructing dwellings with basements.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

### Septic tank absorption fields

*Suitability:* Tatum—suited; Montonia—poorly suited
*Management concerns:* Tatum—restricted

permeability and slope; Montonia—depth to rock and slope
*Management measures and considerations:*
• Increasing the size of the absorption field and placing distribution lines on the contour help to improve the performance of septic tanks.
• Locating and using areas of the deeper Tatum soil may improve the performance of filter fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Tatum—low strength and slope; Montonia—slope
*Management measures and considerations:*
• Incorporating sand and gravel into the soils 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.

### *Interpretive Groups*

*Land capability classification:* Tatum—3e; Montonia—4e
*Woodland ordination symbol:* Tatum—8A based on loblolly pine as the indicator species; Montonia—8D based on shortleaf pine as the indicator species

## TaD—Tatum-Montonia complex, 15 to 30 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes
*Shape of areas:* Elongated or irregular
*Size of areas:* 10 to 150 acres

### *Composition*

Tatum soil and similar soils: 50 percent
Montonia soil and similar soils: 45 percent
Dissimilar soils: 5 percent

### *Typical Profile*

**Tatum**

*Surface layer:*
0 to 4 inches—dark yellowish brown gravelly silt loam

*Subsoil:*
4 to 13 inches—yellowish red gravelly silty clay loam
13 to 31 inches—red silty clay loam
31 to 42 inches—yellowish red silty clay loam that has red iron accumulations

*Underlying material:*
42 to 54 inches—light reddish brown and yellowish red channery silt loam saprolite

*Bedrock:*
54 to 62 inches—weathered fine-grained sericite schist
62 inches—unweathered, slightly fractured sericite schist

**Montonia**

*Surface layer:*
0 to 3 inches—yellowish brown very channery silt loam
3 to 8 inches—strong brown channery silt loam

*Subsoil:*
8 to 19 inches—yellowish red channery clay loam
19 to 29 inches—yellowish red channery clay loam

*Bedrock:*
29 to 42 inches—multicolored weathered sericite schist
42 inches—unweathered sericite schist

### *Soil Properties and Qualities*

*Depth class:* Tatum—deep; Montonia—moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Tatum—moderate; Montonia—low
*Slope class:* Moderately steep
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Very severe
*Soil reaction:* Tatum—very strongly acid or strongly acid throughout the profile, except where surface layers have been limed; Montonia—very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from fine-grained rocks
*Depth to bedrock:* Tatum—40 to 60 inches to soft bedrock and more than 60 inches to hard bedrock; Montonia—20 to 40 inches to soft bedrock and 40 to 60 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
• Random areas of Uwharrie soils that have soft bedrock at a depth of more than 60 inches

*Similar:*
• Random areas of soils that are similar to the Tatum soil but have less gravel in the surface layer

### *Land Use*

**Dominant Uses:** Woodland
**Other Uses:** Pasture and hayland

### *Agricultural Development*

#### Cropland

*Suitability:* Poorly suited
*Management concerns:* Tatum—erodibility, equipment use, and soil fertility; Montonia—erodibility, equipment use, rooting depth, 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, control surface runoff, and maximize the infiltration of water.
• This map unit is difficult to manage for cultivated crops because the slope limits equipment use.
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth.
• 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:* Suited
*Suitability for hayland:* Poorly suited
*Management concerns:* Tatum—erodibility, equipment use, and soil fertility; Montonia—erodibility, equipment use, rooting depth, and soil fertility
*Management measures and considerations:*
• Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increases germination.
• The slope limits equipment use in the steeper areas.
• Incorporating plant residue into the soils helps to improve the water-holding capacity, and planting shallow-rooted crops helps to overcome the moderately deep rooting depth of the Montonia soil.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

#### Woodland

*Suitability:* Tatum—well suited; Montonia—suited
*Management concerns:* Tatum—erodibility and equipment use; Montonia—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.
• Periodically harvesting windthrown trees that result from high winds and the limited rooting depth of the Montonia soil helps to increase productivity.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

#### Dwellings

*Suitability:* Poorly suited
*Management concerns:* Erodibility, slope, and corrosivity
*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 on site.
• Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

#### Septic tank absorption fields

*Suitability:* Poorly suited
*Management concerns:* Tatum—slope; Montonia—depth to rock and slope
*Management measures and considerations:*
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

• Locating and using areas of the deeper Tatum soil may improve the performance of filter fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Poorly suited
*Management concerns:* Tatum—low strength and slope; Montonia—slope
*Management measures and considerations:*
• Incorporating sand and gravel into the soils 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.

### *Interpretive Groups*

*Land capability classification:* Tatum—4e; Montonia—6e
*Woodland ordination symbol:* Tatum—6R based on loblolly pine as the indicator species; Montonia—8R based on shortleaf pine as the indicator species

## ToA—Toccoa loam, 0 to 2 percent slopes, occasionally flooded

### *Setting*

*Landscape:* Piedmont
*Landform:* Flood plains
*Landform position:* Planar to slightly convex slopes
*Shape of areas:* Elongated
*Size of areas:* 10 to 250 acres

### *Composition*

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

### *Typical Profile*

*Surface layer:*
0 to 7 inches—brown loam

*Underlying material:*
7 to 17 inches—strong brown sandy loam
17 to 28 inches—strong brown loamy sand
28 to 38 inches—strong brown sandy loam that has brown iron accumulations
38 to 46 inches—brown loamy sand
46 to 60 inches—pale brown silt loam that has reddish brown and strong brown iron accumulations

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderately rapid
*Available water capacity:* Low or moderate
*Seasonal high water table (depth, period):* 2.5 to 5.0 feet from December through April
*Shrink-swell potential:* Low
*Slope class:* Nearly level
*Flooding (frequency, period, duration):* Occasional from December through April for 2 to 7 days
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Slight
*Soil reaction:* Strongly acid to slightly acid throughout the profile
*Parent material:* Alluvium derived mainly from felsic high-grade metamorphic or igneous rock
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
• Somewhat poorly drained Chewacla soils in the slightly lower-lying positions or in depressional areas
• Excessively drained Buncombe soils in the slightly higher positions adjacent to streams

*Similar:*
• Random areas of soils that have more clay in the subsoil than the Toccoa soil

### *Land Use*

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

### *Agricultural Development*

**Cropland**

*Suitability:* Suited
*Management concerns:* Flooding
*Management measures and considerations:*
• This map unit is difficult to manage for cropland because of the potential for flooding during the growing season.

**Pasture and hayland**

*Suitability:* Poorly suited
*Management concerns:* Flooding and droughtiness
*Management measures and considerations:*
• Flooding may pose a hazard to livestock.
• Harvesting hay crops as soon as possible helps to reduce the risk of damage from flooding.
• Rotational grazing and a well planned clipping and harvesting schedule help to maintain pastures and increase productivity.

**Woodland**

*Suitability:* Well suited
*Management concerns:* Competition from undesirable plants
*Management measures and considerations:*
• Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

**Dwellings**

*Suitability:* Unsuited
*Management concerns:* Flooding
*Management measures and considerations:*
• This map unit is severely limited for urban development because of the flooding. A site should be selected on better suited soils.

**Septic tank absorption fields**

*Suitability:* Unsuited
*Management concerns:* Flooding
*Management measures and considerations:*
• This map unit is severely limited for septic tank absorption fields because of the flooding. The local Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Unsuited
*Management concerns:* Flooding
*Management measures and considerations:*
• This map unit is severely limited for roads and streets because of the flooding. A site should be selected on better suited soils.

### *Interpretive Groups*

*Land capability classification:* 2w
*Woodland ordination symbol:* 9A based on yellow-poplar as the indicator species

## UdC—Udorthents, loamy

### *Setting*

*Landscape:* Variable
*Shape of areas:* Irregular
*Size of areas:* 5 to 50 acres

### *Composition*

Udorthents: 85 percent
Dissimilar soils: 15 percent

### *Typical Profile*

This map unit consists of areas where natural soil properties and qualities have been greatly altered by excavation or intensive grading or the natural soils have been covered by earthy fill material. Udorthents are variable in color and depth and have predominantly loamy textures. A typical profile is not given.

### *Soil Properties and Qualities*

*Depth class:* Shallow to very deep
*Drainage class:* Somewhat excessively drained to somewhat poorly drained
*Permeability:* Very slow to moderately rapid
*Available water capacity:* Very low to moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Low or moderate
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Soil reaction:* Extremely acid to slightly acid
*Parent material:* Variable
*Depth to bedrock:* Variable

### *Minor Components*

*Dissimilar:*
• Areas of exposed or excavated bedrock
• Soils that have not been greatly altered by excavation or grading
• Areas of Urban land where the surface has been covered by streets, parking lots, driveways, or buildings

### *Land Use*

**Dominant Uses:** Landfills, cut and fill areas, and urban development

### *Agricultural Development*

**Cropland**

*Suitability:* Unsuited
*Management concerns:* Variable soil properties
*Management measures and considerations:*
• This map unit is severely limited for crop production because of variable soil properties. A site should be selected on better suited soils.

**Pasture and hayland**

*Suitability:* Unsuited

*Management concerns:* Variable soil properties
*Management measures and considerations:*
• This map unit is severely limited for the production of pasture and hay crops because of variable soil properties. A site should be selected on better suited soils.

**Woodland**

*Suitability:* Suited
*Management concerns:* Variable soil properties and limited size of areas
*Management measures and considerations:*
• 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 limited size of its areas and areas of highly disturbed soils.

### *Urban Development*

**Dwellings**

*Suitability:* Poorly suited
*Management concerns:* Variable soil properties and differential settling
*Management measures and considerations:*
• This map unit has severe limitations affecting dwellings and small commercial buildings because of highly variable soil properties.
• Because soils in this map unit were created from cut and fill material, they are subject to uneven settling and may be unstable if not properly compacted.

**Septic tank absorption fields**

*Suitability:* Poorly suited
*Management concerns:* Variable soil properties
*Management measures and considerations:*
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Poorly suited
*Management concerns:* Variable soil properties
*Management measures and considerations:*
• This map unit has severe limitations affecting roads and streets because of highly variable soil properties.

### *Interpretive Groups*

*Land capability classification:* None assigned
*Woodland ordination symbol:* None assigned

## Ur—Urban land

### *Setting*

*Landscape:* Variable
*Shape of areas:* Irregular
*Size of areas:* 5 to 100 acres

### *Composition*

Urban land: 90 percent
Dissimilar inclusions: 10 percent

### *Typical Profile*

This map unit consists of areas that are covered by streets, parking lots, driveways, or buildings. A typical profile is not given.

### *Minor Components*

*Dissimilar:*
• Random areas of Udorthents where natural soil properties and qualities have been greatly altered by excavation or intensive grading or the natural soils have been covered by earthy fill material
• Areas of natural soils that have not been greatly altered by excavation or grading or covered by earthy fill material

### *Land Use*

**Dominant Uses:** Urban development

### *Urban Development*

**Dwellings**

*Suitability:* None assigned
*Management concerns:* Excessive surface water runoff
*Management measures and considerations:*
• Water-control structures, such as diversions and storm drains, are needed to control the increased surface water runoff.

### *Interpretive Groups*

*Land capability classification:* None assigned
*Woodland ordination symbol:* None assigned

## UtB—Uwharrie silt loam, 2 to 8 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Broad ridges
*Landform position:* Interfluves

*Shape of areas:* Irregular
*Size of areas:* 10 to 200 acres

### *Composition*

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

### *Typical Profile*

*Surface layer:*
0 to 5 inches—yellowish brown silt loam
5 to 8 inches—reddish yellow silt loam

*Subsoil:*
8 to 15 inches—red silty clay loam
15 to 36 inches—red silty clay
36 to 50 inches—red silty clay loam that has very pale brown iron accumulations

*Underlying material:*
50 to 72 inches—multicolored silt loam saprolite

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Moderate
*Slope class:* Gently sloping
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Soil reaction:* Very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from fine-grained rocks
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
• Random areas of Tatum soils that have soft bedrock between depths of 40 and 60 inches
• Montonia soils that have soft bedrock at a depth of less than 40 inches; on the outer edge of map units
• Random areas of moderately eroded Uwharrie soils that have surface layers of silty clay loam

*Similar:*
• Soils that are similar to the Uwharrie soil but have yellow or brown subsoils
• Soils that are similar to the Uwharrie soil but have less clay in the subsoil

### *Land Use*

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

### *Agricultural Development*

**Cropland**

*Suitability:* Well suited
*Management concerns:* Erodibility 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, 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:* Well suited
*Management concerns:* Erodibility and soil fertility
*Management measures and considerations:*
• Because of the high potential erodibility of this soil, special care is needed when renovating pastures and establishing seedbeds to prevent soil erosion.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.

**Woodland**

*Suitability:* Well suited
*Management concerns:* Competition from undesirable plants
*Management measures and considerations:*
• Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.

### *Urban Development*

**Dwellings**

*Suitability:* Suited
*Management concerns:* Erodibility, shrink-swell potential, and corrosivity
*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 on site.
• Reinforcing basements or backfilling with coarse

material helps to strengthen foundations and prevents damage caused by shrinking and swelling.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Suited
*Management concerns:* Restricted permeability
*Management measures and considerations:*
• Installing the distribution lines of septic systems during periods when the soil is not wet helps to prevent the smearing and sealing of trench walls.
• Raking trench walls helps to reduce the sealing of soil pores which may occur during the excavation of septic tank absorption fields.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Low strength
*Management measures and considerations:*
• Incorporating sand and gravel into the soil and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* 2e
*Woodland ordination symbol:* 8A based on yellow-poplar as the indicator species

## UuB2—Uwharrie silty clay loam, 2 to 8 percent slopes, moderately eroded

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves
*Shape of areas:* Irregular
*Size of areas:* 15 to 150 acres

### *Composition*

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

### *Typical Profile*

*Surface layer:*
0 to 4 inches—reddish brown silty clay loam

*Subsoil:*
4 to 13 inches—red silty clay loam
13 to 39 inches—red silty clay
39 to 58 inches—red silty clay loam

*Underlying material:*
58 to 72 inches—multicolored silt loam saprolite

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Moderate
*Slope class:* Gently sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Very severe
*Soil reaction:* Very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from fine-grained rocks
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
• Random areas of Tatum soils that have soft bedrock between depths of 40 and 60 inches

*Similar:*
• Slightly eroded Uwharrie soils that have surface layers of silt loam

### *Land Use*

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

### *Agricultural Development*

**Cropland**

*Suitability:* Well suited
*Management concerns:* Erodibility, tilth, and soil fertility
*Management measures and considerations:*
• Resource management systems that include terraces and diversions, conservation tillage, stripcropping, contour farming, crop residue management, and rotations of soil-conserving crops help to minimize erosion, control surface runoff, and maximize the infiltration of rainfall.
• 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.
• 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
*Management concerns:* Erodibility and soil fertility
*Management measures and considerations:*
• Because of the high erodibility of this soil, special care is needed when renovating pastures and establishing seedbeds to prevent further soil erosion.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.

**Woodland**

*Suitability:* Well suited
*Management concerns:* Seedling survival
*Management measures and considerations:*
• Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.

### *Urban Development*

**Dwellings**

*Suitability:* Suited
*Management concerns:* Erodibility, shrink-swell potential, and corrosivity
*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 on site.
• Reinforcing basements or backfilling with coarse material helps to strengthen foundations and prevents damage caused by shrinking and swelling.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Suited
*Management concerns:* Restricted permeability
*Management measures and considerations:*
• Installing the distribution lines of septic systems during periods when the soil is not wet helps to prevent the smearing and sealing of trench walls.
• Raking trench walls helps to reduce the sealing of soil pores which may occur during the excavation of septic tank absorption fields.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Low strength
*Management measures and considerations:*
• Incorporating sand and gravel into the soil and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* 3e
*Woodland ordination symbol:* 6C based on yellow-poplar as the indicator species

## UvC—Uwharrie-Tatum complex, 8 to 15 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Shape of areas:* Irregular
*Size of areas:* 10 to 75 acres

### *Composition*

Uwharrie soil and similar soils: 75 percent
Tatum soil and similar soils: 15 percent
Dissimilar soils: 10 percent

### *Typical Profile*

**Uwharrie**

*Surface layer:*
0 to 5 inches—yellowish brown silt loam
5 to 8 inches—reddish yellow silt loam

*Subsoil:*
8 to 15 inches—red silty clay loam
15 to 36 inches—red silty clay
36 to 50 inches—red silty clay loam that has very pale brown iron accumulations

*Underlying material:*
50 to 72 inches—multicolored silt loam saprolite

**Tatum**

*Surface layer:*
0 to 4 inches—dark yellowish brown gravelly silt loam

*Subsoil:*
4 to 13 inches—yellowish red gravelly silty clay loam
13 to 31 inches—red silty clay loam
31 to 42 inches—yellowish red silty clay loam that has red iron accumulations

*Underlying material:*
42 to 54 inches—light reddish brown and yellowish red channery silt loam saprolite

*Bedrock:*
54 to 62 inches—weathered sericite schist
62 inches—unweathered, slightly fractured sericite schist

### *Soil Properties and Qualities*

*Depth class:* Uwharrie—very deep; Tatum—deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Moderate
*Slope class:* Strongly sloping
*Flooding:* None
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Soil reaction:* Uwharrie—very strongly acid to moderately acid throughout the profile, except where surface layers have been limed; Tatum—very strongly acid or strongly acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from fine-grained rocks
*Depth to bedrock:* Uwharrie—60 to more than 72 inches; Tatum—40 to 60 inches to soft bedrock and more than 60 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
• Random areas of Montonia soils that have soft bedrock between depths of 40 and 60 inches

*Similar:*
• Soils that are similar to the Uwharrie and Tatum soils but have less gravel in the surface layer
• Soils that are similar to the Uwharrie soil but have yellow or brown subsoils
• Soils that are similar to the Uwharrie soil but have less clay in the subsoil

### *Land Use*

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

### *Agricultural Development*

#### Cropland

*Suitability:* Suited
*Management concerns:* Erodibility, equipment use, 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, control surface runoff, and maximize the infiltration of water.
• Using resource management systems that emphasize minimum tillage or no-till should be considered to reduce equipment deterioration and to increase the available water capacity.
• 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
*Management concerns:* Erodibility, equipment use, and soil fertility
*Management measures and considerations:*
• Preparing seedbeds on the contour or across the slope helps to reduce the hazard of erosion and increases germination.
• The slope may limit equipment use in the steeper areas when harvesting hay crops.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.

#### Woodland

*Suitability:* Well suited
*Management concerns:* Competition from undesirable plants
*Management measures and considerations:*
• Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.

### *Urban Development*

#### Dwellings

*Suitability:* Suited
*Management concerns:* Shrink-swell potential and corrosivity
*Management measures and considerations:*
• Reinforcing basements or backfilling with coarse material helps to strengthen foundations and prevents damage caused by shrinking and swelling.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

#### Septic tank absorption fields

*Suitability:* Suited
*Management concerns:* Restricted permeability and slope
*Management measures and considerations:*
• Installing the distribution lines of septic systems

during periods when the soils are not wet helps to prevent the smearing and sealing of trench walls.
• Raking trench walls helps to reduce the sealing of soil pores which may occur during the excavation of septic tank absorption fields.
• 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
*Management measures and considerations:*
• Incorporating sand and gravel into the soils and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* 3e
*Woodland ordination symbol:* Uwharrie—8A based on yellow-poplar as the indicator species; Tatum—8A based on loblolly pine as the indicator species

## UwC2—Uwharrie-Tatum complex, 8 to 15 percent slopes, moderately eroded

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Shape of areas:* Irregular
*Size of areas:* 10 to 100 acres

### *Composition*

Uwharrie soil and similar soils: 65 percent
Tatum soil and similar soils: 30 percent
Dissimilar soils: 5 percent

### *Typical Profile*

**Uwharrie**

*Surface layer:*
0 to 4 inches—reddish brown silty clay loam

*Subsoil:*
4 to 13 inches—red silty clay loam
13 to 39 inches—red silty clay
39 to 58 inches—red silty clay loam

*Underlying material:*
58 to 72 inches—multicolored silt loam saprolite

**Tatum**

*Surface layer:*
0 to 4 inches—red silty clay loam

*Subsoil:*
4 to 14 inches—red clay
14 to 36 inches—red silty clay loam

*Underlying material:*
36 to 47 inches—multicolored silt loam saprolite

*Bedrock:*
47 to 60 inches—weathered sericite schist

### *Soil Properties and Qualities*

*Depth class:* Uwharrie—very deep; Tatum—deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Moderate
*Slope class:* Strongly sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Very severe
*Soil reaction:* Uwharrie—very strongly acid to moderately acid throughout the profile, except where surface layers have been limed; Tatum—very strongly acid or strongly acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from fine-grained rocks
*Depth to bedrock:* Uwharrie—60 to more than 72 inches; Tatum—40 to 60 inches to soft bedrock and more than 60 inches to hard bedrock

### *Minor Components*

*Dissimilar:*
• Random areas of Montonia soils that have soft bedrock between depths of 40 and 60 inches

*Similar:*
• Slightly eroded soils that are similar to the Uwharrie and Tatum soils but have surface layers of silt loam
• Soils that are similar to the Uwharrie and Tatum soils but have less gravel in the surface layer

### *Land Use*

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

### *Agricultural Development*

**Cropland**

*Suitability:* Suited
*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, control surface runoff, and maximize 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 minimize clodding and crusting and increase 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
*Management concerns:* Erodibility, equipment use, and soil fertility
*Management measures and considerations:*
• Because of the high erodibility of these soils, special care is needed when renovating pastures and establishing seedbeds to prevent further soil erosion.
• The slope may limit equipment use in the steeper areas when harvesting hay crops.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hayland and pasture.

**Woodland**

*Suitability:* Well suited
*Management concerns:* Seedling survival and competition from undesirable plants
*Management measures and considerations:*
• Special site preparation, such as harrowing and bedding, helps to establish seedlings, reduces mortality rates, and increases early seedling growth.
• Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.

### *Urban Development*

**Dwellings**

*Suitability:* Suited
*Management concerns:* Erodibility, shrink-swell potential, slope, and corrosivity
*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 on site.
• Reinforcing basements or backfilling with coarse material helps to strengthen foundations and prevents damage caused by shrinking and swelling.
• Grading or shaping land prior to construction helps to reduce damage from surface water and prevents soil erosion.
• Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

**Septic tank absorption fields**

*Suitability:* Suited
*Management concerns:* Restricted permeability and slope
*Management measures and considerations:*
• Installing the distribution lines of septic systems during periods when the soils are not wet helps to prevent the smearing and sealing of trench walls.
• Raking trench walls helps to reduce the sealing of soil pores which may occur during the excavation of septic tank absorption fields.
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Suited
*Management concerns:* Erodibility and low strength
*Management measures and considerations:*
• Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soils and prevents excessive soil erosion.
• Incorporating sand and gravel into the soils and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* 4e
*Woodland ordination symbol:* Uwharrie—6C based on yellow-poplar as the indicator species; Tatum—8A based on loblolly pine as the indicator species

## UxB—Uwharrie-Urban land complex, 2 to 8 percent slopes

### *Setting*

*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves
*Shape of areas:* Irregular
*Size of areas:* 50 to 300 acres

### *Composition*

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

### *Typical Profile*

**Uwharrie**

*Surface layer:*
0 to 4 inches—reddish brown silty clay loam

*Subsoil:*
4 to 13 inches—red silty clay loam
13 to 39 inches—red silty clay
39 to 58 inches—red silty clay loam

*Underlying material:*
58 to 72 inches—multicolored silt loam saprolite

**Urban land**

Urban land consists of areas that are covered by streets, parking lots, driveways, or buildings. A typical profile is not given.

### *Soil Properties and Qualities of the Uwharrie Soil*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Available water capacity:* Moderate
*Depth to seasonal high water table:* More than 6.0 feet
*Shrink-swell potential:* Moderate
*Slope class:* Gently sloping
*Flooding:* None
*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed
*Hazard of water erosion:* Severe
*Soil reaction:* Very strongly acid to moderately acid throughout the profile, except where surface layers have been limed
*Parent material:* Residuum weathered from fine-grained rocks
*Depth to bedrock:* 60 to more than 72 inches

### *Minor Components*

*Dissimilar:*
• Random areas of Tatum soils that have soft bedrock between depths of 40 and 60 inches
• Areas of Udorthents where the natural soils have been altered or covered and the slope modified

*Similar:*
• Slightly eroded Uwharrie soils which have a silt loam surface layer

### *Land Use*

**Dominant Uses:** Urban development

### *Agricultural Development*

**Cropland**

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
• This map unit is difficult to manage for crop production because of the limited size of its areas, intermittent areas of urban land, and areas of highly disturbed soils.

**Pasture and hayland**

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
• This map unit is difficult to manage for the production of pasture and hay crops because of the small size of its areas.

**Woodland**

*Suitability:* Poorly suited
*Management concerns:* Limited size of areas
*Management measures and considerations:*
• Although timber production is rarely feasible in this map unit because of the limited size of the areas and intermittent areas of urban land, planting trees has aesthetic benefits.
• Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### *Urban Development*

**Dwellings**

*Suitability:* Uwharrie—suited; Urban land—none assigned
*Management concerns:* Erodibility, shrink-swell potential, and excessive surface water runoff
*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 on site.
• Reinforcing basements or backfilling with coarse material helps to strengthen foundations and prevents damage caused by shrinking and swelling.
• Water-control structures, such as diversions and storm drains, are needed to control the increased surface water runoff.

**Septic tank absorption fields**

*Suitability:* Uwharrie—suited; Urban land—none assigned
*Management concerns:* Restricted permeability in areas of the Uwharrie soil
*Management measures and considerations:*
• Installing the distribution lines of septic systems during periods when the soil is not wet helps to prevent the smearing and sealing of trench walls.
• Raking trench walls helps to reduce the sealing of soil pores which may occur during the excavation of septic tank absorption fields.
• The Cleveland County Health Department should be contacted for guidance in developing sanitary facilities.

**Local roads and streets**

*Suitability:* Uwharrie—suited; Urban land—none assigned
*Management concerns:* Low soil strength
*Management measures and considerations:*
• Incorporating sand and gravel into the soil and compacting roadbeds help to improve soil strength.

### *Interpretive Groups*

*Land capability classification:* Uwharrie—3e; Urban land—none assigned
*Woodland ordination symbol:* Uwharrie—6C based on yellow-poplar as the indicator species; Urban land—none assigned

## W—Water

This map unit includes streams, lakes, ponds, and estuaries that in most years are covered with water at least during the period warm enough for plants to grow; many areas are covered throughout the year.

## WeA—Wehadkee 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 gray loam

*Subsoil:*
6 to 22 inches—gray silty clay loam that has red and brown iron accumulations
22 to 35 inches—gray loam that has red and brown iron accumulations

*Underlying material:*
35 to 50 inches—olive gray sandy loam
50 to 61 inches—dark gray sandy loam

### *Soil Properties and Qualities*

*Depth class:* Very deep
*Drainage class:* Poorly drained or very poorly drained
*General texture class:* Loamy
*Permeability:* Moderate
*Available water capacity:* High
*Seasonal high water table (depth, period):* 0 to 1.0 foot from November through May
*Shrink-swell potential:* Low
*Slope class:* Nearly level
*Flooding (frequency, period, duration):* Frequent from November through June for 7 to 30 days
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed
*Potential frost action:* Low
*Soil reaction:* Slightly acid to very strongly acid
*Depth to bedrock:* More than 60 inches

### *Minor Components*

*Dissimilar:*
• Somewhat poorly drained Chewacla soils in landform positions similar to those of the Wehadkee soil

*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:*
• This map unit is severely limited for crop production because of the flooding and wetness. 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, management should include selecting forages 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 wetland protection regulations may restrict the use of drainage systems and other land alterations in areas of Wehadkee soils.

**Woodland**

*Suitability:* Suited
*Management concerns:* Equipment use and plant competition
*Management measures and considerations:*
• Using low-pressure ground equipment helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
• Harvesting timber during summer helps to reduce the risk of damage from flooding.
• Site preparation practices, such as chopping, prescribed burning, and applications of herbicide, help to reduce competition from unwanted plants.
• Trees that are tolerant of wetness should be selected for management.
• Federal and State wetland protection regulations may restrict the use of some woodland management measures and other land alterations in areas of Wehadkee soils.

### *Urban Development*

**Dwellings**

*Suitability:* Unsuited
*Management concerns:*
• This map unit is severely limited for dwellings because of the flooding and wetness. A site should be selected on better suited soils.

**Septic tank absorption fields**

*Suitability:* Unsuited
*Management concerns:*
• This map unit is severely limited for septic tank absorption fields because of the flooding and wetness. A site should be selected on better suited soils.

**Local roads and streets**

*Suitability:* Unsuited
*Management concerns:*
• This map unit is severely limited for roads and streets because of the flooding and wetness. A site should be selected on better suited soils.

### *Interpretive Groups*

*Land capability classification:* 6w
*Woodland ordination symbol:* 8W based on yellow-poplar as the indicator species

# Use and Management of 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. It can also 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 forestland; 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, except for the soils that flood, the soils in Cleveland 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

Ben Robinson, 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 are listed for each soil; and prime farmland is described. In this section, the estimated acreages of crops and land use and the livestock numbers are based on data from the 1997 Census of Agriculture.

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 Natural Resources Conservation Service, the Soil and Water Conservation District, 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 1997, approximately 29,500 acres of Cleveland County was harvested for cropland. Approximately 13,400 acres was used for row crops and 5,950 acres for small grains. Some cropland acreage was used for orchards, vegetables, berries, and other specialty crops. Additional cropland was idle, in conservation use, or used for miscellaneous purposes. Approximately 40,900 acres of the county was used for pasture.

### Primary Field Crops

The soils and climate of Cleveland County are suitable for numerous crops grown for grain, hay, silage, and lint. Soybeans are the most widely planted annual crop in the county. In 1997, about 7,900 acres of soybeans were harvested for beans. Additional

acres of soybeans were also harvested for hay. Much of the soybean acreage is double cropped after small grain, with wheat being the most widely planted small grain. In 1997, about 3,700 acres of wheat grown for grain was harvested along with 850 acres of barley and 220 acres of oats. Small grains were also planted and harvested for hay and silage. Corn was harvested for grain on approximately 1,500 acres and for silage on approximately 1,000 acres.

Cotton has been a very important crop for agriculture in Cleveland County. In 1909, almost 39,000 acres of cotton was harvested in the county. As late as the 1940's, Cleveland County was the largest cotton-producing county in North Carolina. In 1997, about 2,900 acres was harvested. Although the acreage has declined significantly during the past century, cotton remains an important crop for agriculture in the county. Two cotton gins still operate in the county.

Many hay and silage crops are grown in the county. These forages include tall fescue, orchardgrass, bermudagrass, alfalfa, lespedezas, sorghums, clovers, small grains, corn, and soybeans. Tall fescue is also harvested for seed on several farms.

### Vegetables, Melons, Berries, and Nursery and Greenhouse Crops

The soils and climate of Cleveland County support a variety of crops other than the more widely planted crops that are grown for grain, hay, silage, and lint. Although the total acreage is relatively small, there are numerous farms and fields throughout the county where vegetables, melons, berries, and nursery and greenhouse crops are grown. Deep soils that have good drainage and that warm up early in spring are especially well suited to many vegetables, melons, and berries.

In 1997, vegetables and melons were grown on 330 acres in Cleveland County. Squash was the main vegetable grown, by acreage, with 130 acres planted. Sweet corn was the widest grown, by number of farms, with it being planted on 12 farms. Other vegetables and melons include tomatoes, pumpkins, watermelons, snap beans, cucumbers and pickles, and cantaloupes.

The main berry grown in the county is the strawberry. In 1997, strawberries were grown on 21 farms, on a total of 43 acres. The operations are mostly pick-your-own, which are very popular with area residents. In 1997, nursery and greenhouse crops were grown on 21 farms in the county. These operations are important to the local economy. They generated almost 5 million dollars in sales in 1997.

### Orchards

Conditions in Cleveland County are favorable for apple and peach production (fig. 10). In 1997, the county had 22 farms with orchards covering a total of 565 acres, 460 acres of which were apple orchards. Apples are grown on both piedmont and mountain soils. Peaches grow best on the warmer piedmont soils. The establishment and management of orchard lands requires careful site selection and orchard layout and maintenance planning. The fruit is grown for the fresh market and the juice market. Many growers sell at their own roadside stands.

Apple and peach trees require deep, well drained soils and landforms that offer protection from early season freezing. Other management considerations should be 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 hinder peach production. In both piedmont and mountain areas, cold air generally moves from the higher, more sloping areas and collects on the lower, flatter areas. Most severe crop losses are caused by early season freezing, which damages buds and flowers. Orchards should be located on sloping soils that have uniform air movement with few obstructions so that cold air pockets do not form. Cold air settles on the lower-lying stream terraces and flood plains, such as in areas of 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.

On piedmont divides, soils such as Cecil, Pacolet, and Madison, are commonly used for orchards. Bethlehem soils are also used; however, 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, maintenance of access roads, and equipment use. Cliffside soils are very stony and can limit tree rooting depth and equipment use.

Aspect and susceptibility to wind damage are landform considerations in mountain areas. Southern aspects may encourage premature bud development and increase the risk of freeze damage. Cellular damage to tree trunks may also occur on southern aspects during winter. Some soils on high mountain ridges, such as Cliffield and Pigeonroost soils, are droughty, limit tree rooting depth, and often leave trees and flowers exposed to excessive wind and ice damage.

Orchard layout and maintenance includes careful

**Figure 10.—Apple trees require deep, well drained soils. They are grown on piedmont and mountain soils.**

tree selection, row spacing, planning of access roads, 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 they permit closer row spacing. Tree variety factors, such as fruit marketability, time of bloom, and disease resistance, affect maintenance costs and fruit quality.

The local office of the Natural Resources Conservation Service, the Soil and Water Conservation District, or the North Carolina Cooperative Extension Service can provide additional information about the establishment and management of orchard lands in Cleveland County.

### Cropland Management

Erosion is the main management concern affecting sustained, productive farming in the county. Because of the rolling topography of the county, most of the soils in the uplands are steep enough that intense conservation practices are required to maintain productivity. The majority of the cropland in the uplands consists of moderately eroded soils that have lost 25 to 75 percent of the topsoil.

Critical eroding areas, such as gullies and steep banks, are high sediment-producing areas in the county. Many of the gullies are along the edge of fields and began as unprotected terrace outlets. Active gullies occur throughout the county, and stabilizing these gullies can be very expensive. Many roadside ditches and banks, as well as streambanks, also produce large amounts of sediment.

Erosion is especially damaging to soils that have a clayey subsoil, such as Cecil, Pacolet, Appling, and Madison soils. As subsoil material is incorporated into the surface layer, the available water capacity decreases, the need for lime and fertilizer increases, and soil porosity decreases. These soils also tend to crust, especially in severely eroded areas. If crusting occurs soon after planting, it may impede crop emergence. Crusting reduces water infiltration, resulting in rapid surface runoff and thus an increased

hazard of further erosion. In addition, soils such as Bethlehem and Saw have a layer in or below the subsoil that limits the depth of the root zone and can be severely damaged by erosion.

Many sloping areas have clayey spots where tilling or preparing a good seedbed is difficult because erosion has removed the original friable surface layer. Such spots are common in areas of moderately eroded soils, such as Cecil, Pacolet, and Bethlehem.

A resource management system that provides a protective surface cover helps to control runoff, increases the rate of water infiltration, and reduces the hazard of erosion. A cropping system that maintains plant cover or plant residue cover for extended periods can keep erosion to a rate that does not reduce the productive capacity of the soil. Crop residue management and the inclusion of grasses and legumes in the cropping system help to control erosion and improve soil tilth.

Since the early 1900's, terraces have been a major conservation practice in the county. Terraces are still used today; however, because of larger tractors and machinery, terraces can sometimes be a hindrance to equipment use or terraces can be lowered to the point that they lose much of their capacity to intercept and divert runoff. In addition, terraces do little to improve the tilth of the soil. In the 1960's, no-till planting, or conservation tillage, was first used in Cleveland County. It involves planting a crop in the previous crop's residue, in a cover crop, or in a sod, with minimal tillage or soil disturbance. Today, it is the most important component in resource management systems for cropland in the county.

Conservation tillage effectively reduces the hazard of erosion and conserves soil moisture, and it can improve soil structure and soil tilth for better rainfall infiltration and less crusting. It is practical and economical and can improve soil quality, thus allowing higher yields at a lower cost. Conservation tillage does require a higher level of management but has been readily adopted by most farmers in the county. With better equipment, weed control, cost savings, and awareness of the soil quality benefits, long-term no-till is being utilized by more and more farmers.

Other cropland conservation practices include utilizing grasses and legumes in rotation with row crops, stripcropping, seeding cover crops after low residue-producing crops, constructing diversions for intercepting excess runoff, and establishing grassed waterways for the safe disposal of runoff in areas of the field where runoff concentrates or at the outlets of terraces and diversions. Field borders of grass also serve to control erosion or intercept sediment before it can leave the field.

**Pasture and Hayland Management**

In 1997, according to the Census of Agriculture, Cleveland County had about 22,700 beef and dairy cattle. Most of the cattle were in pastures, and the rest were on feedlots. In 1997, the county also had approximately 900 horses and 500 sheep. Because of the large number of livestock, pasture and hayland management is very important for agriculture in the county. The major pasture and hay plants are tall fescue and white clover. Other perennial forages used for pasture or hay, or both, are common bermudagrass, hybrid bermudagrass, orchardgrass, and alfalfa. Switchgrass has good potential as a forage in the county, although it has not been readily accepted.

Producers of livestock need to plant a combination of forage species that are best adapted to the soils and that best serve their management needs. Growing a good selection of forage species as well as using good management techniques, such as proper fertilization, pest control, and grazing systems that best utilize the available forage, are needed for pasture and hayland management. Overgrazing is a common problem in the county. Overgrazed forages cannot survive periods of drought nor do they respond as well to fertilization. Where pastures are located on soils too steep for conventional farm equipment, fertilization and pest control are difficult.

Selected forage species should provide maximum quality and versatility in the forage program. Legumes produce high-quality feed and can fix nitrogen from the air. White clovers such as ladino are commonly used for pasture. Alfalfa and red clover are generally used for hay. Tall fescue grass is the most important forage of the county. It is suited to a wide range of conditions and used for both pasture and hay. This grass and orchardgrass are cool-season grasses as their main growing periods are spring and fall. Fertilization should be done in late winter and late summer to best utilize the nutrients for their growing periods.

Warm-season grasses, such as common bermudagrass, hybrid bermudagrass, and switchgrass, grow primarily during summer, from mid-June to September. Although these grasses can be grazed, they are best suited for hay production. These forages can provide feed when the growth of the cool-season grasses has slowed during summer.

Annuals such as sorghums, soybeans, and small grains are also planted for hay, but perennials are normally preferred in forage programs for beef cattle because of lower production costs. Corn silage is extensively used for dairy cattle and, to a lesser degree, for beef cattle. In 1997, according to the

Census of Agriculture, approximately 13,700 acres of hay and silage was harvested in the county. The majority of this acreage was tall fescue hay. Approximately 1,000 acres was corn silage, and 1,500 acres was small grain hay.

Fencing is a management tool that can be utilized in pastures for better management and resource protection. Dividing large pastures into smaller units can result in increased production. Moving cows from one area to another at the proper times better utilizes the forage and prevents overgrazing. Fencing is also increasingly used to exclude livestock from streams and creeks. Excluding cattle from streams and creeks improves water quality and fish and wildlife habitat. These fencing systems, however, do require alternative sources of water, such as watering tanks supplied by wells, municipal water, or water piped from streams or springs on the farm.

**Water Management**

Water management involves controlling flood damage, improving subsurface drainage, and retaining soil moisture. All flood plain soils have some degree of flooding hazard. Flooding occurs from streambank overflow and runoff from adjacent slopes. Flooding can result in crop damage and in delays of harvesting or planting due to inaccessibility of equipment. Wehadkee soils flood frequently. Soils such as Chewacla, Toccoa, and Buncombe flood occasionally but are commonly used for crops and pasture. Dogue soils are rarely flooded.

Wetness due to a high water table is very common on flood plain soils, such as Wehadkee and Chewacla soils. Wetness is not a limitation on Toccoa and Buncombe soils. Upland soils, such as Worsham and Helena soils, that are in drainageways also have wetness as a limitation and are generally not used for cropland. Intensive networks of ditches and tiles have been used on many flood plain soils to make the soils suitable for farming. Installation of a tile drainage system is difficult in some areas because of a lack of suitable outlets and a high content of clay in the subsoil. Soils that have seasonal high water tables and no artificial drainage system can limit equipment use and crop selection. These soils are generally slow to warm in spring and are poorly aerated, and the crops are often susceptible to disease and pest management problems. Crops that are more tolerant of wetness, such as corn, are often planted on these soils. Many flood plains, however, that were once used for annually planted crops have been converted to pasture and trees due to the management problems associated with flooding and wetness.

*Management of drainage in conformance with regulations influencing wetlands many require special permits and extra planning. The local office of the Natural Resources Conservation Service or the Soil and Water Conservation District should be contacted for identification of hydric soils and potential wetlands.*

Retaining soil moisture for crop production is a management concern on most soils in the county. Buncombe soils are severely limited for crop production because of droughtiness. Soils such as Cecil and Pacolet can become droughty, especially during summer. Certain specialty crops are best grown utilizing irrigation; however, most field crops cannot currently be grown economically using irrigation. Additions of organic matter, crop residue management that provides soil cover, cover crops, and conservation tillage can help offset the effects of little rainfall and potentially droughty conditions. These practices increase water infiltration and the water-holding capacity of the soil and decrease evaporation rates.

**Soil Fertility**

The soils in Cleveland 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 and pasture. The acidity level in the soil affects the availability of many nutrients to plants and the activity of beneficial bacteria. Lime also neutralizes exchangeable aluminum in the soil and thus counteracts the adverse effects that high levels of aluminum have on many crops. 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 or needed at lesser amounts, however, for legumes such as clover, alfalfa, and soybeans. A reliable soil test is not available for predicting nitrogen requirements. Nitrogen application is discussed in the section “Yields per Acre.”

Soil tests can indicate the need for phosphorus and potassium fertilizer and other micronutrients. They are needed because phosphorus and potassium tend to build up in the soil. Soil tests can also be used to identify specific deficiencies or excesses that are interfering with optimal plant growth.

**Pest Management**

Pest management systems are necessary to maximize economic returns for crops grown on soils in

Cleveland County. Pest management systems strive to balance economics, desired effects, and environmental risks. Pests may include weeds, insects, diseases, and/or animals. Pest management for a particular crop may include the use of cultural, mechanical, chemical, or biological control. Soil types are important especially when considering environmental effects, such as potential leaching and runoff if chemical pesticides are to be applied. The amount of organic matter and surface layer texture also influence the recommended application rate of chemical pesticides.

Certain crops require more intensive pest management than others. For example, cotton, an annual crop, and alfalfa, a perennial crop, require considerable use of pest management systems. Orchards also require an intensive system of pest control with fungicides, herbicides, and insecticides. Pastures of tall fescue can benefit from a good pest management system but generally require fewer economic inputs for pest control.

### Yields per Acre

The average yields per acre that can be expected of the principle 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 is also shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension personnel. Available yield data from nearby counties and results of field trails and demonstrations also are 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 and nutrient management plans. The application of nitrogen should be based on the potential yield of different soils or actual yield data and the texture of the soil. Sandy soils have a higher nitrogen leaching potential and generally require more nitrogen application than clayey soils. The application of nitrogen at rates in excess of what is required for potential yields is an unnecessary expense and causes a hazard of water pollution.

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.

Many crops other than those shown in table 5 are grown in the county, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service, the Soil and Water Conservation District, 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. 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 numbers 1 through 8. The numbers 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. In class 5 the soils are subject to little or no erosion but have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation. Class 5 contains only the subclasses indicated by *w, s,* or *c.*

The capability classification of each map unit 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, forestland, 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 114,608 acres in the survey area, or about 32 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 and Hulett-Madison-Grover 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, hay, and pasture.

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 in table 6. 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."

## Forestland Management and Productivity

Albert Coffey, Forester, Natural Resources Conservation Service, helped prepare this section.

Owners of forestland in Cleveland 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 forestland.

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; controlling insects, diseases, and weeds; and improving tree growth by applications of fertilizer. Even though timber crops require decades to grow, the goal of intensive 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 138,801 acres, or about 46 percent of the land area of Cleveland County *(4, 14)*. According to the North Carolina Forest Service, private landowners own 121,162 acres; the forest industry and corporations, 16,461 acres; and the state and public organisations, 668 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 Cleveland County, landowners are often encouraged to manage for pine instead of hardwoods on sites suited to pine. Quality pine can be produced more rapidly and in greater volume than quality hardwoods. Local markets for pulpwood also help to increase the demand for quality pine. Loblolly pine does not grow naturally in Cleveland County; however, 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.

For purposes of forest inventory, the predominant forest types identified in Cleveland County are as described in the following paragraphs *(4, 14)*.

*Loblolly-shortleaf.* This forest type covers 37,318 acres. It is predominantly loblolly pine, shortleaf pine, or Virginia pine. Commonly included trees are oak, hickory, and gum.

*Oak-pine.* This forest type covers 34,765 acres. It is predominantly hardwoods, usually upland oaks. Pine species may make up 25 to 50 percent of the stand. Commonly included trees are gum, hickory, maple, and yellow-poplar.

*Oak-hickory.* This forest type covers 66,718 acres. It is predominantly upland oaks or hickory, or both. Commonly included trees are yellow-poplar, gum, and maple.

One of the first steps in planning intensive forest 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 forest management, land acquisition, or industrial investments.

The productive capacity of forestland in Cleveland County depends on physiography, soil properties, climate, and the effects of past management, including erosion. 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 steepness and length of slopes affect water movement and availability. 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 landform position largely determine which tree species grow on a particular soil. For example, yellow-poplar grows on soils that have a high moisture content, whereas chestnut oak grows on soils that have low fertility and a low moisture content. Pitch pine grows on soils that have 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 landform position.

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 Ashlar 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 forestland. Some soils are more susceptible to 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 and management concerns in producing timber. Table 7 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.

Table 7 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 (first tree listed under common trees) in cubic feet 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 *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 *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, W, D, C, and S.

Ratings of *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, such as high-lead cable logging, 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, 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 40 inches of the surface or a seasonal high water table. These soils include Ashlar, Bethlehem, Chewacla, Cliffield, Cliffside, Cowee, 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* number. The predominant common trees are listed in table 7 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 feet per acre 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, and yellow-poplar *(3, 6)*. Productivity is also based on site index data from chestnut oak and scarlet oak *(11)*.

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* is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year. Cubic feet per acre can be converted to cubic meters per hectare by dividing by 14.3. It can be converted to board feet by multiplying by a factor of about 5. For example, a productivity class of 8 means that the soil can be expected to produce about 114 cubic feet per acre per year at the point where mean annual increment culminates, or about 570 board feet per acre per year.

*Trees to manage* are those that are 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

Cleveland County offers a wide variety of outdoor recreational opportunities. Developed facilities are scattered throughout the county and include ball fields, golf courses, parks, swimming pools, and camp sites. There are numerous areas suitable for hunting, fishing, and horseback riding as well. A portion of South Mountain State Park is located in Cleveland County and offers several recreational activities.

The soils of the survey area are rated in table 8 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. User safety in flood-prone areas is of the utmost importance.

In table 8, 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 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

*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 period 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 Cleveland County support a wide variety of vegetative communities and wildlife habitat. Existing land use patterns and water bodies support many species, such as dove, quail, crow, white-tailed deer, squirrel, fox, raccoon, rabbit, mink, otter, muskrat, beaver, opossum, coyotes, and groundhog. Wild turkey and otter have been reintroduced into the county. The interspersing of cropland, idle fields, utility right-of-ways, and borders of hardwood-pine forest provides abundant edge areas, which are important to many wildlife species.

The county has several lakes, ponds, creeks, and rivers which provide a wide variety of fish, including such warm-water species as bass, bluegill, and catfish.

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 Cleveland 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 Cleveland County is privately owned, much of the initiative for management and improvement of wildlife habitat depends on private individuals. The North Carolina Wildlife Resources Commission can be contacted for additional information and guidance.

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 9, 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 9 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.

*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. 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, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and white-tailed deer.

*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.*

*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 10 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 local office of the North Carolina Cooperative Extension Service or the Cleveland Soil and Water Conservation District.

### Sanitary Facilities

Table 11 shows the degree and the 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 11 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 11 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 11 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 area 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 12 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 12, 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 area.

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 area 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 releases a variety of plant nutrients as it decomposes.

### Water Management

Table 13 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 and for embankments, dikes, and levees. 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 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.

*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. Maintenance of terraces and diversions is adversely affected by a restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability.

*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 *(16)*. 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. These results are reported in table 18.

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 14 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

Table 15 shows estimates of some physical and chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each 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 affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence 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 $^1/_3$- or $^1/_{10}$-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each 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. Depending on soil texture, a bulk density of more than 1.4 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 ($K_{sat}$)* refers to the ability of a soil to transmit water or air. The term “permeability,” as used in soil surveys, indicates saturated hydraulic conductivity ($K_{sat}$). The estimates in the table indicate the rate of water movement, in inches per hour, 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 is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. 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.

*Linear extensibility* refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $^1/_3$- or $^1/_{10}$-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition. In table 15, 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.

The content of organic matter in a soil can be maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and

tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

*Erosion factors* are shown in table 15 as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, 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. The estimates are modified by the presence of rock fragments.

*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 without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

*Wind erodibility groups* are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, 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, ash material, 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 wind erosion because of coarse fragments on the surface or because of surface wetness.

*Wind erodibility index* is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion 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 wind erosion.

*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.

## Water Features

Table 16 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, 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, 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 or 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 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.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

*Water table* refers to a saturated zone in the soil. Table 16 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

*Flooding* is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

*Duration* and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

The information 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 are 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.

## Soil Features

Table 17 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

*Potential for 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 corrodes 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 or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete 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 also is expressed as *low, moderate,* or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

## Engineering Index Test Data

Table 18 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. Most of the pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the Soil Mechanics Laboratory, Fort Worth, Texas.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are Unified classification—D 2487 (ASTM); AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); Moisture density—T 99 (AASHTO), D 698 (ASTM); and Specific gravity—T 100 (AASHTO), D 854 (ASTM).

# Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(17)*. 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 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve 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 the State plane grid system or by longitude and latitude. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(18)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(17)* and in "Keys to Soil Taxonomy" *(19)*. 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 weathered from felsic high-grade metamorphic or igneous rock
*Landscape:* Piedmont
*Landform:* Broad ridges
*Landform position:* Interfluves
*Slope range:* 1 to 12 percent
*Taxonomic class:* Fine, kaolinitic, thermic Typic Kanhapludults

**Typical Pedon**

Appling sandy loam, 1 to 6 percent slopes; 0.8 mile north of the South Carolina State line on Secondary Road 1209, about 500 feet east on a farm road, 600 southeast in a field; USGS Chesnee topographic quadrangle; lat. 35 degrees 11 minutes 22 seconds N. and long. 81 degrees 45 minutes 15 seconds W.

Ap—0 to 9 inches; yellowish brown (10YR 5/4) sandy loam; weak medium granular structure; very friable; many fine and medium roots; 5 percent quartz pebbles; moderately acid; abrupt smooth boundary.
Bt1—9 to 29 inches; yellowish brown (10YR 5/6) clay; moderate medium granular structure; firm; sticky; plastic; few fine distinct reddish yellow (7.5YR 6/8) iron accumulations; few faint clay films on faces of peds; few fine flakes of mica; very strongly acid; clear wavy boundary.
Bt2—29 to 37 inches; yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; firm; sticky; plastic; common medium distinct reddish yellow (7.5YR 6/8) and common medium prominent yellowish red (5YR 5/8) iron accumulations; common distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; clear wavy boundary.
BC—37 to 56 inches; strong brown (7.5YR 5/6) and yellowish red (5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; common fine distinct reddish brown (2.5YR 4/4) and pink (5YR 7/3) iron accumulations; few fine flakes of mica; strongly acid; gradual wavy boundary.
C—56 to 72 inches; yellowish red (5YR 5/8) and reddish brown (2.5YR 4/4) loam saprolite; massive; very friable; many medium prominent strong brown (7.5YR 5/6) and pink (5YR 7/3) iron accumulations; 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, commonly more than 72 inches
*Content of mica flakes:* Few or common throughout the profile
*Content and size of rock fragments:* Less than 15 percent throughout the profile
*Reaction:* Very strongly acid or strongly acid throughout the profile, except where surface layers have been limed

*A or Ap horizon:*
Color—hue of 10YR, value of 4 or 5, and chroma of 3 or 4
Texture—sandy loam

*BA horizon (if it occurs):*
Color—hue of 10YR, value of 5 or 6, and chroma of 4 or 6
Texture—sandy loam or sandy clay loam

*E horizon (if it occurs):*
Color—hue of 10YR, value of 5 or 6, and chroma of 4 or 6
Texture—sandy loam or loamy sand

*Bt horizon:*
Color—hue of 5YR to 10YR, value of 5 or 6, and chroma of 6 or 8
Texture—clay
Iron accumulations—shades of red, yellow, or brown

*BC horizon:*
Color—hue of 5YR to 10YR, value of 5, and chroma of 6 or 8
Texture—sandy clay loam
Iron accumulations—shades of red, yellow, brown, or pink

*C horizon:*
Color—horizon has hue of 5YR to 10YR, value of 5, and chroma of 6 or 8 or is multicolored in shades of red, yellow, brown, and white
Texture—loam, sandy loam, or sandy clay loam saprolite

## *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 rocks, such as metamorphosed granite, migmatitic gneiss, biotite gneiss, and porphyroblastic gneiss
*Landscape:* Piedmont
*Landform:* Divides

*Landform position:* Side slopes adjacent to rock outcrops
*Slope range:* 25 to 60 percent
*Taxonomic class:* Coarse-loamy, mixed, semiactive, thermic, shallow Typic Dystrudepts

**Typical Pedon**

Ashlar gravelly sandy loam in an area of Rion-Ashlar complex, 25 to 60 percent slopes, rocky; about 3.2 miles north of Shelby on Secondary Road 1005 to Secondary Road 1839, about 0.1 mile west on Secondary Road 1839, about 1,100 feet west-southwest in a woodland near the First Broad River; at an elevation of 760 feet; USGS Shelby NC topographic quadrangle; lat. 35 degrees 20 minutes 15.45 seconds N. and long. 81 degrees 32 minutes 42.87 seconds W.

Oi—1 inch to 0; slightly decomposed deciduous and coniferous litter.
A1—0 to 3 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam; weak medium granular structure; very friable; many fine, common medium, and few coarse roots; 15 percent gravel, by volume; few fine flakes of mica; very strongly acid; clear wavy boundary.
A2—3 to 6 inches; brown (10YR 4/3) sandy loam; weak medium granular structure; very friable; common fine and medium and few coarse roots; 10 percent gravel, by volume; few fine flakes of mica; extremely acid; clear wavy boundary.
Bw—6 to 18 inches; yellowish brown (10YR 5/4) fine sandy loam with a thin discontinuous interlayer of yellowish red (5YR 4/6) loam in the lower part; weak medium granular structure; very friable; few fine and medium roots; few medium distinct strong brown (7.5YR 5/6) iron accumulations; common fine flakes of mica; extremely acid; clear wavy boundary.
Cr—18 to 29 inches; weathered granitic gneiss that is multicolored in shades of brown, white, yellow, and black; very strongly acid; clear wavy boundary.
R—29 inches; hard granitic 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 and 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 (fine-earth fraction)—sandy loam

*E horizon (if it occurs):*
Color—hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4
Texture (fine-earth fraction)—loamy coarse sand, coarse sandy loam, sandy loam, or fine sandy loam

*Bw horizon:*
Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or coarse sandy loam

*C horizon (if it occurs):*
Color—similar to Bw horizon or multicolored
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or coarse sandy loam saprolite

*Cr layer:*
Type of bedrock—soft, weathered granitic gneiss or metamorphosed granite that can be dug with difficulty using hand tools

*R layer:*
Type of bedrock—hard granitic gneiss or metamorphosed granite that cannot be dug using hand tools

Ashlar soils in Cleveland County are considered taxadjuncts to the series because they are shallower than is defined in the official series.

## *Bethlehem Series*

*Depth class:* Moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Convex interfluves and side slopes
*Slope range:* 2 to 30 percent
*Taxonomic class:* Fine, kaolinitic, thermic Typic Kanhapludults

**Typical Pedon**

Bethlehem gravelly sandy clay loam in an area of Pacolet-Bethlehem complex, 8 to 15 percent slopes, moderately eroded; 0.5 mile south of the First Broad River bridge on Secondary Road 1140 to Secondary Road 1141, about 250 feet east on Secondary Road 1141 to Secondary Road 2500, about 0.3 mile on Secondary Road 2500, about 75 feet northeast in a

field; USGS Blacksburg North topographic quadrangle; lat. 35 degrees 12 minutes 50 seconds N. and long. 81 degrees 36 minutes 42 seconds W.

Ap—0 to 8 inches; brown (7.5YR 4/4) gravelly sandy clay loam; moderate medium granular structure; very friable; many very fine and fine roots; 20 percent, by volume, mica schist pebbles; few fine flakes of mica; neutral; clear smooth boundary.

Bt—8 to 30 inches; red (2.5YR 5/8) clay; moderate medium subangular blocky structure; firm; sticky; plastic; common very fine and fine roots; few fine prominent reddish yellow (7.5YR 6/8) iron accumulations; few distinct clay films on faces of peds; few fine flakes of mica; 5 percent, by volume, mica schist gravel; slightly acid; gradual wavy boundary.

BC—30 to 34 inches; red (2.5YR 5/6) gravelly sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; few fine roots; common fine prominent reddish yellow (7.5YR 6/8) iron accumulations; common fine flakes of mica; 15 percent, by volume, mica schist pebbles; moderately acid; clear wavy boundary.

Cr—34 to 45 inches; weathered, highly fractured mica schist bedrock that can be dug with difficulty with a spade; strongly acid; gradual wavy boundary.

R—45 inches; unweathered, highly fractured mica schist.

**Range in Characteristics**

*Thickness of solum:* 20 to 40 inches

*Depth to bedrock:* 20 to 40 inches to soft bedrock (fig. 11) and 40 to more than 60 inches to hard bedrock

*Content of mica flakes:* Few or common in the A horizon; few to many in the B horizon and the C horizon, where present

*Content and size of rock fragments:* 15 to less than 35 percent in the A horizon and less than 15 percent in the B horizon; mostly pebbles

*Reaction:* Very strongly acid or strongly acid throughout the profile, except where surface layers have been limed

*A or Ap horizon:*
- Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 or 6
- Texture (fine-earth fraction)—sandy clay loam

*Bt horizon:*
- Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8
- Texture—clay
- Iron accumulations (if they occur)—shades of red or yellow

*BC horizon:*
- Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8
- Texture—sandy clay loam or clay loam
- Iron accumulations—shades of red or yellow

*C horizon (if it occurs):*
- Color—multicolored in shades of red, yellow, and brown
- Texture—sandy loam or loam saprolite

*Cr layer:*
- Type of bedrock—weathered, moderately fractured or highly fractured high-grade metamorphic rock that can be dug with difficulty with a spade

*R layer:*
- Type of bedrock—unweathered, moderately fractured or highly fractured high-grade metamorphic rock

## *Buncombe Series*

*Depth class:* Very deep
*Drainage class:* Excessively drained (fig. 12)
*Permeability:* Rapid
*Parent material:* Alluvium derived mainly from felsic high-grade metamorphic or igneous rock
*Landscape:* Piedmont
*Landform:* Flood plains
*Landform position:* Planar to slightly convex slopes
*Slope range:* 1 to 5 percent
*Taxonomic class:* Mixed, thermic Typic Udipsamments

**Typical Pedon**

Buncombe loamy sand, 1 to 5 percent slopes, rarely flooded; 2.0 miles south of Boiling Springs on North Carolina Highway 150 to Secondary Road 1146, about 0.6 mile on Secondary Road 1146 to Secondary Road 1145, about 2.0 miles on Secondary Road 1145 to an unpaved road, about 0.6 mile on the unpaved road to a pasture gate, 675 feet southwest of the gate, in pasture; USGS Boiling Springs South topographic quadrangle; lat. 35 degrees 11 minutes 39 seconds N. and long. 81 degrees 37 minutes 32 seconds W.

Ap—0 to 4 inches; dark yellowish brown (10YR 4/4) loamy sand; weak fine granular structure; very friable; common fine roots; few fine flakes of mica; slightly acid; abrupt smooth boundary.

Bw1—4 to 10 inches; yellowish brown (10YR 5/4) sand; single grained; loose; few fine roots; common fine flakes of mica; moderately acid; clear smooth boundary.

Bw2—10 to 29 inches; light yellowish brown (10YR

6/4) sand; single grained; loose; few fine roots; common fine flakes of mica; strongly acid; clear wavy boundary.
Bw3—29 to 43 inches; dark yellowish brown (10YR 4/6) loamy sand; weak fine granular structure; very friable; common fine flakes of mica; moderately acid; clear wavy boundary.
Bw4—43 to 60 inches; dark yellowish brown (10YR 4/6) sand; single grained; loose; common fine distinct very pale brown (10YR 7/3) iron depletions; common fine flakes of mica; moderately acid; gradual wavy boundary.
C—60 to 72 inches; dark yellowish brown (10YR 4/4) sandy loam; massive; very friable; few fine distinct very pale brown (10YR 7/3) iron depletions; common fine flakes of mica; strongly acid.

**Range in Characteristics**

*Depth to contrasting soil material:* 40 to more than 60 inches to loamy material
*Depth to bedrock:* More than 60 inches, commonly more than 10 feet
*Content of mica flakes:* Few to many throughout the profile
*Content and size of rock fragments:* Less than 15 percent throughout the profile; mostly pebbles
*Reaction:* Very strongly acid to slightly acid, except where surface layers have been limed

*A or Ap horizon:*
Color—hue of 10YR, value of 4, and chroma of 4 or 6
Texture—loamy sand or sand

*AB horizon (if it occurs):*
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6
Texture—loamy sand or sand

*Bw horizon:*
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6
Texture—loamy sand or sand
Iron accumulations—shades of brown

*C horizon:*
Color—hue of 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—sandy loam, loamy sand, or sand
Iron accumulations—shades of brown

## *Cecil Series*

*Depth class:* Very deep (fig. 13)
*Drainage class:* Well drained
*Permeability:* Moderate
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves
*Slope range:* 2 to 8 percent
*Taxonomic class:* Fine, kaolinitic, thermic Typic Kanhapludults

**Typical Pedon**

Cecil sandy clay loam, 2 to 8 percent slopes, moderately eroded; on U.S. Highway 74 west of Shelby, 0.9 mile west of the Brushy Creek bridge, 125 feet north of U.S. Highway 74 in a cultivated field; USGS Shelby topographic quadrangle; lat. 35 degrees 17 minutes 39 seconds N. and long. 81 degrees 35 minutes 32 seconds W.

Ap—0 to 6 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium granular structure; friable; few fine roots; few fine flakes of mica; moderately acid; abrupt smooth boundary.
Bt—6 to 39 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm; sticky; plastic; few fine roots; few fine distinct reddish yellow (5YR 6/6) iron accumulations; common distinct clay films on faces of peds; few fine flakes of mica; 5 percent quartz and feldspar fragments; strongly acid; clear wavy boundary.
BC—39 to 65 inches; red (2.5YR 4/8) sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; common fine distinct reddish yellow (5YR 6/6) iron accumulations; few faint clay films on faces of peds; common fine flakes of mica; 5 percent quartz and feldspar fragments; strongly acid; gradual wavy boundary.
C—65 to 72 inches; red (2.5YR 5/8) sandy loam; massive; friable; many fine distinct reddish yellow (5YR 6/6) and reddish brown (2.5YR 4/4) iron accumulations; common fine flakes of mica; strongly acid.

**Range in Characteristics**

*Thickness of solum:* 40 to more than 60 inches
*Depth to bedrock:* 60 to more than 72 inches
*Content of mica flakes:* Few or common throughout the profile
*Content and size of rock fragments:* Less than 15 percent throughout the profile; mostly pebbles
*Reaction:* Very strongly acid or strongly acid, except where surface layers have been limed

*A or Ap horizon:*
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 or 6
Texture—sandy clay loam

*Bt horizon:*
Color—hue of 2.5YR, value of 4 or 5, and chroma of 6 or 8
Texture—clay
Iron accumulations (if they occur)—shades of yellow or brown

*BC horizon:*
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8
Texture—sandy clay loam or clay loam
Iron accumulations—shades of yellow or brown

*C horizon:*
Color—horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8 or is multicolored in shades of red, yellow, and brown
Texture—sandy loam or loam saprolite

## *Chewacla Series*

*Depth class:* Very deep
*Drainage class:* Somewhat poorly drained
*Permeability:* Moderate
*Parent material:* Recent alluvium
*Landscape:* Piedmont
*Landform:* Flood plains
*Landform position:* Planar to slightly concave slopes
*Slope range:* 0 to 2 percent
*Taxonomic class:* Fine-loamy, mixed, active, thermic Fluvaquentic Dystrudepts

### Typical Pedon

Chewacla loam, 0 to 2 percent slopes, occasionally flooded; 0.75 mile on Secondary Road 2012 from its intersection with Secondary Road 1001 to the south end of Muddy Fork bridge, 275 feet southeast in woods; USGS Waco topographic quadrangle; lat. 35 degrees 17 minutes 42 seconds N. and long. 81 degrees 25 minutes 40 seconds W.

A—0 to 6 inches; dark yellowish brown (10YR 4/4) loam; weak medium granular structure; very friable; many fine and medium and few coarse roots; many fine flakes of mica; moderately acid; abrupt wavy boundary.
Bw1—6 to 15 inches; strong brown (7.5YR 4/6) silty clay loam; weak fine subangular blocky structure; friable; few fine and medium roots; many fine flakes of mica; strongly acid; clear wavy boundary.
Bw2—15 to 19 inches; strong brown (7.5YR 4/6) silty clay loam; weak fine subangular blocky structure; friable; few fine roots; few fine prominent light brownish gray (10YR 6/2) irregularly shaped iron depletions with clear boundaries in the matrix; many fine flakes of mica; strongly acid; abrupt wavy boundary.
Bw3—19 to 39 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine subangular blocky structure; friable; few fine roots; many fine faint light brownish gray (10YR 6/2) irregularly shaped iron depletions with clear boundaries in the matrix; few fine distinct strong brown (7.5YR 4/6) irregularly shaped iron accumulations with diffuse boundaries throughout; many fine flakes of mica; strongly acid; gradual wavy boundary.
BCg—39 to 50 inches; gray (10YR 5/1) loam; weak fine subangular blocky structure; very friable; common fine prominent brown (7.5YR 4/4) and reddish brown (5YR 4/4) irregularly shaped iron accumulations with diffuse boundaries throughout; many fine flakes of mica; strongly acid; clear wavy boundary.
Cg—50 to 72 inches; light gray (10YR 6/1) sandy loam; massive; loose; common fine and medium prominent strong brown (7.5YR 5/8) irregularly shaped iron accumulations with diffuse boundaries throughout; many fine flakes of mica; strongly acid.

### Range in Characteristics

*Thickness of solum:* 15 to 70 inches
*Depth to bedrock:* More than 60 inches, commonly more than 72 inches
*Content of mica flakes:* Few to many throughout the profile
*Content and size of rock fragments:* Less than 15 percent; mostly pebbles
*Reaction:* Very strongly acid to slightly acid throughout the profile, except where surface layers have been limed

*A or Ap horizon:*
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 6
Texture—loam or clay loam

*Bw horizon:*
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6
Texture—silty clay loam, silt loam, loam, sandy clay loam, sandy loam, or clay loam
Redoximorphic features—iron or clay depletions in shades of brown or gray and iron accumulations in shades of yellow or red

*Bg horizon (if it occurs):*
Color—hue of 10YR, value of 4 to 6, and chroma of 1 or 2
Texture—clay loam, sandy loam, sandy clay loam, loam, silt loam, or silty clay loam
Redoximorphic features—iron accumulations in shades of yellow or red

*BCg horizon:*
Color—hue of 10YR, value of 4 or 5, and chroma of 1 or 2
Texture—loam, sandy loam, sandy clay loam, or silty clay loam
Redoximorphic features—iron accumulations in shades of yellow or red

*Cg horizon:*
Color—hue of 10YR, value of 4 to 6, and chroma of 1 or 2
Texture—sandy loam, clay loam, sandy clay loam, loam, silt loam, or silty clay loam
Redoximorphic features—iron accumulations in shades of yellow or red

*Ab horizon (if it occurs):*
Color—hue of 10YR to 2.5Y, value of 3 to 5, and chroma of 1 or 2
Texture—clay loam, sandy loam, sandy clay loam, loam, loamy sand, or loamy fine sand
Redoximorphic features (if they occur)—iron accumulations in shades of yellow or red

## *Cliffield Series*

*Depth class:* Moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Landscape:* Mountains
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 15 to 95 percent
*Taxonomic class:* Loamy-skeletal, mixed, subactive, mesic Typic Hapludults

### Typical Pedon

Cliffield very cobbly sandy loam in an area of Cliffield-Pigeonroost complex, 30 to 50 percent slopes, very stony; 0.4 mile east of South Mountain State Park gate below Benn Knob on a private road, 160 feet south of the road; USGS Benn Knob topographic quadrangle; lat. 35 degrees 33 minutes 40 seconds N. and long. 81 degrees 38 minutes 56 seconds W.

A—0 to 4 inches; dark yellowish brown (10YR 4/4) very cobbly sandy loam; weak fine granular structure; very friable; many fine and medium and few coarse roots; few fine flakes of mica; 25 percent gravel, 15 percent cobbles, and 5 percent stones, by volume; strongly acid; clear smooth boundary.

Bt1—4 to 16 inches; strong brown (7.5YR 5/6) very gravelly loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; 35 percent gravel, 15 percent cobbles, and 5 percent stones, by volume; strongly acid; gradual wavy boundary.

Bt2—16 to 30 inches; strong brown (7.5YR 5/8) very cobbly loam; weak fine subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; 35 percent gravel, 25 percent cobbles, and 5 percent stones, by volume; strongly acid; clear wavy boundary.

R—30 inches; unweathered, slightly fractured sillimanite schist.

### Range in Characteristics

*Thickness of solum:* 20 to 40 inches
*Depth to bedrock:* 20 to 40 inches
*Content of mica flakes:* Few or common throughout the profile
*Content and size of rock fragments:* 15 to less than 60 percent, by volume, in the A horizon and 35 to less than 60 percent in the B horizon
*Reaction:* Extremely acid to strongly acid throughout the profile

*A horizon:*
Color—hue of 10YR, value of 4 or 5, and chroma of 3 to 6
Texture (fine-earth fraction)—sandy loam or loam

*BA horizon (if it occurs):*
Color—hue of 7.5YR or 10YR and value and chroma of 4 to 6
Texture (fine-earth fraction)—sandy loam or loam

*Bt horizon:*
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8
Texture (fine-earth fraction)—loam or clay loam

*R layer:*
Type of bedrock—unweathered, slightly fractured to highly fractured felsic metamorphic rock

## *Cliffside Series*

*Depth class:* Moderately deep
*Drainage class:* Well drained

*Permeability:* Moderate
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes
*Slope range:* 25 to 60 percent
*Taxonomic class:* Loamy-skeletal, mixed, semiactive, thermic Typic Hapludults

**Typical Pedon**

Cliffside very cobbly sandy loam in an area of Rion-Cliffside complex, 25 to 60 percent slopes, very stony; 4.9 miles south of Boiling Springs on N.C. Highway 150 to Secondary Road 1200, about 0.5 mile east on Secondary Road 1200 to Secondary Road 1199, about 0.4 mile north on Secondary Road 1199 to Secondary Road 1198, about 0.8 mile on Secondary Road 1198 to Secondary Road 1197, about 1.0 mile north on Secondary Road 1197 to an unpaved road, 0.1 mile north on the unpaved road, 240 feet east in woods; USGS Boiling Spring South topographic quadrangle; lat. 35 degrees 11 minutes 34 seconds N. and long. 81 degrees 37 minutes 54 seconds W.

Oe—2 inches to 0; partially decomposed leaves and twigs.
A—0 to 7 inches; brown (10YR 4/3) very cobbly sandy loam; weak medium granular structure; very friable; common fine and medium roots; 20 percent gravel and 15 percent cobbles, by volume; few fine flakes of mica; strongly acid; abrupt smooth boundary.
AB—7 to 16 inches; strong brown (7.5YR 4/6) very gravelly sandy loam; moderate medium granular structure; very friable; common fine roots; 25 percent gravel and 10 percent cobbles, by volume; common fine flakes of mica; very strongly acid; clear wavy boundary.
Bt—16 to 30 inches; yellowish red (5YR 4/6) very gravelly sandy clay loam; weak fine subangular blocky structure; friable; few fine roots; 40 percent gravel, by volume; common fine flakes of mica; very strongly acid; clear wavy boundary.
R—30 inches; unweathered, moderately fractured mica schist.

**Range in Characteristics**

*Thickness of solum:* 20 to 40 inches
*Depth to bedrock:* 20 to 40 inches to hard bedrock
*Content of mica flakes:* Few or common throughout the profile
*Content and size of rock fragments:* 15 to less than 60 percent in the A and AB horizons and 35 to less than 60 percent in the B horizon; ranging from pebbles to stones
*Reaction:* Very strongly acid or strongly acid throughout the profile

*A horizon:*
Color—hue of 10YR, value of 4 or 5, and chroma of 3 to 6
Texture (fine-earth fraction)—sandy loam

*AB or BA horizon:*
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6
Texture (fine-earth fraction)—sandy loam

*Bt horizon:*
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 6 or 8
Texture (fine-earth fraction)—sandy clay loam, clay loam, or loam

*R layer:*
Type of bedrock—unweathered, slightly fractured to highly fractured felsic high-grade metamorphic rock

## *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 rocks, such as sillimanite-mica schist, biotite gneiss, and migmatitic gneiss (fig. 14)
*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

**Typical Pedon**

Cowee gravelly sandy loam in an area of Evard-Cowee complex, 30 to 50 percent slopes, stony; about 1.2 miles north of New Home on Secondary Road 1529, about 2.0 miles west on Secondary Road 1536, about 1.6 miles north on Secondary Road 1535, about 250 feet north along a jeep trail, 15 feet east in woodland; at an elevation of 1,329 feet; USGS Benn Knob NC topographic quadrangle; lat. 35 degrees 32 minutes 36.13 seconds N. and long. 81 degrees 40 minutes 48.98 seconds W.

Oi—1 inch to 0; semi-decomposed deciduous litter.
A—0 to 5 inches; dark brown (7.5YR 3/2) gravelly

sandy loam; weak medium granular structure; very friable; many fine and medium and few coarse roots; 20 percent gravel and 5 percent cobbles, by volume; few fine flakes of mica; very strongly acid; clear smooth boundary.

BA—5 to 10 inches; strong brown (7.5YR 4/6) gravelly sandy loam; weak medium subangular blocky structure; very friable; common fine and medium and few coarse roots; 15 percent gravel and 5 percent cobbles, by volume; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt—10 to 28 inches; red (2.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; few faint clay films on faces of peds; common fine, medium, and coarse roots; 5 percent gravel and 5 percent cobbles, by volume; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—28 to 35 inches; red (2.5YR 4/8) sandy clay loam; weak medium subangular blocky structure; friable; few fine and medium and common coarse roots; 5 percent gravel and 5 percent cobbles, by volume; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Cr—35 inches; soft, weathered gneiss bedrock.

**Range in Characteristics**

*Thickness of solum:* 15 to 39 inches

*Depth to bedrock:* 20 to 40 inches to soft bedrock and 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:* Strongly acid to extremely acid

*A horizon:*
- Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 8
- Texture (fine-earth fraction)—sandy loam

*BA horizon:*
- Color—hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8
- Texture (fine-earth fraction)—loam, sandy loam, or fine sandy loam

*Bt horizon:*
- Color—hue of 2.5YR or 5YR (7.5YR in subhorizons), value of 4 to 6, and chroma of 4 to 8
- Texture—sandy clay loam, clay loam, sandy loam, fine sandy loam, or loam

*BC horizon:*
- Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8
- Texture (fine-earth fraction)—sandy clay loam, sandy loam, fine sandy loam, or loam

*C horizon (if it occurs):*
- Color—similar to BC horizon or multicolored
- Texture—loamy saprolite

*Cr layer:*
- Type of bedrock—soft, weathered schist or gneiss rock that can be dug with difficulty 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 toeslopes
*Slope range:* 2 to 8 percent
*Taxonomic class:* Fine, mixed, semiactive, thermic Aquic Hapludults

**Typical Pedon**

Dogue sandy loam, 2 to 8 percent slopes, rarely flooded; about 3.5 miles southeast of Patterson Springs on N.C. Highway 226, about 0.7 mile west on Secondary Road 2228, about 1,000 feet west-northwest in a pasture on the stream terrace; at an elevation of 620 feet; USGS Grover NC topographic quadrangle; lat. 35 degrees 11 minutes 26.96 seconds N. and long. 81 degrees 29 minutes 33.89 seconds W.

A—0 to 4 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; very friable; many fine roots; neutral; abrupt wavy boundary.

E—4 to 7 inches; light olive brown (2.5Y 5/6) sandy loam; weak medium granular structure; very friable; many fine roots; slightly acid; clear wavy boundary.

Bt1—7 to 25 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; firm; sticky; plastic; common fine roots; few medium prominent light olive brown (2.5Y 5/3) iron depletions in the matrix; common distinct clay films on faces of peds; moderately acid; gradual wavy boundary.

Bt2—25 to 36 inches; brownish yellow (10YR 6/6) clay loam; moderate medium subangular blocky structure; firm; sticky; plastic; few fine roots;

common medium distinct strong brown (7.5YR 5/6) irregular iron accumulations and common fine prominent light gray (2.5Y 7/2) iron depletions in the matrix; few fine flakes of mica; common distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

BC—36 to 50 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; friable; common coarse distinct strong brown (7.5YR 5/8) irregular iron accumulations and common fine prominent light gray (2.5Y 7/2) iron depletions in the matrix; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C—50 to 60 inches; brownish yellow (10YR 6/6) coarse sandy loam; massive; very friable; very strongly acid.

**Range in Characteristics**

*Thickness of solum:* 40 to 60 inches or more

*Depth to bedrock:* More than 72 inches

*Content of mica flakes:* Few or common in the B and C horizons

*Content of rock fragments:* 0 to 15 percent rounded or water-worn rock fragments in the solum and 0 to 25 percent in the C horizon

*Reaction:* Extremely acid to strongly acid throughout the profile, except where the surface layers have been limed

*A horizon:*
- Color—hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4
- Texture (fine-earth fraction)—sandy loam

*Ap horizon (if it occurs):*
- Color—hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4
- Texture (fine-earth fraction)—loam, fine sandy loam, sandy loam, or very fine sandy loam

*E horizon:*
- Color—hue of 10YR to 2.5Y, value of 4 to 7, and chroma of 3 to 6
- Texture (fine-earth fraction)—sandy loam, fine sandy loam, very fine sandy loam, or silt loam

*BE or BA horizon (if it occurs):*
- Color—hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 4 to 8
- Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

*Bt horizon:*
- Color—horizon has hue of 7.5YR to 2.5Y, value of 4 to 6 in the upper part and 4 to 7 in the lower part, and chroma of 0 to 8, or it is mottled
- Texture (fine-earth fraction)—clay loam, sandy clay, sandy clay loam, or clay
- Redoximorphic features—iron or clay depletions in shades of gray and iron accumulations in shades of red or brown

*BC horizon:*
- Color—horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8 or is mottled
- Texture (fine-earth fraction)—clay loam, sandy clay loam, sandy clay, or clay
- Redoximorphic features (if they occur)—iron or clay depletions in shades of gray and iron accumulations in shades of red or brown

*BCg horizon (if it occurs):*
- Color—hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 0 to 2
- Texture (fine-earth fraction)—same as BC horizon

*C horizon:*
- Color—horizon is neutral in hue or has hue of 7.5YR to 2.5Y, has value of 4 to 7, and has chroma of 3 to 8, or it is mottled
- Texture (fine-earth fraction)—stratified sand to sandy clay loam

*Cg horizon (if it occurs):*
- Color—horizon is neutral in hue or has hue of 7.5YR to 2.5Y, has value of 4 to 7, and has chroma of 0 to 2, or it is mottled
- Texture (fine-earth fraction)—stratified sand to sandy clay loam

## *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 (fig. 15)

*Landscape:* Mountains

*Landform:* Divides

*Landform position:* Concave summits and side slopes

*Slope range:* 15 to 85 percent

*Taxonomic class:* Fine-loamy, parasesquic, mesic Typic Hapludults

**Typical Pedon**

Evard sandy loam in an area of Evard-Cowee complex, 30 to 50 percent slopes, stony; about 1.2 miles north of New Home on Secondary Road 1529, about 2.0 miles west on Secondary Road 1536, about 1.6 miles north on Secondary Road 1535, about 450 feet north along a jeep trail, in woodland; at an

elevation of 1,330 feet; USGS Benn Knob NC topographic quadrangle; lat. 35 degrees 32 minutes 38.51 seconds N. and long. 81 degrees 40 minutes 48.15 seconds W.

Oi—1 inch to 0; semi-decomposed deciduous litter.
A—0 to 6 inches; reddish brown (5YR 4/4) sandy loam; weak fine granular structure; very friable; many fine and medium and few coarse roots; 10 percent gravel, by volume; few fine flakes of mica; strongly acid; clear smooth boundary.
Bt—6 to 31 inches; red (2.5YR 4/4) sandy clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; few faint clay films on faces of peds; 5 percent gravel and 5 percent cobbles, by volume; few fine flakes of mica; slightly acid; gradual wavy boundary.
BC—31 to 43 inches; red (2.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine and medium roots; 5 percent gravel and 5 percent cobbles, by volume; few fine flakes of mica; slightly acid; gradual wavy boundary.
C—43 to 61 inches; red (2.5YR 4/6) sandy loam saprolite; massive; very friable; 5 percent gravel and 5 percent cobbles, by volume; few fine flakes of mica; extremely 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 (fine-earth fraction)—sandy loam

*BA horizon (if it occurs):*
Color—hue of 5YR to 10YR and value and chroma of 4 to 8
Texture (fine-earth fraction)—sandy clay loam, loam, fine sandy loam, sandy loam, or clay loam

*Bt horizon:*
Color—hue of 2.5YR or 5YR (7.5YR in subhorizons), value of 4 or 5, and chroma of 4 to 8
Texture (fine-earth fraction)—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
Texture (fine-earth fraction)—sandy clay loam, fine sandy loam, loam, sandy loam, or clay loam
Iron accumulations (if they occur)—few or common in shades of red, brown, or yellow

*C horizon:*
Color—similar to BC horizon or multicolored
Texture—saprolite in variable textures ranging from loam to loamy sand

## *Grover Series*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Parent material:* Residuum weathered from granite pegmatite
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes
*Slope range:* 15 to 60 percent
*Taxonomic class:* Fine-loamy, micaceous, thermic Typic Hapludults

**Typical Pedon**

Grover gravelly sandy loam, 15 to 30 percent slopes, rocky; from U.S. Highway 74 East, 5.9 miles on Secondary Road 2238 to Secondary Road 2276, about 0.5 mile north on Secondary Road 2276 to a farm road, 0.5 mile north on the farm road, 500 feet north of the end of the road; USGS Grover topographic quadrangle; lat. 35 degrees 12 minutes 04 seconds N. and long. 81 degrees 25 minutes 46 seconds W.

Oe—2 inches to 0; partially decomposed leaves and twigs.
A—0 to 5 inches; yellowish brown (10YR 5/4) gravelly sandy loam; weak medium granular structure; very friable; many fine, medium, and coarse roots throughout horizon; many fine flakes of mica; 20 percent, by volume, granite and quartz pebbles; moderately acid; clear wavy boundary.
E—5 to 13 inches; brownish yellow (10YR 6/6) sandy loam; weak medium granular structure; very friable; common fine and medium roots throughout horizon; many fine flakes of mica; very strongly acid; clear wavy boundary.
Bt—13 to 27 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots throughout horizon; few faint clay films on faces of peds; many fine and medium flakes of mica; very strongly acid; clear wavy boundary.
BC—27 to 35 inches; reddish yellow (7.5YR 6/6)

sandy loam; weak fine subangular blocky structure; very friable; many fine and medium flakes of mica; many fine to coarse dark grayish brown (10YR 4/2) irregularly shaped bodies of biotite; very strongly acid; clear wavy boundary.

C1—35 to 57 inches; brownish yellow (10YR 6/8) sandy loam; massive; very friable; 10 percent, by volume, granite and quartz pebbles; many fine and medium flakes of mica; many fine to coarse dark grayish brown (10YR 4/2) irregularly shaped bodies of biotite; very strongly acid; gradual wavy boundary.

C2—57 to 72 inches; very pale brown (10YR 7/4) and brownish yellow (10YR 6/6) loamy sand; massive; very friable; many fine and medium flakes of mica; many fine to coarse dark grayish brown (10YR 4/2) irregularly shaped bodies of biotite; very strongly acid.

**Range in Characteristics**

*Thickness of solum:* 20 to 40 inches
*Depth to bedrock:* 60 to more than 72 inches
*Content of mica flakes:* Common or many in the A and E horizons and many in the B and C horizons
*Content and size of rock fragments:* 15 to less than 35 percent, by volume, in the A horizon and less than 15 percent in the E, B, and C horizons; mostly pebbles
*Reaction:* Very strongly acid to slightly acid in the A and E horizon and very strongly acid to moderately acid in the B and C horizons

*A horizon:*
Color—hue of 10YR, value of 5, and chroma of 3 or 4
Texture (fine-earth fraction)—sandy loam

*E horizon:*
Color—hue of 10YR, value of 5 or 6, and chroma of 6 or 8
Texture—sandy loam

*Bt horizon:*
Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8
Texture—sandy clay loam or loam

*BC horizon:*
Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8
Texture—sandy loam or loam

*C horizon:*
Color—horizon has hue of 10YR, value of 6 or 7, and chroma of 3 to 6 or is multicolored in shades of yellow and brown
Texture—sandy loam or loamy sand saprolite

## *Helena Series*

*Depth class:* Very deep
*Drainage class:* Moderately well drained
*Permeability:* Slow
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock
*Landscape:* Piedmont
*Landform:* Upland drainageways and heads of drains
*Landform position:* Head slopes and side slopes
*Slope range:* 1 to 6 percent
*Taxonomic class:* Fine, mixed, semiactive, thermic Aquic Hapludults

**Typical Pedon**

Helena sandy loam in an area of Helena-Worsham complex, 1 to 6 percent slopes; 2.4 miles north of Waco on Secondary Road 1001, about 750 feet east in pasture; USGS Cherryville topographic quadrangle; lat. 35 degrees 23 minutes 26 seconds N. and long. 81 degrees 26 minutes 55 seconds W.

Ap—0 to 7 inches; brown (10YR 4/3) sandy loam; moderate fine granular structure; friable; common fine roots; few fine flakes of mica; moderately acid; abrupt smooth boundary.

BA—7 to 14 inches; yellowish brown (10YR 5/4) sandy loam; moderate medium granular structure; friable; slightly sticky; slightly plastic; few fine roots; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt1—14 to 26 inches; light yellowish brown (10YR 6/4) sandy clay; moderate medium subangular blocky structure; firm; sticky; plastic; few fine roots; common fine distinct light brownish gray (10YR 6/2) irregularly shaped iron depletions with clear boundaries in the matrix; common fine prominent strong brown (7.5YR 5/8) irregularly shaped iron accumulations with clear boundaries throughout; few distinct clay films on faces of peds; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt2—26 to 50 inches; light yellowish brown (2.5Y 6/4) clay; moderate medium subangular blocky structure; firm; sticky; plastic; many fine and medium distinct light brownish gray (2.5Y 6/2) irregularly shaped iron depletions with clear boundaries in the matrix; many fine and medium prominent strong brown (7.5YR 5/8) and few fine prominent red (2.5YR 5/8) irregularly shaped iron accumulations with clear boundaries throughout; few distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

BCg1—50 to 56 inches; light gray (10YR 6/1) sandy clay; weak medium subangular blocky structure;

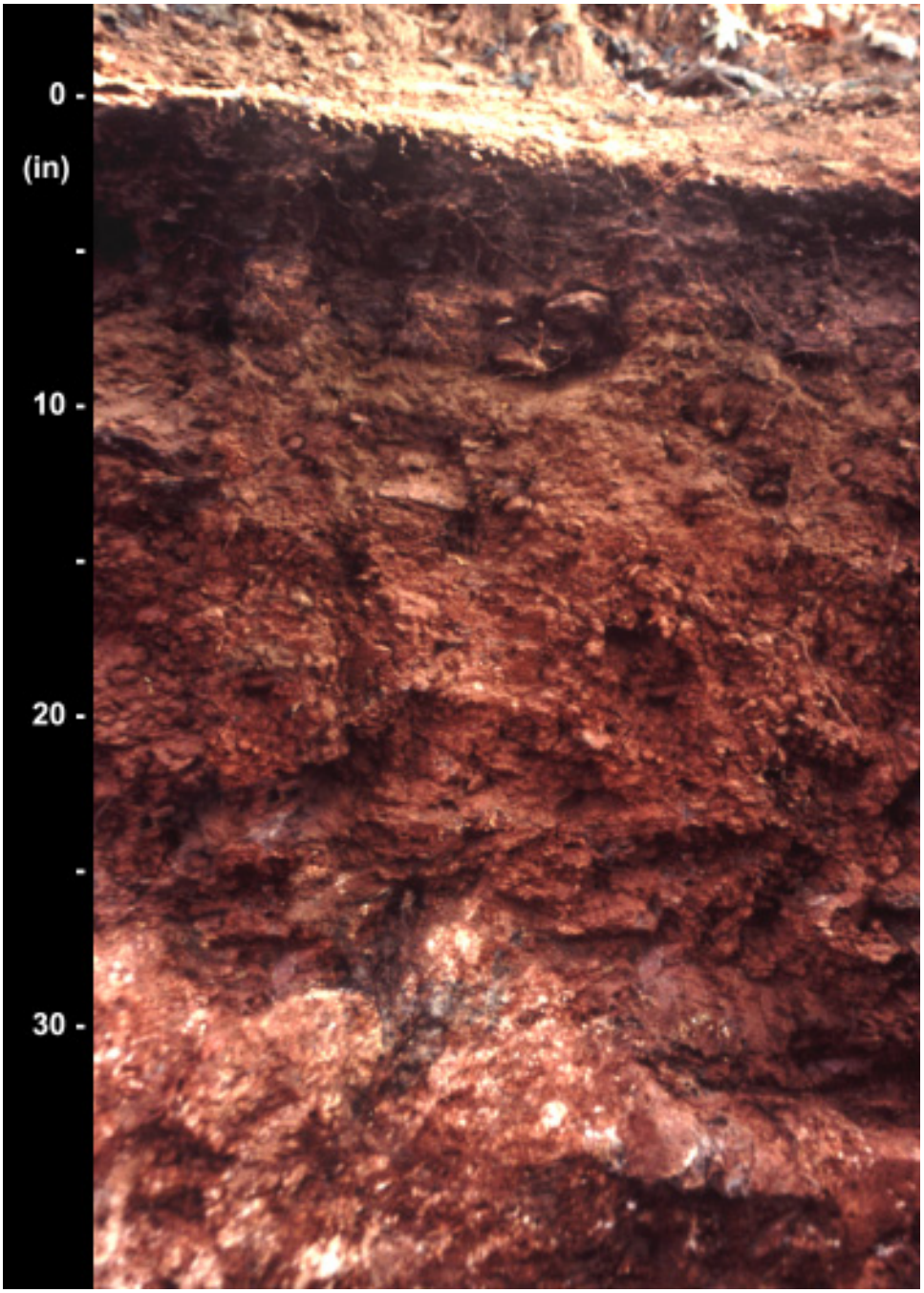


**Figure 11.—Profile of a Bethlehem soil. Bethlehem soils are moderately deep. They formed from high-grade metamorphic rocks, such as mica schist and phyllite schist. Depth to weathered bedrock ranges from 20 to 40 inches. The scale is in inches.**

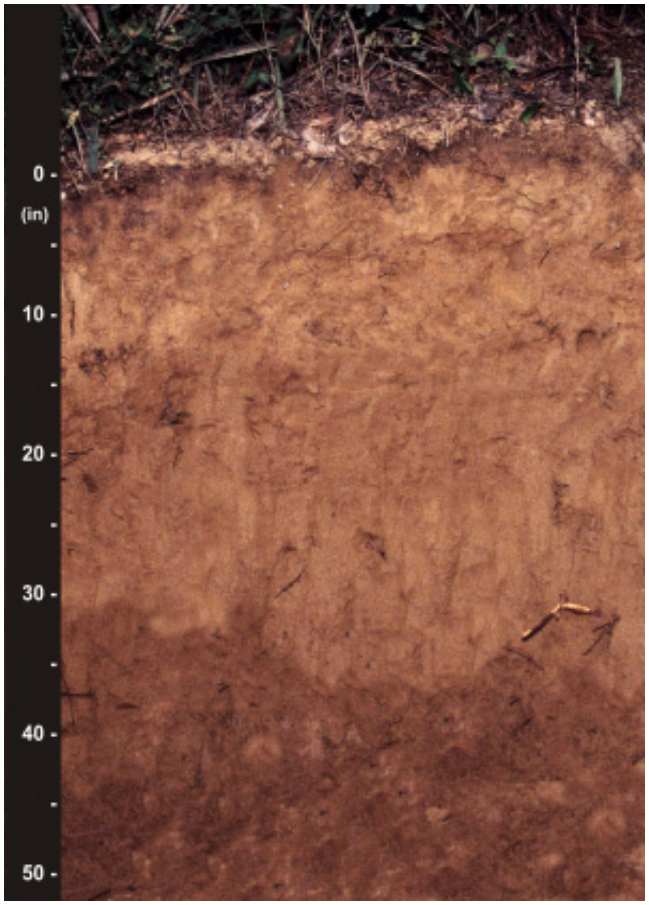


Figure 12.—Profile of Buncombe loamy sand. Buncombe soils are very deep, excessively drained sandy soils occurring on flood plains. Below a depth of 40 inches, textures range from sand to loam or are stratified. The scale is in inches.

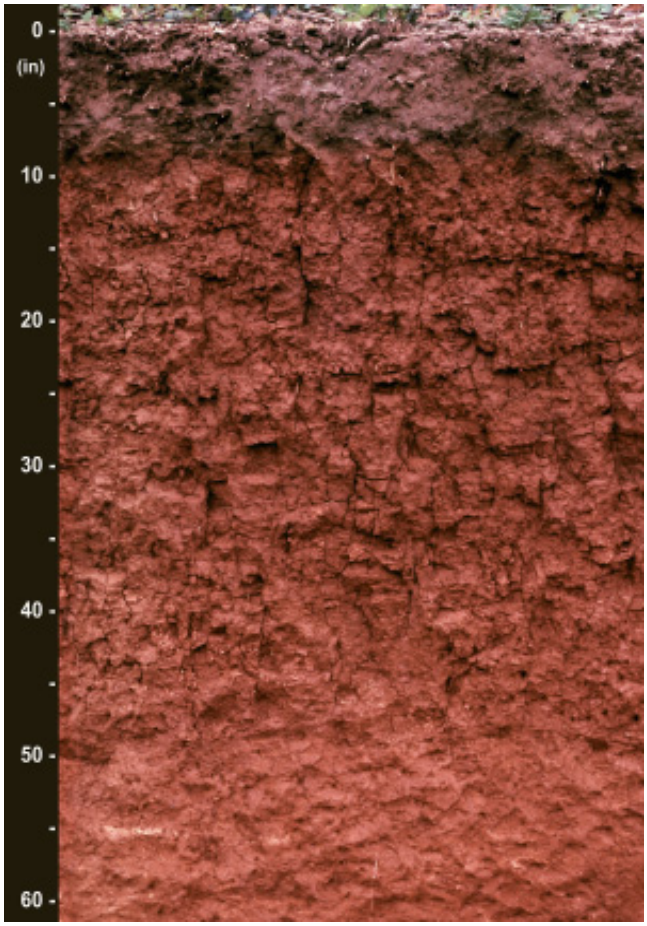


Figure 13.—Profile of Cecil sandy clay loam. Cecil soils are very deep and have a red subsoil which extends below a depth of 40 inches. Depth to bedrock is more than 60 inches. The scale is in inches.

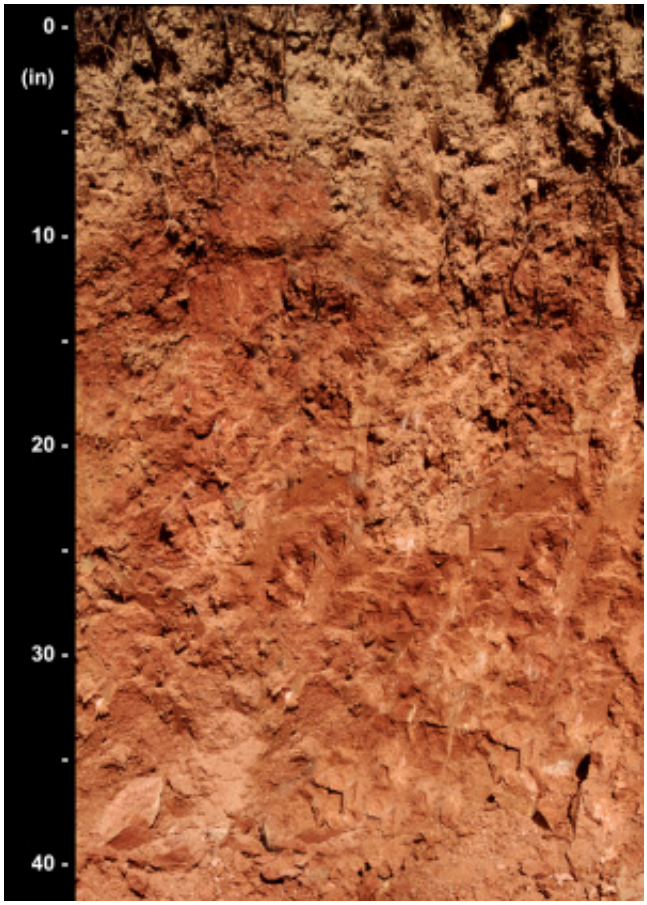


**Figure 14.—Profile of Cowee gravelly sandy loam. Cowee soils formed in place from soft, weathered bedrock that can be dug with difficulty with hand tools. The scale is in feet.**

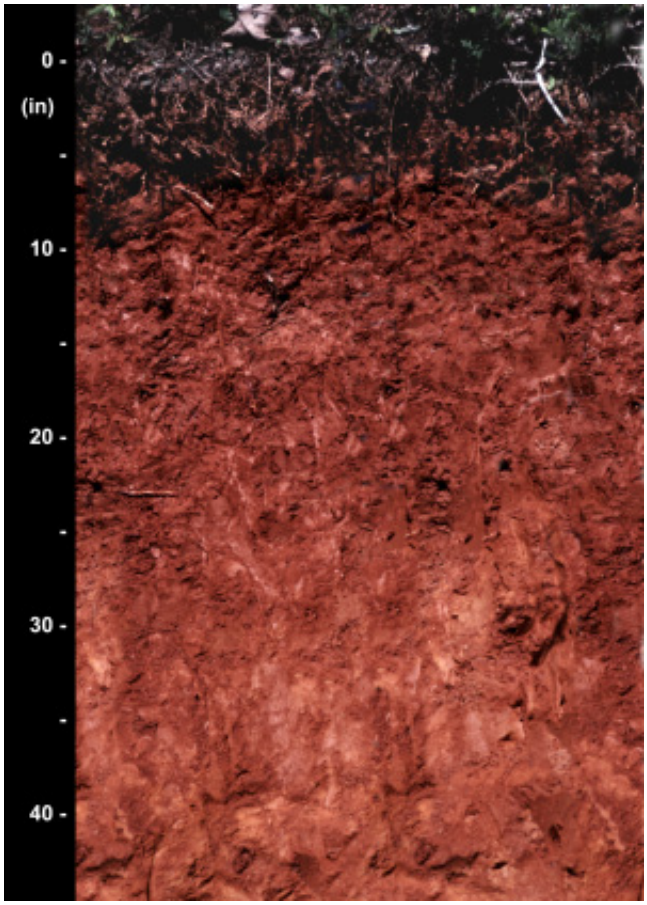


**Figure 15.—Profile of an Evard soil. Evard soils are very deep and may be affected by soil creep in the upper part. Depth to bedrock is more than 60 inches. The scale is in centimeters.**


**Figure 16.—Profile of a Wake soil. Wake soils are excessively drained, shallow, and sandy. They occur in the uplands of the Southern Piedmont area. Depth to hard bedrock ranges from 11 to 20 inches. The scale is in centimeters.**

firm; sticky; plastic; many fine and medium prominent strong brown (7.5YR 5/8 and 5/6) irregularly shaped iron accumulations throughout; few fine flakes of mica; strongly acid; gradual wavy boundary.

BCg2—56 to 60 inches; gray (N 6/0) sandy clay loam; weak medium subangular blocky structure; firm; sticky; plastic; many medium and coarse distinct light yellowish brown (2.5Y 6/4) and few fine and medium prominent strong brown (7.5YR 5/8) irregularly shaped iron accumulations throughout; few fine flakes of mica; strongly acid.

**Range in Characteristics**

*Thickness of solum:* 40 to more than 60 inches
*Depth to bedrock:* More than 60 inches
*Content of mica flakes:* Few or common throughout the profile
*Content and size of rock fragments:* Less than 15 percent throughout the profile; mostly pebbles
*Reaction:* Extremely acid to strongly acid, except where surface layers have been limed

*A or Ap horizon:*
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6
Texture—sandy loam or loam

*BA horizon (if it occurs):*
Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8
Texture—sandy loam or loam

*Bt horizon:*
Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8
Texture—sandy clay or clay
Redoximorphic features—iron or clay depletions in shades of gray and iron accumulations in shades of red or brown

*BCg horizon:*
Color—horizon has hue of 10YR or 2.5YR, value of 4 to 6, and chroma of 0 to 2 or is neutral in hue and has value of 6
Texture—sandy clay loam, sandy clay, or clay
Redoximorphic features—iron or clay depletions in shades of gray and iron accumulations in shades of red or brown

*Cg horizon (if it occurs):*
Color—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 0 to 2
Color (upon exposure to air)—hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6
Texture—sandy loam or loam
Redoximorphic features—iron or clay depletions in shades of gray and iron accumulations in shades of red or brown

## *Hulett Series*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock with a high content of mica
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 2 to 15 percent
*Taxonomic class:* Fine, kaolinitic, thermic Typic Hapludults

**Typical Pedon**

Hulett gravelly sandy loam, 2 to 8 percent slopes; 3.4 miles north of the intersection of U.S. Highway 74 Bypass in Kings Mountain on N.C. Highway 216, about 0.6 mile east on a farm road, 75 feet east in a cultivated field; USGS Bessemer City topographic quadrangle; lat. 35 degrees 17 minutes 45 seconds N. and long. 81 degrees 22 minutes 02 seconds W.

Ap—0 to 8 inches; yellowish brown (10YR 5/4) gravelly sandy loam; weak medium granular structure; very friable; common fine roots throughout horizon; 15 percent, by volume, quartz and granitic pebbles; common fine and medium flakes of mica; strongly acid; abrupt smooth boundary.

Bt1—8 to 19 inches; strong brown (7.5YR 5/6) clay; moderate medium subangular blocky structure; firm; moderately sticky; moderately plastic; common fine roots between peds; common fine and medium distinct yellowish red (5YR 5/8) and few fine faint reddish yellow (7.5YR 7/6) iron accumulations; common distinct clay films on faces of peds; many fine and medium flakes of mica; very strongly acid; clear wavy boundary.

Bt2—19 to 27 inches; yellowish red (5YR 5/6) clay; moderate medium subangular blocky structure; firm; moderately sticky; moderately plastic; few fine roots between peds; common fine and medium distinct red (2.5YR 5/8) and reddish yellow (7.5YR 7/6) and few fine and medium prominent yellowish brown (10YR 5/4) iron accumulations; common distinct clay films on faces of peds; many fine and medium flakes of mica; extremely acid; clear wavy boundary.

BC—27 to 37 inches; yellowish red (5YR 5/8) clay loam; weak medium subangular blocky structure;

friable; slightly sticky; slightly plastic; few very fine roots between peds; many medium and coarse prominent reddish yellow (7.5YR 8/6) and common fine and medium distinct strong brown (7.5YR 5/6) and red (2.5YR 5/8) iron accumulations; many fine and medium flakes of mica; extremely acid; clear wavy boundary.

C1—37 to 56 inches; reddish yellow (7.5YR 8/6) sandy clay loam saprolite; massive; very friable; many fine and medium prominent red (2.5YR 5/8) and common fine and medium distinct strong brown (7.5YR 5/6) iron accumulations; many fine and medium flakes of mica; extremely acid; gradual irregular boundary.

C2—56 to 72 inches; reddish yellow (7.5YR 8/6) sandy loam saprolite; massive; very friable; many fine and medium red (2.5YR 5/8) and strong brown (7.5YR 5/6) iron accumulations; many fine and medium flakes of mica; extremely acid.

**Range in Characteristics**

*Thickness of solum:* 20 to more than 40 inches

*Depth to bedrock:* More than 60 inches, commonly more than 72 inches

*Content of mica flakes:* Few or common in the A horizon, common or many in the upper part of the B horizon, and many in the lower part of the B horizon and in the C horizon

*Content of rock fragments:* 15 to less than 35 percent in the A horizon and less than 15 percent in the B and C horizons

*Reaction:* Very strongly acid to moderately acid in the A horizon and very strongly acid or strongly acid in the B and C horizons

*A or Ap horizon:*
- Color—hue of 10YR, value of 4 or 5, and chroma of 3 or 4
- Texture (fine-earth fraction)—sandy loam

*Bt horizon:*
- Color—hue of 5YR to 10YR, value of 5 or 6, and chroma of 4 to 8
- Texture—clay
- Iron accumulations—shades of red, brown, or yellow

*BC horizon:*
- Color—hue of 5YR to 10YR, value of 5 or 6, and chroma of 4 to 8
- Texture—clay loam or loam
- Iron accumulations—shades of red, brown, or yellow

*C horizon:*
- Color—horizon has hue of 10YR, value of 6 to 8, and chroma of 3 to 8 or is multicolored in shades of red, yellow, and brown
- Texture—sandy loam or sandy clay loam saprolite

## *Madison Series*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock with a high content of mica
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 2 to 15 percent
*Taxonomic class:* Fine, kaolinitic, thermic Typic Kanhapludults

**Typical Pedon**

Madison gravelly sandy clay loam, 2 to 8 percent slopes, moderately eroded; 4.5 miles north of the intersection of U.S. Highway 74 Bypass in Kings Mountain on N.C. Highway 216, about 200 feet east in an idle field; USGS Bessemer City topographic quadrangle; lat. 35 degrees 18 minutes 27 seconds N. and long. 81 degrees 21 minutes 51 seconds W.

Ap—0 to 6 inches; strong brown (7.5YR 4/6) gravelly sandy clay loam; moderate medium granular structure; friable; common fine roots; few fine flakes of mica; 17 percent, by volume, quartz fragments; moderately acid; abrupt smooth boundary.

Bt1—6 to 24 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; sticky; plastic; few fine distinct reddish yellow (5YR 6/8) iron accumulations; common distinct clay films on faces of peds; common fine flakes of mica; strongly acid; clear wavy boundary.

Bt2—24 to 37 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm; sticky; plastic; few fine distinct reddish yellow (5YR 6/8) and few fine prominent reddish yellow (7.5YR 6/8) iron accumulations; common distinct clay films on faces of peds; many fine flakes of mica; strongly acid; clear wavy boundary.

BC—37 to 50 inches; red (2.5YR 4/8) sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; few fine distinct reddish yellow (5YR 6/8) and reddish brown (2.5YR 4/4) and few fine prominent reddish yellow (7.5YR 6/8) iron accumulations; many fine flakes of mica; strongly acid; gradual wavy boundary.

C—50 to 72 inches; reddish yellow (5YR 6/8) sandy loam; massive; very friable; many fine distinct yellowish red (5YR 4/6) and reddish brown (2.5YR 4/4) and many fine prominent brownish yellow (10YR 6/8) iron accumulations; many fine and medium flakes of mica; strongly acid.

**Range in Characteristics**

*Thickness of solum:* 20 to 50 inches
*Depth to bedrock:* 60 to more than 72 inches
*Content of mica flakes:* Few to many in the A horizon, common or many in the upper part of the B horizon, and many in the lower part of the B horizon and in the C horizon
*Content of rock fragments:* 15 to less than 35 percent in the A horizon and less than 15 percent in the B and C horizons
*Reaction:* Moderately acid to very strongly acid throughout the profile, except where surface layers have been limed

*A or Ap horizon:*
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6
Texture (fine-earth fraction)—sandy clay loam

*Bt horizon:*
Color—hue of 2.5YR, value of 4 or 5, and chroma of 6 or 8
Texture—clay
Iron accumulations (if they occur)—shades of yellow or brown

*BC horizon:*
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8
Texture—sandy clay loam or clay loam
Iron accumulations—shades of red, yellow, or brown

*C horizon:*
Color—horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 to 8 or is multicolored in shades of red, yellow, and brown
Texture—sandy loam, loam, or sandy clay loam saprolite

## *Montonia Series*

*Depth class:* Moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Parent material:* Residuum weathered from fine-grained felsic high-grade metamorphic rock
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 2 to 60 percent
*Taxonomic class:* Fine-loamy, mixed, semiactive, thermic Typic Hapludults

**Typical Pedon**

Montonia very channery silt loam, 25 to 60 percent slopes, very stony; 1.9 miles south of Kings Mountain on N.C. Highway 161, about 1.3 miles on Secondary Road 2289, about 100 feet southeast in woods; USGS Kings Mountain topographic quadrangle; lat. 35 degrees 12 minutes 04 seconds N. and long. 81 degrees 21 minutes 13 seconds W.

Oi—2 inches to 0; partially decomposed leaves and twigs.
A—0 to 3 inches; yellowish brown (10YR 5/4) very channery silt loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; 45 percent channers and 5 percent flagstones, by volume; very strongly acid; abrupt wavy boundary.
AB—3 to 8 inches; strong brown (7.5YR 5/6) channery silt loam; moderate medium granular structure; friable; many fine and medium roots; 25 percent channers, by volume; very strongly acid; clear wavy boundary.
Bt—8 to 19 inches; yellowish red (5YR 5/6) channery clay loam; moderate medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; 15 percent channers, by volume; strongly acid; clear wavy boundary.
BC—19 to 29 inches; yellowish red (5YR 5/6) channery clay loam; weak medium subangular blocky structure; friable; few fine roots; few distinct clay films on faces of peds; 30 percent channers, by volume; strongly acid; clear wavy boundary.
Cr—29 to 42 inches; weathered, highly fractured quartz-sericite schist that can be dug with difficulty with a spade; strongly acid; clear smooth boundary.
R—42 inches; unweathered, moderately fractured quartz-sericite schist.

**Range in Characteristics**

*Thickness of solum:* 20 to 40 inches
*Depth to bedrock:* 20 to 40 inches to soft bedrock and 40 to 60 inches to hard bedrock
*Content of mica flakes:* None or few throughout the profile
*Content and size of rock fragments:* 15 to less than 60 percent in the A and AB horizons, less than 35 percent in the B horizon, and 15 to less than 60 percent in the BC and C horizons; mostly channers and flagstones

*Reaction:* Very strongly acid to moderately acid throughout the profile, except where surface layers have been limed

*A or Ap horizon:*
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6
Texture (fine-earth fraction)—silt loam or loam

*AB horizon:*
Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6
Texture (fine-earth fraction)—silt loam or loam

*Bt horizon:*
Color—hue of 2.5YR to 7.5YR, value of 4 or 6, and chroma of 6 or 8
Texture (fine-earth fraction)—silty clay loam or clay loam
Iron accumulations (if they occur)—shades of red, yellow, or brown

*BC horizon:*
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 or 8
Texture (fine-earth fraction)—silty clay loam or clay loam
Iron accumulations (if they occur)—shades of red, yellow, or brown

*C horizon (if it occurs):*
Color—horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 6 or is multicolored in shades of red, yellow, and brown
Texture (fine-earth fraction)—silt loam or loam

*Cr layer:*
Type of bedrock—weathered, moderately fractured or highly fractured high-grade metamorphic rock that can be dug with difficulty with a spade

*R layer:*
Type of bedrock—unweathered, slightly fractured to highly fractured high-grade metamorphic rock

## *Pacolet Series*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 2 to 30 percent
*Taxonomic class:* Fine, kaolinitic, thermic Typic Kanhapludults

### Typical Pedon

Pacolet sandy clay loam, 8 to 15 percent slopes, moderately eroded; 1.0 mile north of Fallston on Secondary Road 1650 to Secondary Road 1637, about 2.8 miles on Secondary Road 1637, about 200 feet southwest in a field; USGS Lawndale topographic quadrangle; lat. 35 degrees 26 minutes 58 seconds N. and long. 81 degrees 33 minutes 11 seconds W.

Ap—0 to 7 inches; yellowish red (5YR 4/6) sandy clay loam; moderate medium granular structure; friable; many fine roots; few fine flakes of mica; slightly acid; clear smooth boundary.
Bt—7 to 28 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; sticky; plastic; few fine roots; few fine distinct reddish yellow (5YR 6/8) iron accumulations; common distinct clay films on faces of peds; common fine flakes of mica; moderately acid; gradual wavy boundary.
BC—28 to 44 inches; red (2.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; few fine roots; common fine distinct reddish yellow (5YR 6/8) and common fine prominent pink (5YR 8/3) iron accumulations; common fine flakes of mica; strongly acid; gradual wavy boundary.
C1—44 to 60 inches; yellowish red (5YR 5/8) sandy loam saprolite; massive; very friable; few fine distinct reddish yellow (5YR 6/8) and dark reddish brown (5YR 3/3) iron accumulations; many fine flakes of mica; strongly acid; clear wavy boundary.
C2—60 to 72 inches; yellowish red (5YR 5/8) sandy loam saprolite; massive; very friable; many moderately distinct reddish yellow (5YR 6/8), dark reddish brown (5YR 3/3), and reddish yellow (5YR 7/8) iron accumulations; many fine flakes of mica; strongly acid.

### Range in Characteristics

*Thickness of solum:* 20 to more than 40 inches
*Depth to bedrock:* 60 to more than 72 inches
*Content of mica flakes:* Few or common in the A and B horizons and common or many in the C horizon
*Content of rock fragments:* Less than 35 percent in the A horizon and less than 15 percent in the B and C horizons
*Reaction:* Slightly acid to very strongly acid in the A horizon and very strongly acid to moderately acid throughout the rest of the profile

*A or Ap horizon:*
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 or 6
Texture (fine-earth fraction)—sandy loam or sandy clay loam in eroded areas

*Bt horizon:*
Color—hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8
Texture—clay
Iron accumulations (if they occur)—shades of yellow or brown

*BC horizon:*
Color—hue of 10R to 5YR, value of 4 or 5, and chroma of 6 or 8
Texture—clay loam or sandy clay loam
Iron accumulations—shades of yellow or brown

*C horizon:*
Color—horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 or 8, or it does not have a dominant color and is in shades of red, yellow, and brown
Texture—sandy loam or loam

## *Pigeonroost Series*

*Depth class:* Moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Parent material:* Residuum weathered from felsic high-grade metamorphic rock
*Landscape:* Mountains
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 15 to 50 percent
*Taxonomic class:* Fine-loamy, mixed, active, mesic Typic Hapludults

### Typical Pedon

Pigeonroost gravelly sandy loam in an area of Cliffield-Pigeonroost complex, 30 to 50 percent slopes, very stony; 1.1 miles west of the South Mountain State Park gate below Benn Knob on an unpaved road to USGS Benchmark, 140 feet southwest of the benchmark; USGS Benn Knob topographic quadrangle; lat. 35 degrees 34 minutes 07 seconds N. and long. 81 degrees 40 minutes 29 seconds W.

Oe—2 inches to 0; partially decomposed leaves and twigs.
A—0 to 5 inches; yellowish brown (10YR 5/4) gravelly sandy loam; weak fine granular structure; very friable; many fine and medium and few coarse roots; few fine flakes of mica; 25 percent schist pebbles, by volume; very strongly acid; clear smooth boundary.
BA—5 to 10 inches; brown (7.5YR 4/4) gravelly sandy loam; moderate medium granular structure; friable; many fine and medium and few coarse roots; few fine flakes of mica; 20 percent schist pebbles, by volume; very strongly acid; clear smooth boundary.
Bt—10 to 24 inches; strong brown (7.5YR 4/6) gravelly loam; weak fine subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; 20 percent schist pebbles, by volume; very strongly acid; clear wavy boundary.
Cr—24 to 43 inches; weathered, highly fractured sillimanite schist that can be dug with difficulty with a spade; few fine roots in fractures; very strongly acid; clear smooth boundary.
R—43 inches; unweathered, slightly fractured sillimanite schist.

### Range in Characteristics

*Thickness of solum:* 20 to 40 inches
*Depth to bedrock:* 20 to 40 inches to soft bedrock and 40 to 60 inches to hard bedrock
*Content of mica flakes:* Few or common throughout the profile
*Content and size of rock fragments:* 15 to less than 35 percent throughout the profile; mostly pebbles
*Reaction:* Very strongly acid to moderately acid throughout the profile

*A horizon:*
Color—hue of 10YR, value of 4 or 5, and chroma of 3 or 4
Texture (fine-earth fraction)—sandy loam or loam

*AB or BA horizon:*
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8
Texture (fine-earth fraction)—sandy loam or loam

*Bt horizon:*
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8
Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

*BC horizon (if it occurs):*
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8
Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

*C horizon (if it occurs):*
Color—horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8 or is multicolored in shades of red and yellow

Texture (fine-earth fraction)—commonly coarse sandy loam, sandy loam, fine sandy loam, or loam; including sandy clay loam and clay loam

*Cr layer:*
Type of bedrock—weathered, slightly fractured to highly fractured high-grade metamorphic rock that can be dug with difficulty with a spade

*R layer:*
Type of bedrock—unweathered, slightly fractured or moderately fractured high-grade metamorphic rock

## *Rion Series*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Side slopes and nose slopes
*Slope range:* 25 to 60 percent
*Taxonomic class:* Fine-loamy, mixed, semiactive, thermic Typic Hapludults

### Typical Pedon

Rion gravelly loamy sand in an area of Rion-Ashlar complex, 25 to 60 percent slopes, rocky; 0.1 mile south of the Broad River on N.C. Highway 150, about 600 feet east on N.C. Highway 150, about 180 feet south in woods; USGS Boiling Springs South topographic quadrangle; lat. 35 degrees 11 minutes 56 seconds N. and long. 81 degrees 39 minutes 54 seconds W.

Oe—2 inches to 0; partially decomposed leaves and twigs.
A—0 to 8 inches; dark yellowish brown (10YR 4/4) gravelly loamy sand; weak fine granular structure; very friable; many fine and medium and few coarse roots; 20 percent gravel, by volume; common fine flakes of mica; strongly acid; abrupt smooth boundary.
Bt1—8 to 22 inches; brown (7.5YR 5/4) gravelly sandy clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; 18 percent gravel, by volume; common fine flakes of mica; very strongly acid; clear wavy boundary.
Bt2—22 to 34 inches; yellowish red (5YR 5/6) gravelly sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; 15 percent gravel, by volume; common fine flakes of mica; very strongly acid; clear wavy boundary.
BC—34 to 44 inches; strong brown (7.5YR 5/6) gravelly clay loam; weak medium subangular blocky structure; friable; few fine distinct reddish yellow (7.5YR 7/8) iron accumulations; 15 percent gravel, by volume; common fine flakes of mica; very strongly acid; gradual wavy boundary.
C—44 to 60 inches; strong brown (7.5YR 5/8) gravelly sandy loam; massive; very friable; common fine distinct reddish yellow (7.5YR 7/8) iron accumulations; 15 percent gravel, by volume; 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, commonly more than 72 inches
*Content of mica flakes:* Few or common throughout the profile
*Content and size of rock fragments:* 15 to less than 35 percent throughout the profile; mostly pebbles or cobbles
*Reaction:* Very strongly acid to slightly acid throughout the profile

*A horizon:*
Color—hue of 10YR and value and chroma of 4 or 6
Texture (fine-earth fraction)—loamy sand or sandy loam

*AB or BA horizon (if it occurs):*
Color—hue of 10YR and value and chroma of 4 or 6
Texture (fine-earth fraction)—loamy sand or sandy loam

*Bt horizon:*
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8
Texture (fine-earth fraction)—sandy clay loam or clay loam
Iron accumulations (if they occur)—shades of red, yellow, or brown

*BC horizon:*
Color—hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8
Texture (fine-earth fraction)—sandy clay loam, clay loam, or sandy loam
Iron accumulations (if they occur)—shades of red, yellow, or brown

*C horizon:*
Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—sandy loam
Iron accumulations—shades of red, yellow, or brown

## Saw Series

*Depth class:* Moderately deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Parent material:* Residuum weathered from felsic igneous rock
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 2 to 30 percent
*Taxonomic class:* Fine, kaolinitic, thermic Typic Kanhapludults

### Typical Pedon

Saw gravelly sandy clay loam in an area of Pacolet-Saw complex, 8 to 15 percent slopes, moderately eroded; 5.7 miles north of Fallston on N.C. Highway 18 to Secondary Road 1619, about 0.65 mile west on Secondary Road 1619, about 50 feet north of the road in an idle field; USGS Casar topographic quadrangle; lat. 36 degrees 30 minutes 45 seconds N. and long. 81 degrees 31 minutes 24 seconds W.

Ap—0 to 5 inches; yellowish red (5YR 4/6) gravelly sandy clay loam; moderate medium granular structure; friable; many fine and medium roots; few fine flakes of mica; 15 percent, by volume, quartz pebbles; moderately acid; abrupt smooth boundary.
Bt—5 to 21 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm; sticky; plastic; few fine roots; common distinct clay films on faces of peds; few fine flakes of mica; moderately acid; clear smooth boundary.
BC—21 to 31 inches; red (2.5YR 4/8) clay loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; few fine distinct yellowish red (5YR 5/8) iron accumulations; common fine flakes of mica; strongly acid; abrupt smooth boundary.
R—31 inches; unweathered, moderately fractured granite.

### Range in Characteristics

*Thickness of solum:* 20 to 40 inches
*Depth to bedrock:* 20 to 40 inches to hard bedrock
*Content of mica flakes:* Few or common in the A horizon and few to many in the B and C horizons
*Content and size of rock fragments:* 15 to less than 35 percent in the A horizon and less than 15 percent in the B and C horizons; mostly pebbles
*Reaction:* Very strongly acid to moderately acid throughout the profile, except where surface layers have been limed

*A or Ap horizon:*
Color—hue of 5YR to 10YR and value and chroma of 4 or 6
Texture (fine-earth fraction)—sandy loam or sandy clay loam in eroded areas

*Bt horizon:*
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 or 8
Texture—clay
Iron accumulations (if they occur)—shades of red, yellow, or brown

*BC horizon:*
Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 or 8
Texture—sandy clay loam
Iron accumulations (if they occur)—shades of red, yellow, or brown

*C horizon (if it occurs):*
Color—horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 or 8, or it does not have a dominant color and is in shades of red, yellow, and brown
Texture—sandy loam saprolite

*R layer:*
Type of bedrock—unweathered, slightly fractured to highly fractured felsic igneous rock

## Tatum Series

*Depth class:* Deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Parent material:* Fine-grained, high-grade metamorphic rock
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 8 to 30 percent
*Taxonomic class:* Fine, kaolinitic, thermic Typic Hapludults

### Typical Pedon

Tatum gravelly silt loam in an area of Tatum-Montonia complex, 15 to 30 percent slopes; 3.0 miles south of Kings Mountain on N.C. Highway 161 to Secondary Road 2289, about 1.2 miles on Secondary Road 2289,

about 50 feet east to a creek, 450 feet northeast in woods; USGS Kings Mountain topographic quadrangle; lat. 35 degrees 11 minutes 30 seconds N. and long. 81 degrees 21 minutes 30 seconds W.

Oe—2 inches to 0; partially decomposed evergreen leaf litter and twigs.
A—0 to 4 inches; brown (7.5YR 4/4) gravelly silt loam; weak medium granular structure; very friable; many fine and medium and few coarse roots; 25 percent quartz pebbles and sericite schist channers and 5 percent cobbles, by volume; very strongly acid; clear wavy boundary.
Bt1—4 to 13 inches; yellowish red (5YR 4/6) gravelly silty clay loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; common fine and medium and few coarse roots; few distinct clay films on faces of peds; 18 percent quartz pebbles and sericite schist channers, by volume; very strongly acid; clear wavy boundary.
Bt2—13 to 31 inches; red (2.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm; sticky; plastic; few fine roots; common distinct clay films on faces of peds; 5 percent quartz pebbles and sericite schist channers, by volume; strongly acid; clear wavy boundary.
BC—31 to 42 inches; yellowish red (5YR 5/8) silty clay loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; few fine distinct red (2.5YR 5/8) iron accumulations; very strongly acid; clear wavy boundary.
C—42 to 54 inches; light reddish brown (5YR 6/4) and yellowish red (5YR 5/8) channery silt loam saprolite; massive; very friable; common fine distinct reddish yellow (7.5YR 7/8) iron accumulations; 20 percent sericite schist channers, by volume; strongly acid; clear wavy boundary.
Cr—54 to 62 inches; weathered, highly fractured sericite schist that can be dug with difficulty with a spade; strongly acid; abrupt smooth boundary.
R—62 inches; unweathered, slightly fractured sericite schist.

**Range in Characteristics**

*Thickness of solum:* 30 to 60 inches
*Depth to bedrock:* 40 to 60 inches to soft bedrock and more than 60 inches to hard bedrock
*Content of mica flakes:* None or few
*Content and size of rock fragments:* Less than 35 percent throughout the profile; mostly pebbles and channers
*Reaction:* Very strongly acid or strongly acid throughout the profile, except where surface layers have been limed

*A or Ap horizon:*
Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8
Texture (fine-earth fraction)—silt loam or silty clay loam in eroded areas

*Bt horizon:*
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8
Texture (fine-earth fraction)—silty clay loam or silty clay

*BC horizon:*
Color—hue of 5YR, value of 4 to 6, and chroma of 6 or 8
Texture (fine-earth fraction)—silty clay loam
Iron accumulations—shades of red or yellow

*C horizon:*
Color—hue of 5YR, value of 4 to 8, and chroma of 2 to 8
Texture (fine-earth fraction)—silt loam or loam saprolite
Iron accumulations—shades of red, yellow, or brown

*Cr layer:*
Type of bedrock—weathered, moderately fractured or highly fractured high-grade metamorphic rock that can be dug with difficulty with a spade

*R layer:*
Type of bedrock—unweathered, slightly fractured to highly fractured high-grade metamorphic rock

## *Toccoa Series*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderately rapid
*Parent material:* Alluvium derived mainly from felsic high-grade metamorphic or igneous rock
*Landscape:* Piedmont
*Landform:* Flood plains
*Landform position:* Planar to slightly convex slopes
*Slope range:* 0 to 2 percent
*Taxonomic class:* Coarse-loamy, mixed, active, nonacid, thermic Typic Udifluvents

**Typical Pedon**

Toccoa loam, 0 to 2 percent slopes, occasionally flooded; 0.8 mile northeast of N.C. Highway 150 South on Secondary Road 1123, about 0.3 mile west on a farm road to the edge of a flood plain, 150 feet west;

USGS Boiling Springs North topographic quadrangle; lat. 35 degrees 15 minutes 39 seconds N. and long. 81 degrees 37 minutes 32 seconds W.

Ap—0 to 7 inches; brown (7.5YR 4/4) sandy loam; weak medium granular structure; very friable; many fine roots throughout; common fine flakes of mica; strongly acid; gradual wavy boundary.
C1—7 to 17 inches; strong brown (7.5YR 4/6) sandy loam; massive; very friable; common fine roots throughout; common fine flakes of mica; moderately acid; gradual wavy boundary.
C2—17 to 28 inches; strong brown (7.5YR 4/6) loamy sand; massive; very friable; common fine roots throughout; common fine flakes of mica; moderately acid; gradual wavy boundary.
C3—28 to 38 inches; strong brown (7.5YR 4/6) sandy loam; massive; very friable; few fine faint brown (7.5YR 5/4) iron accumulations; few fine roots throughout; common fine flakes of mica; moderately acid; gradual wavy boundary.
C4—38 to 46 inches; brown (7.5YR 5/4) loamy sand; massive; very friable; few fine flakes of mica; moderately acid; clear wavy boundary.
C5—46 to 60 inches; pale brown (10YR 6/3) silt loam; massive; very friable; common medium prominent reddish brown (2.5YR 5/4) and common medium distinct strong brown (7.5YR 4/6) iron accumulations; few fine flakes of mica; moderately acid.

**Range in Characteristics**

*Depth to bedrock:* 60 to more than 72 inches
*Content of mica flakes:* Few to many in all horizons
*Rock fragments:* Gravelly horizons or gravelly strata may occur, usually in the lower part of the profile
*Reaction:* Strongly acid to slightly acid throughout the profile

*Ap or A horizon:*
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6
Texture—loam, sandy loam, or silt loam

*C horizon:*
Color—horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6 or is multicolored in shades of red, yellow, and brown
Texture—loam, silt loam, sandy loam, loamy sand, or sand
Redoximorphic features (if they occur)—iron or clay depletions in shades of gray; iron accumulations in shades of red or brown

## *Udorthents*

*Depth class:* Shallow to very deep
*Drainage class:* Somewhat excessively drained to somewhat poorly drained
*Permeability:* Very slow to moderately rapid
*Parent material:* Variable
*Landscape:* Piedmont
*Landform:* Areas where the natural soil properties and qualities have been greatly altered by excavation or intensive grading or covered by earthy fill material
*Slope range:* 2 to 15 percent

**Typical Pedon**

A typical pedon is not given for these soils because of their variability. These soils consist of excavated, filled, or highly disturbed areas. The excavated areas are mainly borrow pits from which the soil has been removed and used as foundation material for roads or buildings or as topsoil. The fill areas are sites where at least 20 inches of loamy material covers borrow pits, landfills, natural drainageways, or flood plains.

Udorthents are in shades of red, brown, yellow, and gray. The texture is variable but typically loamy. Landfills have layers of material other than soil covered with loamy material.

**Range in Characteristics**

*Depth to bedrock:* Variable
*Content and size of rock fragments:* Variable, averaging 0 to 35 percent, by volume, to a depth of 40 inches; ranging from pebbles to stones
*Reaction:* Extremely acid to slightly acid

## *Uwharrie Series*

*Depth class:* Very deep
*Drainage class:* Well drained
*Permeability:* Moderate
*Parent material:* Residuum weathered from fine-grained felsic high-grade metamorphic rock
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 2 to 15 percent
*Taxonomic class:* Fine, mixed, semiactive, thermic Typic Hapludults

**Typical Pedon**

Uwharrie silt loam, 2 to 8 percent slopes; 1,100 feet north of the South Carolina State line on N.C. Highway 161, about 125 feet west of the road in woods; USGS

Kings Mountain topographic quadrangle; lat. 35 degrees 09 minutes 59 seconds N. and long. 81 degrees 19 minutes 42 seconds W.

Oe—2 inches to 0; partially decomposed leaves and twigs.
A—0 to 5 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.
AB—5 to 8 inches; reddish yellow (7.5YR 6/6) silt loam; moderate medium granular structure; friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.
Bt1—8 to 15 inches; red (2.5YR 5/8) silty clay loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; few fine roots; few faint clay films on faces of peds; 5 percent quartz pebbles, by volume; strongly acid; clear smooth boundary.
Bt2—15 to 36 inches; red (2.5YR 4/8) silty clay; moderate medium subangular blocky structure; firm; sticky; plastic; few fine roots; common distinct clay films on faces of peds; strongly acid; clear smooth boundary.
BC—36 to 50 inches; red (2.5YR 5/8) silty clay loam; weak fine subangular blocky structure; friable; slightly sticky; slightly plastic; few fine prominent very pale brown (10YR 8/3) iron accumulations; very strongly acid; gradual smooth boundary.
C—50 to 72 inches; multicolored silt loam saprolite; massive; very friable; very strongly acid.

**Range in Characteristics**

*Thickness of solum:* 40 to more than 60 inches
*Depth to bedrock:* 60 to more than 72 inches
*Content of mica flakes:* None or few throughout the profile
*Content and size of rock fragments:* Less than 35 percent in the A horizon and less than 15 percent in the B and C horizons; mostly pebbles
*Reaction:* Very strongly acid or strongly acid throughout the profile, except where surface layers have been limed

*A or Ap horizon:*
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6
Texture—silt loam or silty clay loam in eroded areas

*AB or BA horizon (if it occurs):*
Color—hue of 7.5YR, value of 5 or 6, and chroma of 4 or 6
Texture—silt loam

*Bt horizon:*
Color—hue of 10R to 5YR, value of 4 or 5, and chroma of 6 or 8
Texture—silty clay loam or silty clay

*BC horizon:*
Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8
Texture—silty clay loam
Iron accumulations (if they occur)—shades of red, yellow, or brown

*C horizon:*
Color—horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 to 6, or it does not have a dominant color and is in shades of red, yellow, and brown
Texture—silt loam or loam saprolite

## *Wake Series*

*Depth class:* Shallow (fig. 16)
*Drainage class:* Excessively drained
*Permeability:* Rapid
*Parent material:* Residuum weathered from felsic igneous rock
*Landscape:* Piedmont
*Landform:* Ridges
*Landform position:* Interfluves and side slopes
*Slope range:* 4 to 30 percent
*Taxonomic class:* Loamy, mixed, thermic Lithic Udorthents

**Typical Pedon**

Wake loamy sand in an area of Saw-Wake complex, 4 to 15 percent slopes, very rocky; 7.1 miles north of Fallston on N.C. Highway 18 to Secondary Road 1601, about 0.1 mile west on Secondary Road 1601 to Secondary Road 1602, about 0.5 mile on Secondary Road 1602, about 175 feet west on an unpaved road, 130 feet south in a peach orchard; USGS Casar topographic quadrangle; lat. 35 degrees 31 minutes 33 seconds N. and long. 81 degrees 31 minutes 14 seconds W.

Ap—0 to 7 inches; yellowish brown (10YR 5/4) loamy sand; single grained; loose; many fine roots; 5 to 10 percent gravel, by volume; few fine flakes of mica; moderately acid; abrupt smooth boundary.
C—7 to 14 inches; brownish yellow (10YR 6/6) gravelly sandy loam; weak medium granular structure; very friable; common fine roots; few fine distinct reddish yellow (7.5YR 6/8) iron accumulations; 18 percent igneous pebbles and

feldspar, by volume; few fine flakes of mica; moderately acid; clear smooth boundary.
R—14 inches; unweathered, slightly fractured granite.

**Range in Characteristics**

*Thickness of solum:* Less than 20 inches
*Depth to bedrock:* Less than 20 inches
*Content of mica flakes:* Few or common throughout the profile
*Content of rock fragments:* Less than 35 percent throughout the profile
*Reaction:* Very strongly acid to moderately acid throughout the profile, except where surface layers have been limed

*A or Ap horizon:*
Color—hue of 10YR, value of 4 to 6, and chroma of 2 to 4
Texture (fine-earth fraction)—loamy sand or loamy coarse sand

*C horizon:*
Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 8
Texture (fine-earth fraction)—sandy loam or sandy clay loam saprolite
Iron accumulations (if they occur)—shades of red, yellow, or brown

*R layer:*
Type of bedrock—unweathered, slightly fractured or moderately fractured felsic igneous rock

The Wake soils in Cleveland County are considered taxadjuncts to the series because the subsurface layers are loamier than is defined as the range of the official series.

## *Wehadkee Series*

*Depth class:* Very deep
*Drainage class:* Poorly drained or very 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, active, thermic Fluvaquentic Endoaquepts

**Typical Pedon**

Wehadkee loam, 0 to 2 percent slopes, frequently flooded; about 3.5 miles southeast of Patterson Springs on N.C. Highway 226, about 0.4 mile west on Secondary Road 2228, about 1,400 feet west-northwest in pasture on the flood plain; at an elevation of 610 feet; USGS Grover NC topographic quadrangle; lat. 35 degrees 11 minutes 36.82 seconds N. and long. 81 degrees 29 minutes 20.82 seconds W.

A—0 to 6 inches; dark gray (2.5Y 4/1) loam; weak medium granular structure; very friable; slightly sticky; many fine and medium roots; few fine flakes of mica; very strongly acid; abrupt smooth boundary.
Bg1—6 to 22 inches; gray (5Y 5/1) silty clay loam; weak medium subangular blocky structure; friable; sticky; slightly plastic; common fine and medium roots; common medium prominent soft iron accumulations in shades of red and brown; few fine flakes of mica; moderately acid; clear smooth boundary.
Bg2—22 to 35 inches; gray (5Y 6/1) loam; weak medium subangular blocky structure; friable; slightly sticky; few fine and medium roots; common fine prominent soft iron accumulations in shades of red and brown; few fine flakes of mica; moderately acid; clear smooth boundary.
Cg—35 to 50 inches; olive gray (5Y 5/2) sandy loam; massive; nonsticky; few fine roots; few fine flakes of mica; neutral; clear smooth boundary.
Ab—50 to 61 inches; dark gray (2.5Y 4/1) sandy loam; weak medium granular structure; nonsticky; 5 percent wood fragments, by volume; few fine flakes of mica; slightly 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 to a depth of 40 inches and 0 to 35 percent in horizons below a depth of 40 inches; dominantly gravel
*Reaction:* Neutral 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
Redoximorphic features (if they occur)—few or common in shades of brown
Texture—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

Redoximorphic features—iron accumulations in shades of red, yellow, or brown
Texture—silt loam, silty clay loam, sandy clay loam, loam, or clay loam

*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
Redoximorphic features (if they occur)—iron accumulations in shades of red, yellow, or brown
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

*Ab 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
Texture—fine sandy loam, very fine sandy loam, loam, silty clay loam, sandy loam, or silt loam
Redoximorphic features (if they occur)—few or common in shades of brown

## *Worsham Series*

*Depth class:* Very deep
*Drainage class:* Poorly drained
*Permeability:* Very slow or slow
*Parent material:* Residuum weathered from felsic high-grade metamorphic or igneous rock
*Landscape:* Piedmont
*Landform:* Upland drainageways and the head of drains
*Landform position:* Head slopes and toeslopes
*Slope range:* 1 to 6 percent
*Taxonomic class:* Fine, mixed, active, thermic Typic Endoaquults

### Typical Pedon

Worsham loam in an area of Helena-Worsham complex, 1 to 6 percent slopes; 2.5 miles north of Waco on Secondary Road 1001 to Secondary Road 1908, about 0.2 mile on Secondary Road 1908 to a farm road, 700 feet south on the farm road, 125 feet east in a field; USGS Cherryville topographic quadrangle; lat. 35 degrees 23 minutes 22 seconds N. and long. 81 degrees 27 minutes 20 seconds W.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine subangular blocky structure; friable; few fine roots; common medium prominent yellowish red (5YR 5/8) irregularly shaped iron accumulations with clear boundaries throughout; few fine flakes of mica; strongly acid; clear smooth boundary.

A—5 to 12 inches; grayish brown (10YR 5/2) sandy loam; weak fine subangular blocky structure; friable; few fine roots; common medium prominent yellowish red (5YR 5/8) irregularly shaped iron accumulations with clear boundaries throughout; few fine flakes of mica; strongly acid; clear smooth boundary.

Btg1—12 to 20 inches; gray (N 5/0) clay; moderate medium subangular blocky structure; firm; sticky; plastic; few fine distinct dark gray (5Y 4/1) irregularly shaped iron depletions with clear boundaries on faces of peds and in pores; common medium prominent yellowish red (5YR 5/8) irregularly shaped iron accumulations with clear boundaries throughout; few fine flakes of mica; strongly acid; gradual smooth boundary.

Btg2—20 to 55 inches; gray (N 5/0) clay; moderate medium subangular blocky structure; firm; sticky; plastic; common medium distinct dark gray (5Y 4/1) irregularly shaped iron depletions with clear boundaries on faces of peds and in pores; common medium prominent yellowish red (5YR 5/8) irregularly shaped iron accumulations with clear boundaries throughout; few fine flakes of mica; strongly acid; gradual smooth boundary.

Cg—55 to 60 inches; gray (N 6/0) sandy clay loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; many medium distinct white (5Y 8/1) and common medium distinct dark gray (5Y 4/1) irregularly shaped iron depletions with clear boundaries throughout; strongly acid.

### Range in Characteristics

*Thickness of solum:* 40 to more than 60 inches
*Depth to bedrock:* 60 to more than 72 inches
*Content of mica flakes:* Few or common throughout the profile
*Content and size of rock fragments:* Less than 15 percent throughout the profile; mostly pebbles
*Reaction:* Very strongly acid or strongly acid throughout the profile, except where surface layers have been limed

*A or Ap horizon:*
Color—hue of 10YR, value of 3 to 5, and chroma of 2 or 3
Texture—sandy loam or loam

*Btg horizon:*
- Color—horizon has hue of 10YR or 2.5Y, value of 5, and chroma of 0 to 2 or is neutral in hue and has value of 5 or 6
- Texture—clay
- Redoximorphic features—iron or clay depletions in shades of gray and iron accumulations in shades of red or yellow

*Cg horizon:*
- Color—horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 0 to 2 or is neutral in hue and has value of 5 or 6
- Texture—sandy clay loam or clay loam
- Redoximorphic features—iron or clay depletions in shades of gray and iron accumulations in shades of red or yellow

# Formation of the Soils

This section describes the factors of soil formation and relates them to the soils in Cleveland County. It also discusses the processes of horizon differentiation and the geology and mineralogy of the survey area.

More specific information on parent material and landform position for individual soils is available in the sections "Classification of the Soils" and "Detailed Soil Map Units." The soils in Cleveland 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 material, such as metamorphic, igneous, and sedimentary rocks, and fluvial stream sediments. The combined influence of parent material, relief, climate, living organisms, and time determines the characteristics of a soil. These five factors are responsible for the profile development and chemical properties that differentiate soils. Figure 17 illustrates variations in profile development caused by different combinations of soil-forming factors, such as parent material, topography, and time, in piedmont soils, and figure 18 illustrates these variations in mountain soils.

### Parent Material

Parent material is largely responsible for the physical, chemical, and mineralogical composition of the soils in Cleveland County. Major differences among the soils in the county can be attributed to a large degree to variations in parent material. Obvious differences, such as texture, are easily observed in the field. Less distinct differences, such as mineralogical composition, can be determined only by careful laboratory analysis.

The parent material in Cleveland County can be grouped into two broad classes: residuum and alluvium. Residual material was produced by the weathering of underlying rock. Alluvial material is material that was removed and transported by water from soils or rocks and is related directly to them.

In Cleveland County, the parent material of the residual soils derived mainly from two types of rock: felsic (acid) igneous rock, chiefly granite, and high-grade metamorphic rock, such as biotite gneiss, mica schist, and sericite schist. The resulting soils are generally characterized by having a low pH and low natural fertility. Most of these soils have a kaolinitic clay mineralogy. Soils such as Cecil, Pacolet, and Appling may occur over both igneous and metamorphic parent material. However, soils such as Hulett and Bethlehem only occur over one type of parent material.

Another soil property that is affected by parent material is texture. Texture influences such soil properties as permeability and available water capacity. In Cleveland County, most soils have a clayey subsoil because the parent material contained relatively high amounts of minerals that weathered to clay. Soils that formed from material weathered from sericite schist, such as Uwharrie and Montonia soils, have a high content of silt. In contrast, soils that formed from material weathered from granite, such as Saw and Wake soils, have a relatively low content of silt.

Alluvial soils formed in transported upland soil material. This material has been changed very little by the soil-forming processes. Buncombe, Chewacla, Toccoa, and Wehadkee soils formed in alluvium. They are on flood plains along large and small streams.

### Relief

Relief has a major effect on soil formation. It influences such soil properties as drainage, surface water runoff, and the extent of erosion. In Cleveland County, relief is influenced by geology and the dissection of the landscape by streams.

Relief determines soil drainage. In Cleveland County, drainageways have entrenched the uplands to the extent that most of the soils are well drained. However, soils that are moderately well drained to poorly drained occur along intermittent drainageways in the uplands or on flood plains. A high water table is generally related to nearly level or depressional areas. Soils in these lower landform positions are less sloping

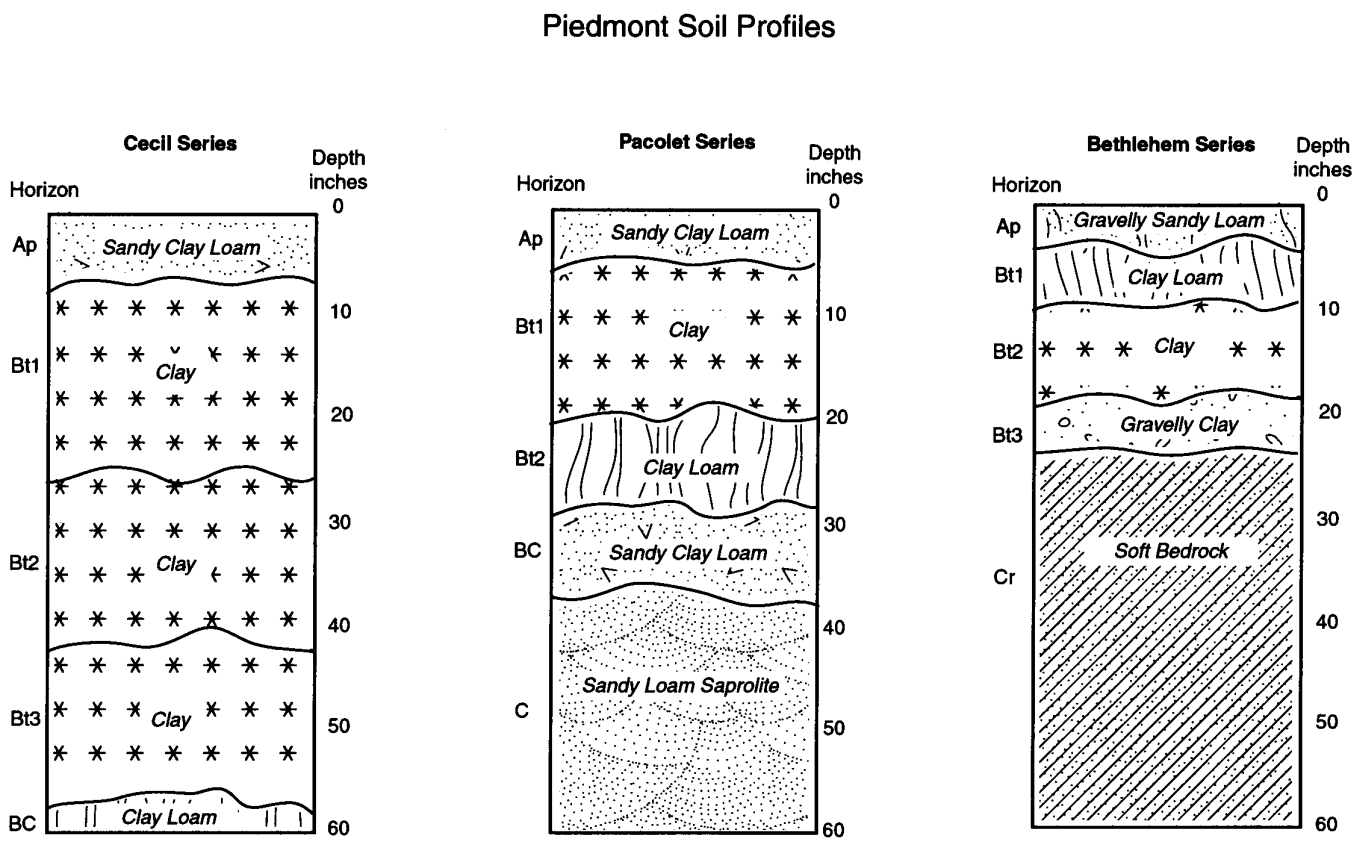


**Figure 17.—Comparison between three piedmont upland soils showing depth and clay content. Cecil soils are very deep to bedrock and have clayey textures that extend below a depth of 30 inches. Pacolet soils are very deep to bedrock and do not have clayey textures below a depth of 30 inches. Bethlehem soils are moderately deep to soft bedrock and, like Pacolet soils, do not have clayey textures below a depth of 30 inches.**

and receive runoff from the adjacent higher areas. The runoff water accumulates faster than it can drain through the soil profile.

Relief also affects the degree of profile development and depth of soils. Relief influences the rate of surface water runoff as well as the movement of water through the soil profile. The degree of soil profile development is influenced by chemical reactions and the leaching of minerals as water moves through the soil. Slopes in the county range from 0 to 95 percent. On the more stable upland ridgetops in the Piedmont that are least dissected by drainageways, the gently sloping Cecil and Appling soils have very deep, well developed profiles. On the more dissected ridgetops and side slopes, soils such as Pacolet and Bethlehem have less developed profiles or are not as deep. As the steepness of slope increases, the rate of geologic erosion increases and soil material is removed almost as fast as it forms. Cliffield and Pigeonroost soils are both moderately deep to bedrock. These steep and very steep soils are in the South Mountains, where the rate of geologic erosion is greatest.

## Climate

Climate, particularly temperature and precipitation, affects the physical, chemical, and biological relationships in the soil. Temperature and rainfall influence the rate of weathering of rock and the decomposition of organic matter. Climate also affects the plants and animals that live in an area. Temperature influences the kinds of organisms in the soil and their growth. It also influences the rate of chemical and biological activity in the soil. The amount of leaching in soils is related to the amount of precipitation and the rate of water movement through the soil.

Cleveland County has a warm, humid climate. Summers are hot, and winters are mild. Rainfall is distributed fairly evenly throughout the year. This

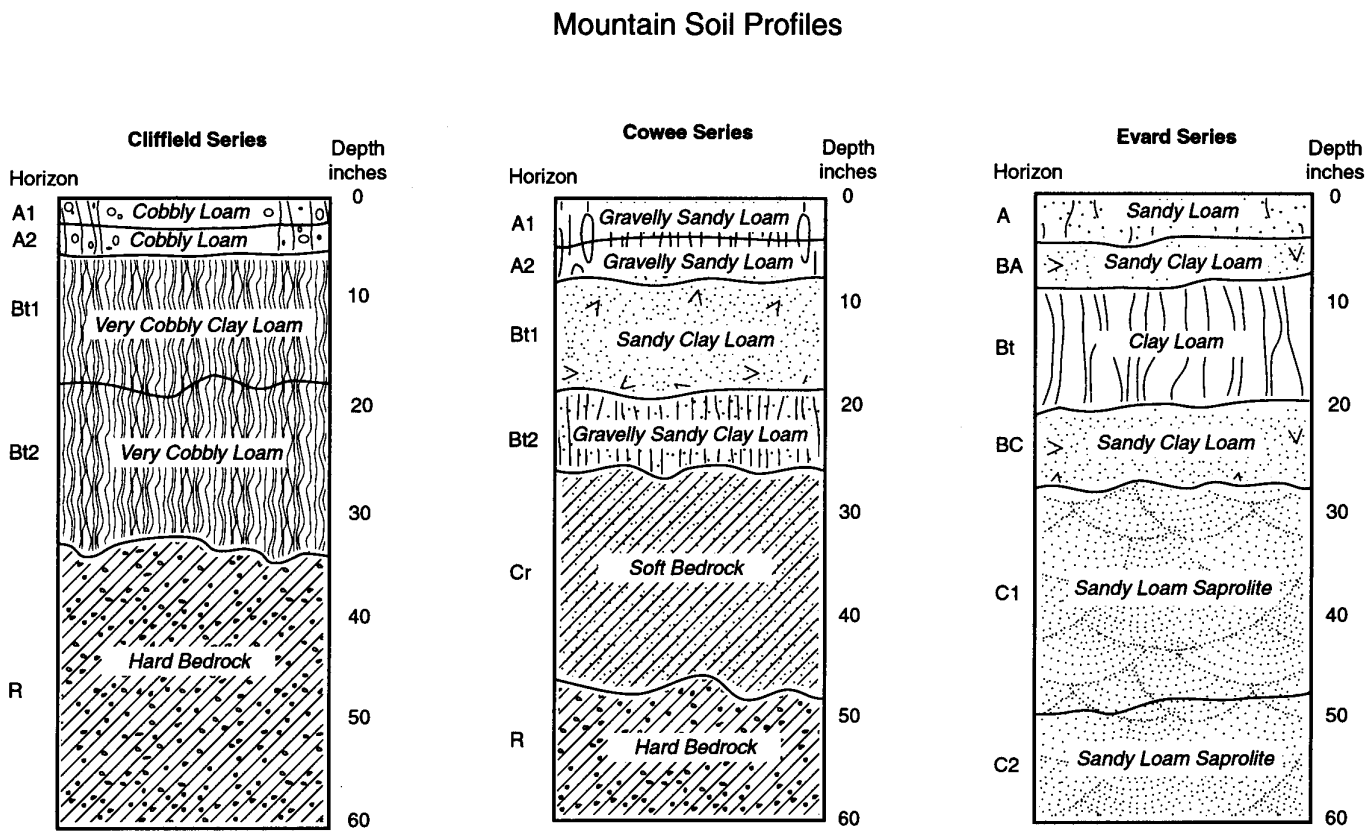


**Figure 18.—Comparison between three mountain upland soils showing depth and content of rock fragments. Cliffield soils are moderately deep to hard bedrock and have an average of 35 percent rock fragments, by volume, in the subsoil. Cowee soils are moderately deep to soft bedrock. They have fewer rock fragments in the subsoil that the Cliffield soils. Evard soils are very deep to bedrock and have the least amount of rock fragments.**

climate is favorable to rapid chemical and biological processes that result in the decomposition of organic matter and the weathering of rocks.

The soils of the county reflect the effects of climate. The mild temperatures and abundant rainfall have depleted the organic matter and considerably leached the soluble bases from the soils, leaving them acid. Clay and less soluble colloids have been transported and have accumulated in the subsoil. In most areas of the county, the combined effect of temperature and rainfall has produced a clayey subsoil below a loamy topsoil.

## Living Organisms

Plants and animals influence the formation and differentiation of soil horizons. The type and number of organisms in the soil and on the surface are determined partly by climate and partly by the soil material, relief, and age of the soil. Bacteria, fungi, and other micro-organisms aid in the weathering of rocks and in the decomposition of organic matter. The plants and animals that live on the soil are the primary source of organic material.

Plants largely determine the kinds and amounts of organic matter that are added to the soil under normal conditions and the way in which the organic matter is added. They also are important for the changes in base status and for the leaching process of the soil through the nutrient cycle.

Living organisms contribute to the chemical environment within the soil profile. Old roots leave channels for air and water. Decaying plants release nutrients and organic acids. Living roots absorb water and nutrients, raise the level of carbon dioxide, lower the level of oxygen, and increase acidity. Nutrients are absorbed by deep tree roots before they are leached past the root zone and later deposited in leaves on the

soil surface. Animals convert complex compounds into simpler forms and add their own bodies to the organic matter. Most of the organic material accumulates on the surface where it is acted upon by micro-organisms, fungi, earthworms, and other forms of life and by chemical reaction. The organic material is then mixed in the uppermost mineral part of the soil by the activities of earthworms and other small invertebrates.

In Cleveland 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 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 very rapidly in the soils of the county because of the moderate temperatures, the abundant moisture supply, and the character of the organic material. As a result, little organic matter accumulates in the soil.

### Time

The length of time that soil material has been exposed to the soil-forming processes accounts for some differences between soils. The formation of a well defined soil profile, however, also depends on other factors. Less time is required for a profile to develop in coarse-textured material than in similar but finer textured material, even if the environment is the same for both materials. Less time is required for a soil profile to develop in an area, such as Cleveland County, that is warm and humid and has a dense plant cover than in a cold, dry area that has a sparse plant cover.

Soils vary considerably in age. The length of time that a soil has been forming is generally reflected in the profile. Old soils generally have better defined horizons than young soils. In Cleveland County, the effects of time as a soil-forming factor are more apparent in the older soils, such as Cecil and Appling soils, which are in the broader parts of the Piedmont uplands. These soils have more distinct horizons than Chewacla soils, which formed in alluvium and are still acquiring new deposits from the uplands.

Chewacla soils and other soils on flood plains have not been in place long enough to have well developed profiles and are considered young soils. Other soils in the county are considered young because of their landform position. Cliffside soils, for example, are not well developed because they are steep and geologic erosion has kept pace with soil development. The rate of geologic erosion also partly accounts for the shallowness to bedrock.

## 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.

Several of these processes have been active in the formation of most of the soils in Cleveland County. 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 layers have 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 iron accumulations 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” *(20)*.

## Geology and Mineralogy

The rocks that underlie the survey area are represented by two distinct geologic belts: the Kings Mountain Belt, in the southeastern part of the county, which has its western boundary extending approximately along Interstate 85 and the Inner Piedmont Belt which underlies the remainder of the county.

The Kings Mountain Belt in Cleveland County is mainly composed of sericite schist and phyllite, which are felsic (acid), fine-grained metamorphic rocks. These rocks formed mainly from the metamorphism resulting from the alteration of sedimentary and igneous rocks by intense heat and pressure *(8)*. The soils that formed from these fine-grained rocks, such as Uwharrie, Montonia, and Tatum soils, have a higher silt content than soils occurring in other areas of the county.

The Inner Piedmont Belt in Cleveland County consists primarily of thinly layered mica schist and biotite gneiss, which are felsic metamorphic rocks. These rocks formed mainly from the metamorphism of sedimentary rocks and, to a lesser degree, igneous rocks *(8)*. Although the soils that formed from these metamorphic rocks are highly weathered and contain kaolinitic clay in the subsoil, soil depth and profile development are variable. Bethlehem soils, which formed from mica schist, are not as deep as Cecil soils, which formed from biotite gneiss, and do not have the high degree of profile development of these latter soils.

Also within the Inner Piedmont Belt are two distinct masses of granitic rock. Granite, which is a felsic igneous rock, formed from the slow cooling and solidification of magma underground. The main body of the Toluca Granite formation occupies much of the area that extends from north and west of Belwood southward to Fallston. Other smaller masses of the Toluca Granite, such as the one near the Shelby airport, are scattered widely throughout the county. Although the soils that formed from this granitic formation are highly weathered and contain kaolinitic clay in the subsoil, they vary in depth and profile development. Saw soils are not as deep as Pacolet soils and do not have the degree of profile development of these latter soils.

The Cherryville Granite is a northeast-trending formation that occupies most of the area east of Buffalo Creek and Moss Lake to Grover and Kings Mountain. The distinct characteristic of this formation is the abundance of granite pegmatite, another felsic igneous rock associated with granite. Granite pegmatite formed from very rapid crystallization of minerals from residual fluids and gases escaping from the cooling and thickening of granitic magma *(5)*. In this very coarse-grained rock, the mica content is very high and grain size of the mica is highly variable. Soils that formed from granite pegmatite are highly weathered and very deep except on the steepest slopes. Hulett and Madison soils contain many mica flakes throughout, especially in the lower subsoil and in the saprolite.

Because of the abundance and variety of mineral resources in Cleveland County, the mining industry is a major employer. The primary location for mining activity in the county lies within a narrow, northeast-trending zone of rocks called the Tin-spodumene Belt. This belt lies along the boundary of the Cherryville Granite and the Kings Mountain Belt, extending from the North Carolina-South Carolina State line near Grover into Gaston and Lincoln Counties. It consists of pegmatite dikes that contain large amounts of spodumene, a major source of lithium.

Lithium is the county's most important mineral resource. The belt of spodumene pegmatite contains the largest developed reserve of lithium in the world. Lithium compounds are used in ceramics and glasses to improve resistance to rapid temperature changes. It is also used in lubricating greases, refrigerants, and pharmaceuticals, as a catalyst in the manufacture of synthetic rubber, and in nonrechargeable batteries. Potential uses for lithium in rechargeable batteries and in the development of nuclear fusion as an energy source may greatly increase its consumption in the future. The by-products of spodumene mining are also of high economic value. Feldspathic sand is produced for use in ceramics and glass. Crushed stone is used for roadbase and construction material *(9)*.

The saprolite deposits that formed from granite pegmatite are an important mineral resource. Cleveland County is an important producer of mica, feldspar, and clay. Mica is used in roofing, paints, and electronics. Feldspar is used in ceramics and glass making. The clay mined in the county is used for brick *(7)*.

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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.

**Aquifer.** A water-bearing bed or stratum of permeable rock, sand, or gravel capable of fielding considerable quantities of water to wells or springs.

**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 areas.** 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.

**Broad-based dips.** Short sections of access road having a reverse grade to intercept storm water and divert it off the roadbed. Dips are spaced about 200 feet apart and placed to divert water away from stream crossings or steep grades.

**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 hillslopes.

**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.

**Culmination of the 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.

**Footslope.** 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.

**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 one meter or to bedrock if the soil is shallower than one 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, or 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, or loamy very fine sand.

*Silty.*—A general texture term that includes silt, silt loam, or 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 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 habitat. 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, backslope, and footslope.

**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 one acre.

**Migmatite.** A rock composed of igneous or igneous-appearing material and/or metamorphic material.

**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 area 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.

**Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**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.

**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, but 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 landform position that is just below the shoulder and just above the toeslope, 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. They 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, forestland, 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 1 1/2 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 1 1/2 times the percentage of clay is not less than 15; 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 1961-90 at Shelby, North Carolina)**

| Month | Temperature | | | | | | Precipitation | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 2 years in 10 will have-- | | | | 2 years in 10 will have-- | | | |
| | Average daily maximum | Average daily minimum | Average | Maximum temperature higher than-- | Minimum temperature lower than-- | Average number of growing degree days* | Average | Less than-- | 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 | 50.4 | 27.6 | 39.0 | 72 | 2 | 19 | 3.89 | 2.08 | 5.48 | 6 | 3.8 |
| February | 54.7 | 30.4 | 42.5 | 76 | 8 | 36 | 4.12 | 2.39 | 5.66 | 6 | 2.0 |
| March | 63.8 | 37.8 | 50.8 | 83 | 17 | 125 | 4.80 | 2.89 | 6.52 | 7 | 1.1 |
| April | 72.4 | 45.5 | 58.9 | 89 | 26 | 285 | 3.31 | 1.50 | 4.86 | 5 | 0.0 |
| May | 79.3 | 54.0 | 66.7 | 92 | 35 | 518 | 4.42 | 2.11 | 6.42 | 7 | 0.0 |
| June | 85.5 | 61.8 | 73.6 | 97 | 45 | 709 | 4.38 | 2.34 | 6.44 | 6 | 0.0 |
| July | 88.3 | 65.6 | 76.9 | 99 | 54 | 835 | 4.21 | 1.69 | 6.34 | 7 | 0.0 |
| August | 87.1 | 64.9 | 76.0 | 97 | 52 | 798 | 4.21 | 2.01 | 6.12 | 6 | 0.0 |
| September | 81.4 | 58.3 | 69.8 | 93 | 40 | 593 | 3.57 | 1.24 | 5.50 | 4 | 0.0 |
| October | 72.1 | 45.7 | 58.9 | 87 | 26 | 290 | 3.72 | 1.02 | 5.88 | 4 | 0.0 |
| November | 63.2 | 38.0 | 50.6 | 80 | 17 | 111 | 3.47 | 1.72 | 4.99 | 5 | 0.0 |
| December | 53.2 | 30.6 | 41.9 | 72 | 8 | 33 | 3.99 | 1.70 | 5.93 | 6 | 0.5 |
| Yearly: | | | | | | | | | | | |
| Average | 71.0 | 46.7 | 58.8 | --- | --- | --- | --- | --- | --- | --- | --- |
| Extreme | 105 | -11 | --- | 99 | 1 | --- | --- | --- | --- | --- | --- |
| Total | --- | --- | --- | --- | --- | 4,352 | 48.09 | 35.98 | 53.61 | 69 | 7.3 |

* 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 (50 degrees F).

**Table 2.—Freeze Dates in Spring and Fall**

**(Recorded in the period 1961-90 at Shelby, 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-- | Mar. 30 | Apr. 17 | Apr. 28 |
| 2 years in 10 later than-- | Mar. 23 | Apr. 11 | Apr. 23 |
| 5 years in 10 later than-- | Mar. 10 | Mar. 31 | Apr. 14 |
| First freezing temperature in fall: | | | |
| 1 year in 10 earlier than-- | Nov. 2 | Oct. 12 | Oct. 10 |
| 2 years in 10 earlier than-- | Nov. 8 | Oct. 19 | Oct. 14 |
| 5 years in 10 earlier than-- | Nov. 19 | Nov. 1 | Oct. 22 |

**Table 3.—Growing Season**

**(Recorded in the period 1961-90 at Shelby, 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 | 226 | 186 | 172 |
| 8 years in 10 | 235 | 196 | 178 |
| 5 years in 10 | 253 | 213 | 190 |
| 2 years in 10 | 271 | 231 | 203 |
| 1 year in 10 | 280 | 240 | 209 |

Table 4.—Acreage and Proportionate Extent of the Soils

| Map symbol | Soil name | Acres | Percent |
|---|---|---|---|
| ApB | Appling sandy loam, 1 to 6 percent slopes | 4,852 | 1.6 |
| ApC | Appling sandy loam, 6 to 12 percent slopes | 1,376 | 0.5 |
| BuB | Buncombe loamy sand, 1 to 5 percent slopes, rarely flooded | 918 | 0.3 |
| CaB2 | Cecil sandy clay loam, 2 to 8 percent slopes, moderately eroded | 46,778 | 15.6 |
| CeB | Cecil-Urban land complex, 2 to 8 percent slopes | 4,105 | 1.4 |
| ChA | Chewacla loam, 0 to 2 percent slopes, occasionally flooded | 13,263 | 4.4 |
| CpD | Cliffield-Pigenroost complex, 15 to 30 percent slopes, very stony | 227 | * |
| CpE | Cliffield-Pigenroost complex, 30 to 50 percent slopes, very stony | 508 | 0.2 |
| CrF | Cliffield-Rock outcrop complex, 50 to 95 percent slopes | 1,339 | 0.4 |
| DAM | Dam | 40 | * |
| DoB | Dogue sandy loam, 2 to 8 percent slopes, rarely flooded | 688 | 0.2 |
| EvD | Evard-Cowee complex, 15 to 30 percent slopes, stony | 1,088 | 0.4 |
| EvE | Evard-Cowee complex, 30 to 50 percent slopes, stony | 3,007 | 1.0 |
| EwF | Evard-Cowee complex, 50 to 85 percent slopes, rocky | 738 | 0.2 |
| GrD | Grover gravelly sandy loam, 15 to 30 percent slopes, rocky | 5,934 | 2.0 |
| GvE | Grover gravelly sandy loam, 30 to 60 percent slopes, very stony | 182 | * |
| HeB | Helena-Worsham complex, 1 to 6 percent slopes | 2,061 | 0.7 |
| HhB | Hulett gravelly sandy loam, 2 to 8 percent slopes | 12,050 | 4.0 |
| HtC | Hulett gravelly sandy loam, 8 to 15 percent slopes, stony | 9,591 | 3.2 |
| HuC | Hulett-Saw complex, 4 to 15 percent slopes, very rocky | 786 | 0.3 |
| HwB | Hulett-Urban land compex, 2 to 8 percent slopes | 446 | 0.1 |
| MaB2 | Madison gravelly sandy clay loam, 2 to 8 percent slopes, moderately eroded | 2,989 | 1.0 |
| MaC2 | Madison gravelly sandy clay loam, 8 to 15 percent slopes, moderately eroded | 1,819 | 0.6 |
| MbB2 | Madison-Bethlehem complex, 2 to 8 percent slopes, stony, moderately eroded | 5,142 | 1.7 |
| McC2 | Madison-Bethlehem complex, 8 to 15 percent slopes, very stony, moderately eroded | 4,787 | 1.6 |
| MnB | Madison-Bethlehem-Urban land complex, 2 to 8 percent slopes | 1,674 | 0.6 |
| MoE | Montonia very channery silt loam, 25 to 60 percent slopes, very stony | 1,104 | 0.4 |
| PaC2 | Pacolet sandy clay loam, 8 to 15 percent slopes, moderately eroded | 10,517 | 3.5 |
| PaD2 | Pacolet sandy clay loam, 15 to 25 percent slopes, moderately eroded | 35,956 | 12.0 |
| PbB2 | Pacolet-Bethlehem complex, 2 to 8 percent slopes, moderately eroded | 20,271 | 6.8 |
| PbC2 | Pacolet-Bethlehem complex, 8 to 15 percent slopes, moderately eroded | 29,361 | 9.8 |
| PbD2 | Pacolet-Bethlehem complex, 15 to 25 percent slopes, moderately eroded | 7,503 | 2.5 |
| PeD | Pacolet-Bethlehem complex, 15 to 25 percent slopes, stony | 5,253 | 1.8 |
| PrB | Pacolet-Bethlehem-Urban land complex, 2 to 8 percent slopes | 1,523 | 0.5 |
| PrC | Pacolet-Bethlehem-Urban land complex, 8 to 15 percent slopes | 704 | 0.2 |
| PsB2 | Pacolet-Saw complex, 2 to 8 percent slopes, moderately eroded | 5,874 | 2.0 |
| PsC2 | Pacolet-Saw complex, 8 to 15 percent slopes, moderately eroded | 14,291 | 4.8 |
| PtD | Pacolet-Saw complex, 15 to 25 percent slopes, stony | 17,180 | 5.7 |
| PuC | Pacolet-Urban land complex, 8 to 15 percent slopes | 472 | 0.2 |
| Pw | Pits, quarry | 186 | * |
| RaE | Rion-Ashlar complex, 25 to 60 percent slopes, rocky | 817 | 0.3 |
| RnE | Rion-Cliffside complex, 25 to 60 percent slopes, very stony | 1,632 | 0.5 |
| SaC | Saw-Wake complex, 4 to 15 percent slopes, very rocky | 139 | * |
| SaD | Saw-Wake complex, 15 to 30 percent slopes, very rocky | 645 | 0.2 |
| TaB | Tatum-Montonia complex, 2 to 8 percent slopes | 380 | 0.1 |
| TaC | Tatum-Montonia complex, 8 to 15 percent slopes | 751 | 0.3 |
| TaD | Tatum-Montonia complex, 15 to 30 percent slopes | 1,390 | 0.5 |
| ToA | Toccoa loam, 0 to 2 percent slopes, occasionally flooded | 4,601 | 1.5 |
| UdC | Udorthents, loamy | 2,828 | 0.9 |
| Ur | Urban land | 1,328 | 0.4 |
| UtB | Uwharrie silt loam, 2 to 8 percent slopes | 1,273 | 0.4 |
| UuB2 | Uwharrie silty clay loam, 2 to 8 percent slopes, moderately eroded | 1,351 | 0.5 |
| UvC | Uwharrie-Tatum complex, 8 to 15 percent slopes | 1,206 | 0.4 |
| UwC2 | Uwharrie-Tatum complex, 8 to 15 percent slopes, moderately eroded | 395 | 0.1 |
| UxB | Uwharrie-Urban land complex, 2 to 8 percent slopes | 1,156 | 0.4 |
| W | Water | 2,779 | 0.9 |
| WeA | Wehadkee loam, 0 to 2 percent slopes, frequently flooded | 515 | 0.2 |
| | Total | 299,769 | 100.0 |

* Less than 0.1 percent; collectively making up 0.2 percent of the county.

**Table 5.—Land Capability and Yields per Acre of Crops and Pasture**

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. 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 | Corn | Corn silage | Cotton lint | Grass hay | Wheat |
|---|---|---|---|---|---|---|
| | | Bu | Tons | Lbs | Tons | Bu |
| ApB: | | | | | | |
| Appling | 2e | 100 | 17 | 650 | 4.00 | 60 |
| ApC: | | | | | | |
| Appling | 3e | 90 | 15 | 600 | 3.75 | 55 |
| BuB: | | | | | | |
| Buncombe | 3s | 60 | 9 | 400 | 2.00 | 30 |
| CaB2: | | | | | | |
| Cecil | 3e | 95 | 16 | 600 | 3.75 | 55 |
| CeB: | | --- | --- | --- | --- | --- |
| Cecil | 3e | | | | | |
| Urban land. | | | | | | |
| ChA: | | | | | | |
| Chewacla | 3w | 105 | 18 | 650 | 4.00 | 55 |
| CpD: | | --- | --- | --- | --- | --- |
| Cliffield | 6s | | | | | |
| Pigeonroost | 6e | | | | | |
| CpE: | | --- | --- | --- | --- | --- |
| Cliffield | 7s | | | | | |
| Pigeonroost | 7e | | | | | |
| CrF: | | --- | --- | --- | --- | --- |
| Cliffield | 7s | | | | | |
| Rock outcrop. | | | | | | |
| DAM. | | | | | | |
| Dam | | | | | | |
| DoB: | | | | | | |
| Dogue | 2e | 120 | 21 | 700 | 4.50 | 70 |
| EvD: | | --- | --- | --- | --- | --- |
| Evard | 6e | | | | | |
| Cowee | 6e | | | | | |
| EvE, EwF: | | --- | --- | --- | --- | --- |
| Evard | 7e | | | | | |
| Cowee | 7e | | | | | |
| GrD: | | | | | | |
| Grover | 6e | --- | --- | --- | 2.75 | --- |
| GvE: | | | | | | |
| Grover | 7e | --- | --- | --- | --- | --- |
| HeB: | | 85 | 14 | 550 | 3.25 | 45 |
| Helena | 2e | | | | | |
| Worsham | 4w | | | | | |

Table 5.—Land Capability and Yields per Acre of Crops and Pasture—Continued

| Map symbol and soil name | Land capability | Corn | Corn silage | Cotton lint | Grass hay | Wheat |
|---|---|---|---|---|---|---|
| | | Bu | Tons | Lbs | Tons | Bu |
| HhB: | | | | | | |
| Hulett | 2e | 90 | 15 | 575 | 3.50 | 50 |
| HtC: | | | | | | |
| Hulett | 4e | 80 | 13 | 525 | 3.25 | 45 |
| HuC: | | 80 | 13 | 525 | 3.25 | 45 |
| Hulett | 4e | | | | | |
| Saw | 3e | | | | | |
| HwB: | | --- | --- | --- | --- | --- |
| Hulett | 2e | | | | | |
| Urban land. | | | | | | |
| MaB2: | | | | | | |
| Madison | 3e | 85 | 14 | 550 | 3.25 | 45 |
| MaC2: | | | | | | |
| Madison | 4e | 75 | 12 | 500 | 3.00 | 40 |
| MbB2: | | 85 | 14 | 550 | 3.25 | 45 |
| Madison | 3e | | | | | |
| Bethlehem | 3e | | | | | |
| McC2: | | 75 | 12 | 500 | 3.00 | 40 |
| Madison | 6e | | | | | |
| Bethlehem | 3e | | | | | |
| MnB: | | --- | --- | --- | --- | --- |
| Madison | 3e | | | | | |
| Bethlehem | 3e | | | | | |
| Urban land. | | | | | | |
| MoE: | | | | | | |
| Montonia | 7e | --- | --- | --- | --- | --- |
| PaC2: | | | | | | |
| Pacolet | 6e | 80 | 13 | 525 | 3.25 | 45 |
| PaD2: | | | | | | |
| Pacolet | 7e | --- | --- | --- | 2.75 | --- |
| PbB2: | | 85 | 14 | 550 | 3.25 | 45 |
| Pacolet | 3e | | | | | |
| Bethlehem | 3e | | | | | |
| PbC2: | | 75 | 12 | 500 | 3.00 | 40 |
| Pacolet | 6e | | | | | |
| Bethlehem | 4e | | | | | |
| PbD2: | | --- | --- | --- | 2.50 | --- |
| Pacolet | 7e | | | | | |
| Bethlehem | 6e | | | | | |
| PeD: | | --- | --- | --- | 2.60 | --- |
| Pacolet | 6e | | | | | |
| Bethlehem | 6e | | | | | |

Table 5.—Land Capability and Yields per Acre of Crops and Pasture—Continued

| Map symbol and soil name | Land capability | Corn | Corn silage | Cotton lint | Grass hay | Wheat |
|---|---|---|---|---|---|---|
| | | Bu | Tons | Lbs | Tons | Bu |
| PrB: | | --- | --- | --- | --- | --- |
| Pacolet | 3e | | | | | |
| Bethlehem | 3e | | | | | |
| Urban land. | | | | | | |
| PrC: | | --- | --- | --- | --- | --- |
| Pacolet | 6e | | | | | |
| Bethlehem | 4e | | | | | |
| Urban land. | | | | | | |
| PsB2: | | 85 | 14 | 550 | 3.25 | 45 |
| Pacolet | 3e | | | | | |
| Saw | 3e | | | | | |
| PsC2: | | 75 | 12 | 500 | 3.00 | 40 |
| Pacolet | 6e | | | | | |
| Saw | 4e | | | | | |
| PtD: | | --- | --- | --- | 2.75 | --- |
| Pacolet | 6e | | | | | |
| Saw | 6e | | | | | |
| PuC: | | --- | --- | --- | --- | --- |
| Pacolet | 6e | | | | | |
| Urban land. | | | | | | |
| Pw: | | | | | | |
| Pits | 8s | --- | --- | --- | --- | --- |
| RaE: | | --- | --- | --- | --- | --- |
| Rion | 7e | | | | | |
| Ashlar | 7e | | | | | |
| RnE: | | --- | --- | --- | --- | --- |
| Rion | 7e | | | | | |
| Cliffside | 7s | | | | | |
| SaC: | | 70 | 14 | 475 | 2.75 | 40 |
| Saw | 3e | | | | | |
| Wake | 4s | | | | | |
| SaD: | | --- | --- | --- | 2.75 | --- |
| Saw | 6e | | | | | |
| Wake | 6s | | | | | |
| TaB: | | 85 | 15 | 575 | 3.25 | 50 |
| Tatum | 2e | | | | | |
| Montonia | 3s | | | | | |
| TaC: | | 80 | 12 | 500 | 3.00 | 45 |
| Tatum | 3e | | | | | |
| Montonia | 4e | | | | | |
| TaD: | | --- | --- | --- | 2.25 | 25 |
| Tatum | 4e | | | | | |
| Montonia | 6e | | | | | |
| ToA: | | | | | | |
| Toccoa | 2w | 110 | 19 | 675 | 4.25 | 65 |

Table 5.—Land Capability and Yields per Acre of Crops and Pasture—Continued

| Map symbol and soil name | Land capability | Corn | Corn silage | Cotton lint | Grass hay | Wheat |
|---|---|---|---|---|---|---|
| | | Bu | Tons | Lbs | Tons | Bu |
| UdC. | | | | | | |
| Udorthents | | | | | | |
| Ur. | | | | | | |
| Urban land | | | | | | |
| UtB: | | | | | | |
| Uwharrie | 2e | 100 | 17 | 650 | 4.00 | 60 |
| UuB2: | | | | | | |
| Uwharrie | 3e | 95 | 16 | 600 | 3.75 | 55 |
| UvC: | | 90 | 15 | 600 | 3.50 | 55 |
| Uwharrie | 3e | | | | | |
| Tatum | 3e | | | | | |
| UwC2: | | 85 | 14 | 550 | 3.25 | 50 |
| Uwharrie | 4e | | | | | |
| Tatum | 4e | | | | | |
| UxB: | | --- | --- | --- | --- | --- |
| Uwharrie | 3e | | | | | |
| Urban land. | | | | | | |
| W. | | | | | | |
| Water | | | | | | |
| WeA: | | | | | | |
| Wehadkee | 6w | --- | --- | --- | 2.00 | --- |

**Table 6.—Prime Farmland**

**(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)**

| Map symbol | Soil name |
|---|---|
| ApB | Appling sandy loam, 1 to 6 percent slopes |
| CaB2 | Cecil sandy clay loam, 2 to 8 percent slopes, moderately eroded |
| ChA | Chewacla loam, 0 to 2 percent slopes, occasionally flooded (in drained areas) |
| DoB | Dogue sandy loam, 2 to 8 percent slopes, rarely flooded |
| HhB | Hulett gravelly sandy loam, 2 to 8 percent slopes |
| MaB2 | Madison gravelly sandy clay loam, 2 to 8 percent slopes, moderately eroded |
| MbB2 | Madison-Bethlehem complex, 2 to 8 percent slopes, stony, moderately eroded |
| ToA | Toccoa loam, 0 to 2 percent slopes, occasionally flooded |
| UtB | Uwharrie silt loam, 2 to 8 percent slopes |
| UuB2 | Uwharrie silty clay loam, 2 to 8 percent slopes, moderately eroded |

Table 7.—Forestland Management and Productivity

| Map symbol and soil name | Ordination symbol | Management concerns | | | | | Potential productivity | | | Trees to manage |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Erosion hazard | Equipment limitation | Seedling mortality | Windthrow hazard | Plant competition | Common trees | Site index | Volume of wood fiber | |
| | | | | | | | | | cu ft/ac | |
| ApB, ApC: | | | | | | | | | | |
| Appling | 8A | Slight | Slight | Slight | Slight | Moderate | Loblolly pine | 84 | 118 | Loblolly pine, shortleaf pine. |
| | | | | | | | Virginia pine | 77 | 118 | |
| | | | | | | | Yellow-poplar | 81 | 73 | |
| | | | | | | | Shortleaf pine | 63 | 95 | |
| | | | | | | | Sweetgum | --- | --- | |
| | | | | | | | Hickory | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Scarlet oak | --- | --- | |
| | | | | | | | Southern red oak | --- | --- | |
| BuB: | | | | | | | | | | |
| Buncombe | 9S | Slight | Moderate | Moderate | Slight | Slight | Yellow-poplar | 106 | 117 | American sycamore, eastern white pine, yellow-poplar. |
| | | | | | | | River birch | --- | --- | |
| | | | | | | | Hickory | --- | --- | |
| | | | | | | | Sweetgum | --- | --- | |
| | | | | | | | Loblolly pine | --- | --- | |
| | | | | | | | American sycamore | --- | --- | |
| | | | | | | | Southern red oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| | | | | | | | Elm | --- | --- | |
| CaB2: | | | | | | | | | | |
| Cecil | 7C | Slight | Moderate | Moderate | Slight | Moderate | Loblolly pine | 83 | 116 | Loblolly pine, shortleaf pine. |
| | | | | | | | Shortleaf pine | 67 | 103 | |
| | | | | | | | Virginia pine | 71 | 110 | |
| | | | | | | | White oak | 78 | 60 | |
| | | | | | | | Northern red oak | 81 | 63 | |
| CeB: | | | | | | | | | | |
| Cecil | 7C | Slight | Moderate | Moderate | Slight | Moderate | Loblolly pine | 83 | 116 | Loblolly pine, shortleaf pine. |
| | | | | | | | Shortleaf pine | 67 | 103 | |
| | | | | | | | Virginia pine | 71 | 110 | |
| | | | | | | | White oak | 78 | 60 | |
| | | | | | | | Northern red oak | 81 | 63 | |
| Urban land. | | | | | | | | | | |
| ChA: | | | | | | | | | | |
| Chewacla | 7W | Slight | Moderate | Slight | Moderate | Severe | Yellow-poplar | 96 | 100 | American sycamore, loblolly pine, sweetgum, yellow-poplar. |
| | | | | | | | Loblolly pine | 95 | 142 | |
| | | | | | | | Sweetgum | 100 | 128 | |
| | | | | | | | Water oak | 90 | 86 | |
| | | | | | | | Green ash | 78 | 46 | |
| | | | | | | | Willow oak | 90 | --- | |
| | | | | | | | Red maple | --- | --- | |
| | | | | | | | Blackgum | --- | --- | |
| | | | | | | | Eastern cottonwood | --- | --- | |
| | | | | | | | Southern red oak | --- | --- | |

Table 7.—Forestland Management and Productivity—Continued

| Map symbol and soil name | Ordination symbol | Management concerns: Erosion hazard | Equipment limitation | Seedling mortality | Windthrow hazard | Plant competition | Potential productivity: Common trees | Site index | Volume of wood fiber (cu ft/ac) | Trees to manage |
|---|---|---|---|---|---|---|---|---|---|---|
| CpD: | | | | | | | | | | |
| Cliffield | 2R | Moderate | Moderate | Moderate | Moderate | Moderate | Scarlet oak | 50 | 34 | Chestnut oak, scarlet oak, shortleaf pine. |
| | | | | | | | Chestnut oak | 50 | 34 | |
| | | | | | | | Red maple | --- | --- | |
| | | | | | | | Shortleaf pine | --- | --- | |
| | | | | | | | Pitch pine | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| | | | | | | | Black locust | --- | --- | |
| Pigeonroost | 12R | Moderate | Moderate | Moderate | Moderate | Moderate | Chestnut oak | 55 | 38 | Chestnut oak, Fraser fir, Norway spruce, Scotch pine, eastern white pine, flowering dogwood, scarlet oak, white oak, yellow-poplar. |
| | | | | | | | Yellow-poplar | 80 | 71 | |
| | | | | | | | Eastern white pine | 78 | 139 | |
| | | | | | | | Scarlet oak | 54 | 38 | |
| | | | | | | | Red maple | --- | --- | |
| | | | | | | | Hickory | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| CpE: | | | | | | | | | | |
| Cliffield | 2R | Severe | Severe | Moderate | Moderate | Moderate | Scarlet oak | 50 | 34 | Chestnut oak, scarlet oak, shortleaf pine. |
| | | | | | | | Chestnut oak | 50 | 34 | |
| | | | | | | | Red maple | --- | --- | |
| | | | | | | | Shortleaf pine | --- | --- | |
| | | | | | | | Pitch pine | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| | | | | | | | Black locust | --- | --- | |
| Pigeonroost | 12R | Severe | Severe | Moderate | Moderate | Moderate | Chestnut oak | 55 | 38 | Fraser fir, Norway spruce, Scotch pine, chestnut oak, eastern white pine, flowering dogwood, scarlet oak, white oak, yellow-poplar. |
| | | | | | | | Yellow-poplar | 80 | 71 | |
| | | | | | | | Eastern white pine | 78 | 139 | |
| | | | | | | | Scarlet oak | 54 | 38 | |
| | | | | | | | Red maple | --- | --- | |
| | | | | | | | Hickory | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| CrF: | | | | | | | | | | |
| Cliffield | 2R | Severe | Severe | Moderate | Moderate | Moderate | Scarlet oak | 50 | 34 | Chestnut oak, scarlet oak, shortleaf pine. |
| | | | | | | | Chestnut oak | 50 | 34 | |
| | | | | | | | Red maple | --- | --- | |
| | | | | | | | Shortleaf pine | --- | --- | |
| | | | | | | | Pitch pine | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| | | | | | | | Black locust | --- | --- | |
| Rock outcrop. | | | | | | | | | | |
| DAM. | | | | | | | | | | |
| Dam | | | | | | | | | | |

Table 7.—Forestland Management and Productivity—Continued

| Map symbol and soil name | Ordination symbol | Management concerns | | | | | Potential productivity | | | Trees to manage |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Erosion hazard | Equipment limitation | Seedling mortality | Windthrow hazard | Plant competition | Common trees | Site index | Volume of wood fiber | |
| | | | | | | | | | cu ft/ac | |
| DoB: | | | | | | | | | | |
| Dogue | 9A | Slight | Moderate | Slight | Slight | Moderate | Loblolly pine | 95 | 142 | Loblolly pine. |
| | | | | | | | Sweetgum | --- | --- | |
| | | | | | | | Yellow-poplar | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Southern red oak | --- | --- | |
| EvD: | | | | | | | | | | |
| Evard | 8R | Moderate | Moderate | Slight | Slight | Moderate | Eastern white pine | 91 | 168 | Eastern white pine, shortleaf pine, yellow-poplar. |
| | | | | | | | Yellow-poplar | 95 | 98 | |
| | | | | | | | White oak | 75 | 57 | |
| | | | | | | | Virginia pine | 70 | 109 | |
| | | | | | | | Shortleaf pine | 73 | 116 | |
| | | | | | | | Southern red oak | --- | 57 | |
| | | | | | | | Pitch pine | --- | --- | |
| | | | | | | | Hickory | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| Cowee | 3R | Moderate | Moderate | Slight | Moderate | Moderate | Eastern white pine | 78 | 139 | Eastern white pine, shortleaf pine. |
| | | | | | | | Yellow-poplar | 80 | 71 | |
| | | | | | | | Chestnut oak | 55 | 38 | |
| | | | | | | | Virginia pine | 63 | 96 | |
| | | | | | | | Scarlet oak | 54 | 38 | |
| | | | | | | | Shortleaf pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| EvE, EwF: | | | | | | | | | | |
| Evard | 8R | Severe | Severe | Slight | Slight | Moderate | Eastern white pine | 91 | 168 | Eastern white pine, shortleaf pine, yellow-poplar. |
| | | | | | | | Yellow-poplar | 95 | 98 | |
| | | | | | | | White oak | 75 | 57 | |
| | | | | | | | Virginia pine | 70 | 109 | |
| | | | | | | | Shortleaf pine | 73 | 116 | |
| | | | | | | | Southern red oak | --- | 57 | |
| | | | | | | | Pitch pine | --- | --- | |
| | | | | | | | Hickory | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| Cowee | 3R | Severe | Severe | Slight | Moderate | Moderate | Eastern white pine | 78 | 139 | Eastern white pine, shortleaf pine. |
| | | | | | | | Yellow-poplar | 80 | 71 | |
| | | | | | | | Chestnut oak | 55 | 38 | |
| | | | | | | | Virginia pine | 63 | 96 | |
| | | | | | | | Scarlet oak | 54 | 38 | |
| | | | | | | | Shortleaf pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |

Table 7.—Forestland Management and Productivity—Continued

| Map symbol and soil name | Ordination symbol | Management concerns: Erosion hazard | Equipment limitation | Seedling mortality | Wind-throw hazard | Plant competition | Potential productivity: Common trees | Site index | Volume of wood fiber (cu ft/ac) | Trees to manage |
|---|---|---|---|---|---|---|---|---|---|---|
| GrD: | | | | | | | | | | |
| Grover | 8R | Moderate | Moderate | Slight | Slight | Moderate | Shortleaf pine | 67 | 103 | Loblolly pine, yellow-poplar, shortleaf pine. |
| | | | | | | | Hickory | --- | --- | |
| | | | | | | | Sweetgum | --- | --- | |
| | | | | | | | Yellow-poplar | --- | --- | |
| | | | | | | | Loblolly pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Scarlet oak | --- | --- | |
| | | | | | | | Southern red oak | --- | --- | |
| | | | | | | | Chestnut oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| GvE: | | | | | | | | | | |
| Grover | 8R | Severe | Severe | Slight | Slight | Moderate | Shortleaf pine | 67 | 103 | Loblolly pine, yellow-poplar, shortleaf pine. |
| | | | | | | | Hickory | --- | --- | |
| | | | | | | | Sweetgum | --- | --- | |
| | | | | | | | Yellow-poplar | --- | --- | |
| | | | | | | | Loblolly pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Scarlet oak | --- | --- | |
| | | | | | | | Southern red oak | --- | --- | |
| | | | | | | | Chestnut oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| HeB: | | | | | | | | | | |
| Helena | 8A | Slight | Slight | Slight | Slight | Severe | Loblolly pine | 84 | 118 | Loblolly pine, shortleaf pine. |
| | | | | | | | Shortleaf pine | 66 | 101 | |
| | | | | | | | Hickory | --- | --- | |
| | | | | | | | Sweetgum | --- | --- | |
| | | | | | | | Yellow-poplar | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Southern red oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| Worsham | 9W | Slight | Severe | Severe | Slight | Severe | Yellow-poplar | 93 | 95 | Eastern white pine, loblolly pine, yellow-poplar. |
| | | | | | | | Virginia pine | --- | --- | |
| | | | | | | | Southern red oak | --- | --- | |
| | | | | | | | Pin oak | --- | --- | |
| HhB, HtC: | | | | | | | | | | |
| Hulett | 8A | Slight | Slight | Slight | Slight | Moderate | Loblolly pine | --- | --- | Shortleaf pine, loblolly pine, yellow-poplar. |
| | | | | | | | Southern red oak | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| HuC: | | | | | | | | | | |
| Hulett | 8A | Slight | Slight | Slight | Slight | Moderate | Loblolly pine | --- | --- | Shortleaf pine, loblolly pine, yellow-poplar. |
| | | | | | | | Southern red oak | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| Saw | 6D | Slight | Slight | Slight | Moderate | Moderate | Shortleaf pine | --- | --- | Loblolly pine, shortleaf pine. |
| | | | | | | | Loblolly pine | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Scarlet oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| | | | | | | | Post oak | --- | --- | |

Table 7.—Forestland Management and Productivity—Continued

| Map symbol and soil name | Ordination symbol | Management concerns: Erosion hazard | Equipment limitation | Seedling mortality | Windthrow hazard | Plant competition | Potential productivity: Common trees | Site index | Volume of wood fiber | Trees to manage |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | cu ft/ac | |
| HwB: | | | | | | | | | | |
| Hulett | 8A | Slight | Slight | Slight | Slight | Moderate | Loblolly pine | --- | --- | Shortleaf pine, loblolly pine, yellow-poplar. |
| | | | | | | | Southern red oak | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| Urban land. | | | | | | | | | | |
| MaB2: | | | | | | | | | | |
| Madison | 6C | Slight | Moderate | Moderate | Slight | Moderate | Shortleaf pine | 63 | 95 | Loblolly pine, shortleaf pine. |
| | | | | | | | Virginia pine | 71 | 110 | |
| | | | | | | | Loblolly pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| MaC2: | | | | | | | | | | |
| Madison | 7A | Slight | Slight | Slight | Slight | Severe | Shortleaf pine | 63 | 95 | Loblolly pine, shortleaf pine. |
| | | | | | | | Virginia pine | 71 | 110 | |
| | | | | | | | Loblolly pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| MbB2, McC2: | | | | | | | | | | |
| Madison | 6C | Slight | Moderate | Moderate | Slight | Moderate | Shortleaf pine | 63 | 95 | Loblolly pine, shortleaf pine. |
| | | | | | | | Virginia pine | 71 | 110 | |
| | | | | | | | Loblolly pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| Bethlehem | 7D | Slight | Slight | Slight | Moderate | Moderate | Shortleaf pine | 67 | 103 | Loblolly pine, shortleaf pine. |
| | | | | | | | Virginia pine | 76 | 117 | |
| | | | | | | | Scarlet oak | 73 | 55 | |
| | | | | | | | Chestnut oak | 64 | 47 | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| MnB: | | | | | | | | | | |
| Madison | 6C | Slight | Moderate | Moderate | Slight | Moderate | Shortleaf pine | 63 | 95 | Loblolly pine, shortleaf pine. |
| | | | | | | | Virginia pine | 71 | 110 | |
| | | | | | | | Loblolly pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| Bethlehem | 7D | Slight | Slight | Slight | Moderate | Moderate | Shortleaf pine | 67 | 103 | Loblolly pine, shortleaf pine. |
| | | | | | | | Virginia pine | 76 | 117 | |
| | | | | | | | Scarlet oak | 73 | 55 | |
| | | | | | | | Chestnut oak | 64 | 47 | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| Urban land. | | | | | | | | | | |
| MoE: | | | | | | | | | | |
| Montonia | 7R | Severe | Severe | Moderate | Moderate | Slight | Shortleaf pine | 66 | 101 | Loblolly pine, shortleaf pine. |
| | | | | | | | White oak | 70 | --- | |
| | | | | | | | Chestnut oak | 71 | --- | |
| | | | | | | | Yellow-poplar | --- | --- | |
| | | | | | | | Scarlet oak | --- | --- | |
| | | | | | | | Red maple | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |

Table 7.—Forestland Management and Productivity—Continued

| Map symbol and soil name | Ordination symbol | Management concerns: Erosion hazard | Equipment limitation | Seedling mortality | Wind-throw hazard | Plant competition | Potential productivity: Common trees | Site index | Volume of wood fiber (cu ft/ac) | Trees to manage |
|---|---|---|---|---|---|---|---|---|---|---|
| PaC2: | | | | | | | | | | |
| Pacolet | 6C | 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 | 6R | 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, PbC2: | | | | | | | | | | |
| Pacolet | 6C | 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 | Shortleaf pine | 67 | 103 | Loblolly pine, shortleaf pine. |
| | | | | | | | Virginia pine | 76 | 117 | |
| | | | | | | | Scarlet oak | 73 | 55 | |
| | | | | | | | Chestnut oak | 64 | 47 | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| PbD2: | | | | | | | | | | |
| Pacolet | 6R | 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 | --- | --- | |
| Bethlehem | 7R | Moderate | Moderate | Slight | Moderate | Moderate | Shortleaf pine | 67 | 103 | Loblolly pine, shortleaf pine. |
| | | | | | | | Virginia pine | 76 | 117 | |
| | | | | | | | Scarlet oak | 73 | 55 | |
| | | | | | | | Chestnut oak | 64 | 47 | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| PeD: | | | | | | | | | | |
| Pacolet | 8R | Moderate | Moderate | Slight | 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 | 7R | Moderate | Moderate | Slight | Moderate | Moderate | Shortleaf pine | 67 | 103 | Loblolly pine, shortleaf pine. |
| | | | | | | | Virginia pine | 76 | 117 | |
| | | | | | | | Scarlet oak | 73 | 55 | |
| | | | | | | | Chestnut oak | 64 | 47 | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |

Table 7.—Forestland Management and Productivity—Continued

| Map symbol and soil name | Ordination symbol | Management concerns: Erosion hazard | Equipment limitation | Seedling mortality | Windthrow hazard | Plant competition | Potential productivity: Common trees | Site index | Volume of wood fiber | Trees to manage |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | cu ft/ac | |
| PrB, PrC: | | | | | | | | | | |
| Pacolet | 6C | 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 | Shortleaf pine | 67 | 103 | Loblolly pine, shortleaf pine. |
| | | | | | | | Virginia pine | 76 | 117 | |
| | | | | | | | Scarlet oak | 73 | 55 | |
| | | | | | | | Chestnut oak | 64 | 47 | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Black oak | --- | --- | |
| Urban land. | | | | | | | | | | |
| PsB2, PsC2: | | | | | | | | | | |
| Pacolet | 6C | 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 | --- | --- | |
| Saw | 6D | Slight | Moderate | Moderate | Moderate | Slight | Shortleaf pine | --- | --- | Loblolly pine, shortleaf pine. |
| | | | | | | | Loblolly pine | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Scarlet oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| | | | | | | | Post oak | --- | --- | |
| PtD: | | | | | | | | | | |
| Pacolet | 8R | Moderate | Moderate | Slight | 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 | --- | --- | |
| Saw | 6R | Moderate | Moderate | Slight | Moderate | Moderate | Shortleaf pine | --- | --- | Loblolly pine, shortleaf pine. |
| | | | | | | | Loblolly pine | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Scarlet oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| | | | | | | | Post oak | --- | --- | |
| PuC: | | | | | | | | | | |
| Pacolet | 6C | 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 | --- | --- | |
| Urban land. | | | | | | | | | | |
| Pw. | | | | | | | | | | |
| Pits | | | | | | | | | | |

Table 7.—Forestland Management and Productivity—Continued

| Map symbol and soil name | Ordination symbol | Management concerns: Erosion hazard | Equipment limitation | Seedling mortality | Windthrow hazard | Plant competition | Potential productivity: Common trees | Site index | Volume of wood fiber (cu ft/ac) | Trees to manage |
|---|---|---|---|---|---|---|---|---|---|---|
| RaE: | | | | | | | | | | |
| Rion | 8R | Severe | Severe | Moderate | Slight | Slight | Shortleaf pine | 75 | 114 | Loblolly pine, shortleaf pine, yellow-poplar. |
| | | | | | | | Yellow-poplar | 98 | 86 | |
| | | | | | | | Virginia pine | 78 | --- | |
| | | | | | | | Hickory | --- | --- | |
| | | | | | | | Sweetgum | --- | 86 | |
| | | | | | | | Loblolly pine | --- | 114 | |
| | | | | | | | White oak | --- | 57 | |
| | | | | | | | Southern red oak | --- | 57 | |
| | | | | | | | Northern red oak | --- | --- | |
| Ashlar | 7R | Severe | Severe | Moderate | Moderate | Slight | Shortleaf pine | --- | 86 | Loblolly pine, shortleaf pine. |
| | | | | | | | Loblolly pine | --- | 100 | |
| | | | | | | | Virginia pine | --- | 86 | |
| | | | | | | | Northern red oak | --- | 43 | |
| RnE: | | | | | | | | | | |
| Rion | 8R | Severe | Severe | Moderate | Slight | Slight | Shortleaf pine | 75 | 114 | Loblolly pine, shortleaf pine, yellow-poplar. |
| | | | | | | | Yellow-poplar | 98 | 86 | |
| | | | | | | | Virginia pine | 78 | --- | |
| | | | | | | | Hickory | --- | --- | |
| | | | | | | | Sweetgum | --- | 86 | |
| | | | | | | | Loblolly pine | --- | 114 | |
| | | | | | | | White oak | --- | 57 | |
| | | | | | | | Southern red oak | --- | 57 | |
| | | | | | | | Northern red oak | --- | --- | |
| Cliffside | 6R | Severe | Severe | Moderate | Moderate | Slight | Chestnut oak | --- | 43 | Loblolly pine, shortleaf pine. |
| | | | | | | | Shortleaf pine | --- | --- | |
| | | | | | | | Virginia pine | --- | 86 | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Scarlet oak | --- | --- | |
| SaC: | | | | | | | | | | |
| Saw | 6D | Slight | Slight | Slight | Moderate | Moderate | Shortleaf pine | --- | --- | Loblolly pine, shortleaf pine. |
| | | | | | | | Loblolly pine | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Scarlet oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| | | | | | | | Post oak | --- | --- | |
| Wake | 5D | Slight | Slight | Moderate | Severe | Slight | Loblolly pine | 69 | 91 | Loblolly pine. |
| | | | | | | | Hickory | --- | --- | |
| | | | | | | | Shortleaf pine | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |
| | | | | | | | Post oak | --- | --- | |
| SaD: | | | | | | | | | | |
| Saw | 6R | Moderate | Moderate | Slight | Moderate | Moderate | Shortleaf pine | --- | --- | Loblolly pine, shortleaf pine. |
| | | | | | | | Loblolly pine | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |
| | | | | | | | White oak | --- | --- | |
| | | | | | | | Scarlet oak | --- | --- | |
| | | | | | | | Northern red oak | --- | --- | |
| | | | | | | | Post oak | --- | --- | |

Table 7.—Forestland Management and Productivity—Continued

| Map symbol and soil name | Ordination symbol | Management concerns: Erosion hazard | Equipment limitation | Seedling mortality | Windthrow hazard | Plant competition | Potential productivity: Common trees | Site index | Volume of wood fiber | Trees to manage |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | cu ft/ac | |
| SaD: | | | | | | | | | | |
| Wake | 5D | Moderate | Moderate | Moderate | Severe | Slight | Loblolly pine | 69 | 91 | Loblolly pine. |
| | | | | | | | Hickory | --- | --- | |
| | | | | | | | Shortleaf pine | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |
| | | | | | | | Post oak | --- | --- | |
| TaB, TaC: | | | | | | | | | | |
| Tatum | 8A | Slight | Slight | Slight | Slight | Moderate | Loblolly pine | 82 | 114 | Loblolly pine, |
| | | | | | | | Shortleaf pine | 72 | 114 | shortleaf pine. |
| | | | | | | | Virginia pine | --- | --- | |
| Montonia | 8D | Slight | Slight | Slight | Moderate | Moderate | Shortleaf pine | 66 | 101 | Loblolly pine, |
| | | | | | | | White oak | 70 | --- | shortleaf pine. |
| | | | | | | | Chestnut oak | 71 | --- | |
| | | | | | | | Yellow-poplar | --- | --- | |
| | | | | | | | Scarlet oak | --- | --- | |
| | | | | | | | Red maple | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |
| TaD: | | | | | | | | | | |
| Tatum | 6R | Moderate | Moderate | Moderate | Slight | Moderate | Loblolly pine | 82 | 114 | Loblolly pine, |
| | | | | | | | Shortleaf pine | 72 | 114 | shortleaf pine. |
| | | | | | | | Virginia pine | --- | --- | |
| Montonia | 8R | Moderate | Moderate | Slight | Moderate | Moderate | Shortleaf pine | 66 | 101 | Loblolly pine, |
| | | | | | | | White oak | 70 | --- | shortleaf pine. |
| | | | | | | | Chestnut oak | 71 | --- | |
| | | | | | | | Yellow-poplar | --- | --- | |
| | | | | | | | Scarlet oak | --- | --- | |
| | | | | | | | Red maple | --- | --- | |
| | | | | | | | Virginia pine | --- | --- | |
| ToA: | | | | | | | | | | |
| Toccoa | 9A | Slight | Slight | Slight | Slight | Moderate | Yellow-poplar | --- | --- | American sycamore, |
| | | | | | | | Loblolly pine | --- | --- | loblolly pine, |
| | | | | | | | Southern red oak | --- | --- | yellow-poplar. |
| | | | | | | | Sweetgum | --- | --- | |
| UdC. | | | | | | | | | | |
| Udorthents | | | | | | | | | | |
| Ur. | | | | | | | | | | |
| Urban land | | | | | | | | | | |
| UtB: | | | | | | | | | | |
| Uwharrie | 8A | Slight | Slight | Slight | Slight | Moderate | Yellow-poplar | 100 | 107 | Shortleaf pine, |
| | | | | | | | Sweetgum | 97 | 128 | loblolly pine. |
| | | | | | | | Water oak | 94 | 91 | |
| | | | | | | | Willow oak | 94 | 91 | |
| | | | | | | | Green ash | 89 | 64 | |
| | | | | | | | White ash | --- | --- | |
| | | | | | | | River birch | --- | --- | |
| | | | | | | | American sycamore | --- | --- | |

Table 7.—Forestland Management and Productivity—Continued

| Map symbol and soil name | Ordination symbol | Management concerns: Erosion hazard | Equipment limitation | Seedling mortality | Windthrow hazard | Plant competition | Potential productivity: Common trees | Site index | Volume of wood fiber | Trees to manage |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | cu ft/ac | |
| UuB2: | | | | | | | | | | |
| Uwharrie | 6C | Slight | Slight | Moderate | Slight | Moderate | Yellow-poplar | 100 | 107 | Shortleaf pine, loblolly pine. |
| | | | | | | | Sweetgum | 97 | 128 | |
| | | | | | | | Water oak | 94 | 91 | |
| | | | | | | | Willow oak | 94 | 91 | |
| | | | | | | | Green ash | 89 | 64 | |
| | | | | | | | White ash | --- | --- | |
| | | | | | | | River birch | --- | --- | |
| | | | | | | | American sycamore | --- | --- | |
| UvC: | | | | | | | | | | |
| Uwharrie | 8A | Slight | Slight | Slight | Slight | Moderate | Yellow-poplar | 100 | 107 | Shortleaf pine, loblolly pine. |
| | | | | | | | Sweetgum | 97 | 128 | |
| | | | | | | | Water oak | 94 | 91 | |
| | | | | | | | Willow oak | 94 | 91 | |
| | | | | | | | Green ash | 89 | 64 | |
| | | | | | | | White ash | --- | --- | |
| | | | | | | | River birch | --- | --- | |
| | | | | | | | American sycamore | --- | --- | |
| Tatum | 8A | Slight | Slight | Slight | Slight | Moderate | Loblolly pine | 82 | 114 | Loblolly pine, shortleaf pine. |
| | | | | | | | Shortleaf pine | 72 | 114 | |
| | | | | | | | Virginia pine | --- | --- | |
| UwC2: | | | | | | | | | | |
| Uwharrie | 6C | Slight | Slight | Moderate | Slight | Moderate | Yellow-poplar | 100 | 107 | Shortleaf pine, loblolly pine. |
| | | | | | | | Sweetgum | 97 | 128 | |
| | | | | | | | Water oak | 94 | 91 | |
| | | | | | | | Willow oak | 94 | 91 | |
| | | | | | | | Green ash | 89 | 64 | |
| | | | | | | | White ash | --- | --- | |
| | | | | | | | River birch | --- | --- | |
| | | | | | | | American sycamore | --- | --- | |
| Tatum | 8A | Slight | Slight | Slight | Slight | Moderate | Loblolly pine | 82 | 114 | Loblolly pine, shortleaf pine. |
| | | | | | | | Shortleaf pine | 72 | 114 | |
| | | | | | | | Virginia pine | --- | --- | |
| UxB: | | | | | | | | | | |
| Uwharrie | 6C | Slight | Slight | Moderate | Slight | Moderate | Yellow-poplar | 100 | 107 | Shortleaf pine, loblolly pine. |
| | | | | | | | Sweetgum | 97 | 128 | |
| | | | | | | | Water oak | 94 | 91 | |
| | | | | | | | Willow oak | 94 | 91 | |
| | | | | | | | Green ash | 89 | 64 | |
| | | | | | | | White ash | --- | --- | |
| | | | | | | | River birch | --- | --- | |
| | | | | | | | American sycamore | --- | --- | |
| Urban land. | | | | | | | | | | |
| W. | | | | | | | | | | |
| Water | | | | | | | | | | |
| WeA: | | | | | | | | | | |
| Wehadkee | 8W | Slight | Severe | Moderate | Moderate | Severe | Yellow-poplar | 100 | 107 | Green ash, sweetgum, yellow-poplar. |
| | | | | | | | Sweetgum | 97 | 128 | |
| | | | | | | | Water oak | 94 | 91 | |
| | | | | | | | Willow oak | 94 | 91 | |
| | | | | | | | Green ash | 89 | 64 | |
| | | | | | | | White ash | --- | --- | |
| | | | | | | | River birch | --- | --- | |
| | | | | | | | American sycamore | --- | --- | |

Table 8.—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. |
| BuB: | | | | | |
| Buncombe | Severe: flooding. | Moderate: too sandy. | Moderate: too sandy. | Moderate: too sandy. | Severe: droughty. |
| CaB2: | | | | | |
| Cecil | Slight | Slight | Moderate: slope, small stones. | Slight | Slight. |
| CeB: | | | | | |
| Cecil | Slight | Slight | Moderate: slope, small stones. | Slight | Slight. |
| Urban land. | | | | | |
| ChA: | | | | | |
| Chewacla | Severe: flooding, wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. | Severe: wetness. |
| 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. | | | | | |

Table 8.—Recreational Development—Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| DAM. | | | | | |
| Dam | | | | | |
| DoB: | | | | | |
| Dogue | Severe: flooding, too acid. | Severe: too acid. | Severe: too acid. | Moderate: wetness. | Severe: too acid. |
| EvD: | | | | | |
| Evard | Severe: slope. | Severe: slope. | Severe: slope, small stones. | 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: large stones, slope, small stones. | 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, small stones. | Severe: slope. | Severe: slope. |
| Cowee | Severe: slope, too acid. | Severe: slope, too acid. | Severe: slope, small stones, too acid. | Severe: slope. | Severe: slope. |
| GrD: | | | | | |
| Grover | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Moderate: slope. | Severe: slope. |
| GvE: | | | | | |
| Grover | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| 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. |
| HhB: | | | | | |
| Hulett | Moderate: percs slowly, small stones. | Moderate: percs slowly, small stones. | Severe: small stones. | Slight | Moderate: small stones. |

Table 8.—Recreational Development—Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| HtC: | | | | | |
| Hulett | Moderate: percs slowly, slope, small stones. | Moderate: percs slowly, slope, small stones. | Severe: slope, small stones. | Slight | Moderate: slope, small stones. |
| HuC: | | | | | |
| Hulett | Moderate: percs slowly, slope, small stones. | Moderate: percs slowly, slope, small stones. | Severe: slope, small stones. | Slight | Moderate: slope, small stones. |
| Saw | Moderate: slope, small stones. | Moderate: slope, small stones. | Severe: slope, small stones. | Slight | Moderate: slope, small stones. |
| HwB: | | | | | |
| Hulett | Moderate: percs slowly, small stones. | Moderate: percs slowly, small stones. | Severe: small stones. | Slight | Moderate: small stones. |
| Urban land. | | | | | |
| MaB2: | | | | | |
| Madison | Moderate: small stones. | Moderate: small stones. | Severe: small stones. | Slight | Moderate: large stones, small stones. |
| MaC2: | | | | | |
| Madison | Moderate: slope. | Moderate: slope. | Severe: slope. | Slight | Moderate: slope. |
| MbB2: | | | | | |
| Madison | Moderate: small stones. | Moderate: small stones. | Severe: small stones. | Slight | Moderate: large stones, small stones. |
| Bethlehem | Severe: small stones. | Severe: small stones. | Severe: small stones. | Slight | Severe: small stones. |
| McC2: | | | | | |
| Madison | Moderate: slope, small stones. | Moderate: slope, small stones. | Severe: slope, small stones. | Slight | Moderate: large stones, slope, small stones. |
| Bethlehem | Severe: small stones. | Severe: small stones. | Severe: small stones. | Slight | Severe: small stones. |
| MnB: | | | | | |
| Madison | Moderate: small stones. | Moderate: small stones. | Severe: small stones. | Slight | Moderate: large stones, small stones. |
| Bethlehem | Severe: small stones. | Severe: small stones. | Severe: small stones. | Slight | Severe: small stones. |
| Urban land. | | | | | |
| MoE: | | | | | |
| Montonia | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Severe: large stones, small stones. |

Table 8.—Recreational Development—Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| 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, small stones. | Slight | Slight. |
| Bethlehem | Severe: small stones. | Severe: small stones. | Moderate: slope, small stones. | Slight | Severe: small stones. |
| PbC2: | | | | | |
| Pacolet | Moderate: slope. | Moderate: slope. | Severe: slope, small stones. | Slight | Moderate: slope. |
| Bethlehem | Severe: small stones. | Severe: small stones. | Severe: slope, small stones. | Slight | Severe: small stones. |
| PbD2, PeD: | | | | | |
| Pacolet | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Moderate: slope. | Severe: slope. |
| Bethlehem | Severe: slope, small stones. | Severe: slope, small stones. | Severe: slope, small stones. | Moderate: slope. | Severe: slope, small stones. |
| PrB: | | | | | |
| Pacolet | Slight | Slight | Moderate: slope, small stones. | Slight | Slight. |
| Bethlehem | Severe: small stones. | Severe: small stones. | Severe: small stones. | Slight | Severe: small stones. |
| Urban land. | | | | | |
| PrC: | | | | | |
| Pacolet | Moderate: slope. | Moderate: slope. | Severe: slope, small stones. | Slight | Moderate: slope. |
| Bethlehem | Severe: small stones. | Severe: small stones. | Severe: slope, small stones. | Slight | Severe: small stones. |
| Urban land. | | | | | |
| PsB2: | | | | | |
| Pacolet | Slight | Slight | Moderate: slope, small stones. | Slight | Moderate: slope. |
| Saw | Slight | Slight | Moderate: slope, small stones, depth to rock. | Slight | Moderate: depth to rock. |

Table 8.—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, small stones. | Slight | Moderate: slope. |
| Saw | Moderate: slope. | Moderate: slope. | Severe: slope. | Slight | Moderate: slope, depth to rock. |
| PtD: | | | | | |
| Pacolet | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Moderate: slope. | Severe: slope. |
| Saw | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Moderate: slope. | Severe: slope. |
| PuC: | | | | | |
| Pacolet | Moderate: slope. | Moderate: slope. | Severe: slope. | Slight | Moderate: slope. |
| Urban land. | | | | | |
| Pw: | | | | | |
| Pits | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Moderate: slope. | Severe: slope, depth to rock. |
| RaE: | | | | | |
| Rion | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Ashlar | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| RnE: | | | | | |
| Rion | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Severe: slope. | Severe: slope. |
| Cliffside | Severe: slope. | Severe: slope. | Severe: large stones, slope, small stones. | Severe: slope. | Severe: slope. |
| SaC: | | | | | |
| Saw | Moderate: slope. | Moderate: slope. | Severe: slope. | Slight | Moderate: slope, depth to rock. |
| SaC: | | | | | |
| Wake | Severe: small stones, depth to rock. | Severe: small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Moderate: too sandy. | Severe: small stones, droughty. |

Table 8.—Recreational Development—Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| SaD: | | | | | |
| Saw | Severe: slope. | Severe: slope. | Severe: slope. | Moderate: slope. | Severe: slope. |
| Wake | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Severe: slope, small stones, depth to rock. | Moderate: slope, too sandy. | Severe: slope, small stones, droughty. |
| TaB: | | | | | |
| Tatum | Moderate: small stones. | Moderate: small stones. | Severe: small stones. | Slight | Moderate: small stones. |
| Montonia | Moderate: small stones. | Moderate: small stones. | Severe: small stones. | Slight | Moderate: large stones, small stones, depth to rock. |
| TaC: | | | | | |
| Tatum | Moderate: slope, small stones. | Moderate: slope, small stones. | Severe: slope, small stones. | Slight | Moderate: slope, small stones. |
| Montonia | Moderate: slope, small stones. | Moderate: slope, small stones. | Severe: slope, small stones. | Slight | Moderate: large stones, small stones, depth to rock. |
| TaD: | | | | | |
| Tatum | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Moderate: slope. | Severe: slope. |
| Montonia | Severe: slope. | Severe: slope. | Severe: slope, small stones. | Moderate: slope. | Moderate: large stones, small stones, depth to rock. |
| ToA: | | | | | |
| Toccoa | Severe: flooding. | Slight | Moderate: flooding. | Slight | Moderate: flooding. |
| UdC. | | | | | |
| Udorthents | | | | | |
| Ur. | | | | | |
| Urban land | | | | | |
| UtB, UuB2: | | | | | |
| Uwharrie | Slight | Slight | Moderate: slope. | Severe: erodes easily. | Slight. |
| UvC: | | | | | |
| Uwharrie | Moderate: slope, small stones. | Moderate: slope, small stones. | Severe: slope, small stones. | Slight | Moderate: large stones, slope, small stones. |
| Tatum | Moderate: slope, small stones. | Moderate: slope, small stones. | Severe: slope, small stones. | Slight | Moderate: slope, small stones. |

Table 8.—Recreational Development—Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
|---|---|---|---|---|---|
| UwC2: | | | | | |
| Uwharrie | Moderate: slope. | Moderate: slope. | Severe: slope. | Severe: erodes easily. | Moderate: slope. |
| Tatum | Moderate: slope. | Moderate: slope. | Severe: slope. | Severe: erodes easily. | Moderate: slope. |
| UxB: | | | | | |
| Uwharrie | Slight | Slight | Moderate: slope. | Severe: erodes easily. | Slight. |
| Urban land. | | | | | |
| W. | | | | | |
| Water | | | | | |
| WeA: | | | | | |
| Wehadkee | Severe: flooding, wetness. | Severe: wetness. | Severe: flooding, wetness. | Severe: wetness. | Severe: flooding, wetness. |

**Table 9.—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 | 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. |
| BuB: | | | | | | | | | | |
| Buncombe | Poor | Poor | Fair | 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. |
| CeB: | | | | | | | | | | |
| 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 |
| CpD: | | | | | | | | | | |
| Cliffield | Poor | Fair | Fair | Poor | Poor | Very poor. | Very poor. | Fair | Poor | Very poor. |
| Pigeonroost | Poor | 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 | 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. | | | | | | | | | | |
| DAM. | | | | | | | | | | |
| Dam | | | | | | | | | | |
| DoB: | | | | | | | | | | |
| Dogue | Fair | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |
| EvD: | | | | | | | | | | |
| Evard | Poor | Fair | Good | Good | Good | Very poor. | Very poor. | Fair | Good | Very poor. |

Table 9.—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 | Wetland plants | Shallow water areas | Openland wildlife | Woodland wildlife | Wetland wildlife |
| EvD: | | | | | | | | | | |
| Cowee | Poor | Fair | Fair | Fair | Fair | Very poor. | Very poor. | Fair | Fair | Very poor. |
| EvE, 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. |
| GrD, GvE: | | | | | | | | | | |
| Grover | 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. |
| HhB, HtC: | | | | | | | | | | |
| Hulett | Fair | Good | Good | Good | Good | Very poor. | Very poor. | Good | Good | Very poor. |
| HuC: | | | | | | | | | | |
| Hulett | Fair | Good | Good | Good | Good | Very poor. | Very poor. | Good | Good | Very poor. |
| Saw | Fair | Good | Good | Good | Good | Very poor. | Very poor. | Fair | Good | Very poor. |
| HwB: | | | | | | | | | | |
| Hulett | Fair | Good | Good | Good | Good | Very poor. | Very poor. | Good | Good | Very poor. |
| Urban land. | | | | | | | | | | |
| MaB2: | | | | | | | | | | |
| Madison | Fair | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |
| MaC2: | | | | | | | | | | |
| Madison | Fair | Good | Good | Good | Good | Very poor. | Very poor. | Good | Good | Very poor. |
| MbB2: | | | | | | | | | | |
| Madison | Fair | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |
| Bethlehem | Fair | Good | Good | Fair | Fair | Very poor. | Very poor. | Good | Fair | Very poor. |
| McC2: | | | | | | | | | | |
| Madison | Fair | Good | Good | Good | Good | Very poor. | Very poor. | Good | Good | Very poor. |
| Bethlehem | Fair | Good | Good | Fair | Fair | Very poor. | Very poor. | Good | Fair | Very poor. |

Table 9.—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 | Wetland plants | Shallow water areas | Openland wildlife | Woodland wildlife | Wetland wildlife |
| MnB: | | | | | | | | | | |
| Madison | Fair | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |
| Bethlehem | Fair | Good | Good | Fair | Fair | Very poor. | Very poor. | Good | Fair | Very poor. |
| Urban land. | | | | | | | | | | |
| MoE: | | | | | | | | | | |
| Montonia | Very poor. | Poor | Good | Good | Good | Very poor. | Very poor. | Poor | Fair | 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 | 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. |
| PeD: | | | | | | | | | | |
| Pacolet | Very poor. | Poor | Poor | Fair | Fair | Very poor. | Very poor. | Poor | Fair | Very poor. |
| Bethlehem | Poor | Fair | Good | Fair | Fair | Very poor. | Very poor. | Fair | Fair | Very poor. |
| PrB: | | | | | | | | | | |
| 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. |
| Urban land. | | | | | | | | | | |

Table 9.—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 | Wetland plants | Shallow water areas | Openland wildlife | Woodland wildlife | Wetland wildlife |
| PrC: | | | | | | | | | | |
| Pacolet | Very poor. | Poor | 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. |
| Urban land. | | | | | | | | | | |
| 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 | 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. |
| PtD: | | | | | | | | | | |
| Pacolet | Very poor. | Poor | Poor | Fair | Fair | Very poor. | Very poor. | Poor | Fair | Very poor. |
| Saw | Poor | Fair | Good | Good | Good | Very poor. | Very poor. | Fair | Good | Very poor. |
| PuC: | | | | | | | | | | |
| Pacolet | Very poor. | Poor | Very poor. | Poor | Poor | Very poor. | Very poor. | Very poor. | Poor | Very poor. |
| Urban land. | | | | | | | | | | |
| Pw: | | | | | | | | | | |
| Pits | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. | Very poor. |
| RaE: | | | | | | | | | | |
| 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. |
| RnE: | | | | | | | | | | |
| Rion | Very poor. | Poor | Poor | Fair | Fair | Very poor. | Very poor. | Poor | Fair | Very poor. |
| RnE: | | | | | | | | | | |
| Cliffside | Very poor. | Poor | Fair | Poor | Poor | Very poor. | Very poor. | Poor | Poor | Very poor. |
| SaC: | | | | | | | | | | |
| Saw | Fair | Good | Good | Good | Good | Very poor. | Very poor. | Fair | Good | Very poor. |
| Wake | Poor | Poor | Poor | Fair | Fair | Very poor. | Very poor. | Poor | Fair | Very poor. |

Table 9.—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 | Wetland plants | Shallow water areas | Openland wildlife | Woodland wildlife | Wetland wildlife |
| SaD: | | | | | | | | | | |
| Saw | Poor | Fair | Good | Good | Good | Very poor. | Very poor. | Fair | Good | Very poor. |
| Wake | Very poor. | Very poor. | Poor | Poor | Poor | Very poor. | Very poor. | Very poor. | Poor | Very poor. |
| TaB: | | | | | | | | | | |
| Tatum | Fair | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |
| Montonia | Fair | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |
| TaC: | | | | | | | | | | |
| Tatum | Fair | Good | Good | Good | Good | Very poor. | Very poor. | Good | Good | Very poor. |
| Montonia | Fair | Good | Good | Good | Good | Very poor. | Very poor. | Good | Good | Very poor. |
| TaD: | | | | | | | | | | |
| Tatum | Poor | Fair | Good | Good | Good | Very poor. | Very poor. | Fair | Good | Very poor. |
| Montonia | Poor | Fair | Good | Good | Good | Very poor. | Very poor. | Fair | Good | Very poor. |
| ToA: | | | | | | | | | | |
| Toccoa | Good | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |
| UdC. | | | | | | | | | | |
| Udorthents | | | | | | | | | | |
| Ur. | | | | | | | | | | |
| Urban land | | | | | | | | | | |
| UtB, UuB2: | | | | | | | | | | |
| Uwharrie | Fair | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |
| UvC, UwC2: | | | | | | | | | | |
| Uwharrie | Fair | Good | Good | Good | Good | Very poor. | Very poor. | Good | Good | Very poor. |
| Tatum | Fair | Good | Good | Good | Good | Very poor. | Very poor. | Good | Good | Very poor. |
| UxB: | | | | | | | | | | |
| Uwharrie | Fair | Good | Good | Good | Good | Poor | Very poor. | Good | Good | Very poor. |
| Urban land. | | | | | | | | | | |
| W. | | | | | | | | | | |
| Water | | | | | | | | | | |
| WeA: | | | | | | | | | | |
| Wehadkee | Very poor. | Poor | Poor | Fair | Fair | Good | Fair | Poor | Fair | Fair |

**Table 10.—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 | Slight | Moderate: low strength. | Slight. |
| ApC: | | | | | | |
| Appling | Moderate: slope, too clayey. | Moderate: slope. | Moderate: slope. | Severe: slope. | Moderate: low strength, slope. | Moderate: slope. |
| BuB: | | | | | | |
| Buncombe | Severe: cutbanks cave. | Severe: flooding. | Severe: flooding. | Severe: flooding. | Moderate: flooding. | Severe: droughty. |
| CaB2: | | | | | | |
| Cecil | Moderate: too clayey. | Slight | Slight | Moderate: slope. | Moderate: low strength. | Slight. |
| CeB: | | | | | | |
| Cecil | Moderate: too clayey. | Slight | Slight | Moderate: slope. | Moderate: low strength. | Slight. |
| Urban land. | | | | | | |
| ChA: | | | | | | |
| Chewacla | Severe: wetness. | Severe: flooding, wetness. | Severe: flooding, wetness. | Severe: flooding, wetness. | Severe: flooding, low strength, wetness. | Severe: wetness. |
| CpD, 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. | | | | | | |
| DAM. | | | | | | |
| Dam | | | | | | |
| DoB: | | | | | | |
| Dogue | Severe: wetness, cutbanks cave. | Severe: flooding. | Severe: flooding, wetness. | Severe: flooding. | Severe: low strength. | Severe: too acid. |

Table 10.—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, EvE, 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. |
| GrD, GvE: | | | | | | |
| Grover | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. |
| 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. |
| HhB: | | | | | | |
| Hulett | Moderate: too clayey. | Slight | Slight | Moderate: slope. | Moderate: low strength. | Moderate: small stones. |
| HtC: | | | | | | |
| Hulett | Moderate: slope, too clayey. | Moderate: slope. | Moderate: slope. | Severe: slope. | Moderate: low strength, slope. | Moderate: slope, small stones. |
| HuC: | | | | | | |
| Hulett | Moderate: slope, too clayey. | Moderate: slope. | Moderate: slope. | Severe: slope. | Moderate: low strength, slope. | Moderate: slope, small stones. |
| HuC: | | | | | | |
| 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, small stones. |
| HwB: | | | | | | |
| Hulett | Moderate: too clayey. | Slight | Slight | Moderate: slope. | Moderate: low strength. | Moderate: small stones. |
| Urban land. | | | | | | |
| MaB2: | | | | | | |
| Madison | Moderate: too clayey. | Slight | Slight | Moderate: slope. | Moderate: low strength. | Moderate: large stones, small stones. |
| MaC2: | | | | | | |
| Madison | Moderate: slope, too clayey. | Moderate: slope. | Moderate: slope. | Severe: slope. | Moderate: low strength, slope. | Moderate: slope. |
| MbB2: | | | | | | |
| Madison | Moderate: too clayey. | Slight | Slight | Moderate: slope. | Moderate: low strength. | Moderate: large stones, small stones. |

Table 10.—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 |
|---|---|---|---|---|---|---|
| MbB2: | | | | | | |
| Bethlehem | Moderate: too clayey, depth to rock. | Slight | Moderate: depth to rock. | Moderate: slope. | Moderate: low strength. | Severe: small stones. |
| McC2: | | | | | | |
| Madison | Moderate: slope, too clayey. | Moderate: slope. | Moderate: slope. | Severe: slope. | Moderate: low strength, slope. | Moderate: large stones, slope, small stones. |
| Bethlehem | Moderate: too clayey, depth to rock. | Slight | Moderate: depth to rock. | Moderate: slope. | Moderate: low strength. | Severe: small stones. |
| MnB: | | | | | | |
| Madison | Moderate: too clayey. | Slight | Slight | Moderate: slope. | Moderate: low strength. | Moderate: large stones, small stones. |
| Bethlehem | Moderate: too clayey, depth to rock. | Slight | Moderate: depth to rock. | Moderate: slope. | Moderate: low strength. | Severe: small stones. |
| Urban land. | | | | | | |
| MoE: | | | | | | |
| Montonia | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: large stones, small stones. |
| 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. |

Table 10.—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 |
|---|---|---|---|---|---|---|
| PbD2, PeD: | | | | | | |
| 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. |
| PrB: | | | | | | |
| 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. |
| Urban land. | | | | | | |
| PrC: | | | | | | |
| 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. |
| Urban land. | | | | | | |
| 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. |
| 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. |
| PtD: | | | | | | |
| 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. |
| PuC: | | | | | | |
| Pacolet | Moderate: slope, too clayey. | Moderate: slope. | Moderate: slope. | Severe: slope. | Moderate: low strength, slope. | Moderate: slope. |
| Urban land. | | | | | | |

Table 10.—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 |
|---|---|---|---|---|---|---|
| Pw: | | | | | | |
| Pits | 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. |
| RaE: | | | | | | |
| 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. |
| 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. |
| SaC: | | | | | | |
| 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. |
| Wake | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: slope, depth to rock. | Severe: depth to rock. | Severe: small stones, droughty. |
| SaD: | | | | | | |
| Saw | Severe: slope, depth to rock. | Severe: slope. | Severe: slope, depth to rock. | Severe: slope. | Severe: slope. | Severe: slope. |
| Wake | 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, small stones, droughty. |
| TaB: | | | | | | |
| Tatum | Moderate: too clayey. | Moderate: shrink-swell. | Moderate: shrink-swell. | Moderate: shrink-swell, slope. | Severe: low strength. | Moderate: small stones. |
| Montonia | Moderate: depth to rock. | Slight | Moderate: depth to rock. | Moderate: slope. | Slight | Moderate: large stones, small stones, depth to rock. |
| TaC: | | | | | | |
| Tatum | Moderate: slope, too clayey. | Moderate: shrink-swell, slope. | Moderate: shrink-swell, slope. | Severe: slope. | Severe: low strength. | Moderate: slope, small stones. |
| Montonia | Moderate: slope, depth to rock. | Moderate: slope. | Moderate: slope, depth to rock. | Severe: slope. | Moderate: slope. | Moderate: large stones, small stones, depth to rock. |

Table 10.—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 |
|---|---|---|---|---|---|---|
| TaD: | | | | | | |
| Tatum | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: low strength, slope. | Severe: slope. |
| Montonia | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Moderate: large stones, small stones, depth to rock. |
| ToA: | | | | | | |
| Toccoa | Moderate: flooding, wetness. | Severe: flooding. | Severe: flooding. | Severe: flooding. | Severe: flooding. | Moderate: flooding. |
| UdC. | | | | | | |
| Udorthents | | | | | | |
| Ur. | | | | | | |
| Urban land | | | | | | |
| UtB, UuB2: | | | | | | |
| Uwharrie | Moderate: too clayey. | Moderate: shrink-swell. | Moderate: shrink-swell. | Moderate: shrink-swell, slope. | Severe: low strength. | Slight. |
| UvC: | | | | | | |
| Uwharrie | Moderate: slope, too clayey. | Moderate: shrink-swell, slope. | Moderate: shrink-swell, slope. | Severe: slope. | Severe: low strength. | Moderate: large stones, slope, small stones. |
| Tatum | Moderate: slope, too clayey. | Moderate: shrink-swell, slope. | Moderate: shrink-swell, slope. | Severe: slope. | Severe: low strength. | Moderate: slope, small stones. |
| UwC2: | | | | | | |
| Uwharrie | Moderate: slope, too clayey. | Moderate: shrink-swell, slope. | Moderate: shrink-swell, slope. | Severe: slope. | Severe: low strength. | Moderate: slope. |
| Tatum | Moderate: slope, too clayey. | Moderate: shrink-swell, slope. | Moderate: shrink-swell, slope. | Severe: slope. | Severe: low strength. | Moderate: slope. |
| UxB: | | | | | | |
| Uwharrie | Moderate: too clayey. | Moderate: shrink-swell. | Moderate: shrink-swell. | Moderate: shrink-swell, slope. | Severe: low strength. | Slight. |
| Urban land. | | | | | | |
| W. | | | | | | |
| Water | | | | | | |
| WeA: | | | | | | |
| Wehadkee | Severe: wetness. | Severe: flooding, wetness. | Severe: flooding, wetness. | Severe: flooding, wetness. | Severe: flooding, low strength, wetness. | Severe: flooding, wetness. |

**Table 11.—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. |
| BuB: | | | | | |
| Buncombe | Severe: poor filter. | Severe: seepage. | Severe: seepage, too sandy. | Severe: seepage. | Poor: seepage, too sandy. |
| CaB2: | | | | | |
| Cecil | Moderate: percs slowly. | Moderate: seepage, slope. | Moderate: too clayey. | Slight | Fair: hard to pack, too clayey. |
| CeB: | | | | | |
| 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. |
| CpD, 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. | | | | | |
| DAM. | | | | | |
| Dam | | | | | |

Table 11.—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 |
|---|---|---|---|---|---|
| DoB: | | | | | |
| Dogue | Severe: percs slowly, wetness. | Severe: seepage. | Severe: seepage, wetness. | Severe: wetness. | Poor: hard to pack, too clayey, too acid. |
| EvD, EvE, EwF: | | | | | |
| 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. |
| GrD, GvE: | | | | | |
| Grover | Severe: slope. | Severe: slope. | Severe: slope. | Severe: slope. | Poor: slope. |
| 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. |
| HhB: | | | | | |
| Hulett | Moderate: percs slowly. | Moderate: seepage, slope. | Slight | Slight | Fair: too clayey. |
| HtC: | | | | | |
| Hulett | Moderate: percs slowly. | Severe: slope. | Moderate: slope. | Moderate: slope. | Fair: slope, too clayey. |
| HuC: | | | | | |
| Hulett | Moderate: percs slowly. | 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. |
| HwB: | | | | | |
| Hulett | Severe: percs slowly. | Moderate: seepage, slope. | Slight | Slight | Fair: too clayey. |
| Urban land. | | | | | |
| MaB2: | | | | | |
| Madison | Moderate: percs slowly. | Moderate: seepage, slope. | Slight | Slight | Good. |

Table 11.—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 |
|---|---|---|---|---|---|
| MaC2: | | | | | |
| Madison | Moderate: percs slowly, slope. | Severe: slope. | Moderate: slope. | Moderate: slope. | Fair: too clayey. |
| MbB2: | | | | | |
| Madison | Moderate: percs slowly. | Moderate: seepage, slope. | Slight | Slight | Good. |
| Bethlehem | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Poor: depth to rock. |
| McC2: | | | | | |
| Madison | Moderate: percs slowly, slope. | Severe: slope. | Moderate: slope. | Moderate: slope. | Fair: slope. |
| Bethlehem | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Poor: depth to rock. |
| MnB: | | | | | |
| Madison | Moderate: percs slowly. | Moderate: seepage, slope. | Slight | Slight | Good. |
| Bethlehem | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Poor: depth to rock. |
| Urban land. | | | | | |
| MoE: | | | | | |
| Montonia | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Poor: slope, small stones, depth to rock. |
| 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: small stones. |
| Bethlehem | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Poor: depth to rock. |
| PbC2: | | | | | |
| Pacolet | Moderate: percs slowly, slope. | Severe: slope. | Moderate: slope. | Moderate: slope. | Fair: slope, small stones. |
| Bethlehem | Severe: depth to rock. | Severe: slope, depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Poor: depth to rock. |

Table 11.—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 |
|---|---|---|---|---|---|
| PbD2, PeD: | | | | | |
| 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. |
| PrB: | | | | | |
| Pacolet | Moderate: percs slowly. | Moderate: seepage, slope. | Slight | Slight | Fair: small stones. |
| Bethlehem | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Poor: depth to rock. |
| Urban land. | | | | | |
| PrC: | | | | | |
| Pacolet | Moderate: percs slowly, slope. | Severe: slope. | Moderate: slope. | Moderate: slope. | Fair: slope, small stones. |
| Bethlehem | Severe: depth to rock. | Severe: slope, depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Poor: depth to rock. |
| Urban land. | | | | | |
| PsB2: | | | | | |
| Pacolet | Moderate: percs slowly. | Moderate: seepage, slope. | Slight | Slight | Fair: small stones. |
| 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, small stones. |
| 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. |
| PtD: | | | | | |
| 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. |
| PuC: | | | | | |
| Pacolet | Moderate: percs slowly, slope. | Severe: slope. | Moderate: slope. | Moderate: slope. | Fair: slope, too clayey. |
| Urban land. | | | | | |

Table 11.—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 |
|---|---|---|---|---|---|
| Pw: | | | | | |
| Pits | 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. |
| RaE: | | | | | |
| 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. |
| RnE: | | | | | |
| Rion | Severe: slope. | Severe: seepage, slope. | Severe: seepage, slope. | Severe: seepage, slope. | Poor: slope. |
| RnE: | | | | | |
| Cliffside | Severe: slope, depth to rock. | Severe: seepage, slope, depth to rock. | Severe: large stones, slope, depth to rock. | Severe: slope, depth to rock. | Poor: slope, small stones, depth to rock. |
| SaC: | | | | | |
| 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. |
| Wake | Severe: depth to rock. | Severe: seepage, slope, depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Poor: seepage, small stones, depth to rock. |
| SaD: | | | | | |
| 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. |
| Wake | Severe: slope, depth to rock. | Severe: seepage, slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Poor: seepage, small stones, depth to rock. |
| TaB: | | | | | |
| Tatum | Moderate: percs slowly, depth to rock. | Moderate: seepage, slope, depth to rock. | Severe: too clayey, depth to rock. | Moderate: depth to rock. | Poor: hard to pack, small stones, too clayey. |
| Montonia | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Poor: small stones, depth to rock. |
| TaC: | | | | | |
| Tatum | Moderate: percs slowly, slope, depth to rock. | Severe: slope. | Severe: too clayey, depth to rock. | Moderate: slope, depth to rock. | Poor: hard to pack, small stones, too clayey. |

Table 11.—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 |
|---|---|---|---|---|---|
| TaC: | | | | | |
| Montonia | Severe: depth to rock. | Severe: slope, depth to rock. | Severe: depth to rock. | Severe: depth to rock. | Poor: small stones, depth to rock. |
| TaD: | | | | | |
| Tatum | Severe: slope. | Severe: slope. | Severe: slope, too clayey, depth to rock. | Severe: slope. | Poor: hard to pack, small stones, too clayey. |
| Montonia | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Severe: slope, depth to rock. | Poor: slope, small stones, depth to rock. |
| ToA: | | | | | |
| Toccoa | Severe: flooding, wetness. | Severe: flooding, seepage, wetness. | Severe: flooding, seepage, wetness. | Severe: flooding, seepage, wetness. | Good. |
| UdC. | | | | | |
| Udorthents | | | | | |
| Ur. | | | | | |
| Urban land | | | | | |
| UtB, UuB2: | | | | | |
| Uwharrie | Moderate: percs slowly. | Moderate: seepage, slope. | Severe: too clayey. | Slight | Poor: hard to pack, too clayey. |
| UvC: | | | | | |
| Uwharrie | Moderate: percs slowly, slope. | Severe: slope. | Severe: too clayey. | Moderate: slope. | Poor: hard to pack, too clayey. |
| Tatum | Moderate: percs slowly, slope, depth to rock. | Severe: slope. | Severe: too clayey, depth to rock. | Moderate: slope, depth to rock. | Poor: hard to pack, small stones, too clayey. |
| UwC2: | | | | | |
| Uwharrie | Moderate: percs slowly, slope. | Severe: slope. | Severe: too clayey. | Moderate: slope. | Poor: hard to pack, too clayey. |
| Tatum | Moderate: percs slowly, slope, depth to rock. | Severe: slope. | Severe: too clayey, depth to rock. | Moderate: slope, depth to rock. | Poor: hard to pack, too clayey. |
| UxB: | | | | | |
| Uwharrie | Moderate: percs slowly. | Moderate: seepage, slope. | Severe: too clayey. | Slight | Poor: hard to pack, too clayey. |
| Urban land. | | | | | |
| W. | | | | | |
| Water | | | | | |

Table 11.—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 |
|---|---|---|---|---|---|
| WeA: Wehadkee | Severe: flooding, wetness. | Severe: flooding, wetness. | Severe: flooding, wetness. | Severe: flooding, wetness. | Poor: thin layer, wetness. |

**Table 12.—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, ApC: | | | | |
| Appling | Fair: low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey. |
| BuB: | | | | |
| Buncombe | Good | Probable | Improbable: too sandy. | Poor: too sandy. |
| CaB2: | | | | |
| Cecil | Fair: low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey. |
| CeB: | | | | |
| Cecil | Fair: low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey. |
| Urban land. | | | | |
| ChA: | | | | |
| Chewacla | Poor: low strength, wetness. | Improbable: excess fines. | Improbable: excess fines. | Poor: wetness. |
| 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. | | | | |
| DAM. | | | | |
| Dam | | | | |
| DoB: | | | | |
| Dogue | Fair: wetness. | Probable | Improbable: too sandy. | Poor: too clayey, too acid. |

Table 12.—Construction Materials—Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| EvD: | | | | |
| Evard | Fair: slope. | 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. |
| EvE, EwF: | | | | |
| Evard | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: slope, small stones. |
| Cowee | Poor: slope, depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: slope, small stones, too acid. |
| GrD: | | | | |
| Grover | Fair: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: slope. |
| GvE: | | | | |
| Grover | Poor: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: slope. |
| HeB: | | | | |
| Helena | Poor: low strength, shrink-swell. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, too acid. |
| Worsham | Poor: low strength, wetness. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, wetness. |
| HhB, HtC: | | | | |
| Hulett | Good | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, too clayey. |
| HuC: | | | | |
| Hulett | Good | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, too clayey. |
| Saw | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, too clayey. |
| HwB: | | | | |
| Hulett | Good | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, too clayey. |
| Urban land. | | | | |
| MaB2: | | | | |
| Madison | Good | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey. |

Table 12.—Construction Materials—Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| MaC2: | | | | |
| Madison | Fair: low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey. |
| MbB2, McC2: | | | | |
| Madison | 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. |
| MnB: | | | | |
| Madison | 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. |
| Urban land. | | | | |
| MoE: | | | | |
| Montonia | Poor: slope, depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: slope, small stones. |
| 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, 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, PeD: | | | | |
| Pacolet | Fair: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, slope. |
| Bethlehem | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: slope, small stones, too clayey. |
| PrB, PrC: | | | | |
| 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. |
| Urban land. | | | | |

Table 12.—Construction Materials—Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| PsB2, 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. |
| PtD: | | | | |
| Pacolet | Fair: slope. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey, slope. |
| Saw | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: slope, small stones, too clayey. |
| PuC: | | | | |
| Pacolet | Good | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey. |
| Urban land. | | | | |
| Pw: | | | | |
| Pits | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: slope, depth to rock. |
| RaE: | | | | |
| Rion | Poor: slope. | Probable | Probable | Poor: area reclaim, slope, small stones. |
| Ashlar | Poor: slope, depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: slope, small stones. |
| 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. |
| SaC: | | | | |
| Saw | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones, too clayey. |
| Wake | Poor: depth to rock. | Improbable: thin layer. | Improbable: thin layer. | Poor: area reclaim, small stones, depth to rock. |
| SaD: | | | | |
| Saw | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: slope, small stones, too clayey. |

Table 12.—Construction Materials—Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
|---|---|---|---|---|
| SaD: | | | | |
| Wake | Poor: depth to rock. | Improbable: thin layer. | Improbable: thin layer. | Poor: area reclaim, small stones, depth to rock. |
| TaB, TaC: | | | | |
| Tatum | Poor: low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: area reclaim, small stones, too clayey. |
| Montonia | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: small stones. |
| TaD: | | | | |
| Tatum | Poor: low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: area reclaim, small stones, too clayey. |
| Montonia | Poor: depth to rock. | Improbable: excess fines. | Improbable: excess fines. | Poor: slope, small stones. |
| ToA: | | | | |
| Toccoa | Good | Improbable: excess fines. | Improbable: excess fines. | Good. |
| UdC. | | | | |
| Udorthents | | | | |
| Ur. | | | | |
| Urban land | | | | |
| UtB, UuB2: | | | | |
| Uwharrie | Poor: low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey. |
| UvC, UwC2: | | | | |
| Uwharrie | Poor: low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey. |
| Tatum | Poor: low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: area reclaim, small stones, too clayey. |
| UxB: | | | | |
| Uwharrie | Poor: low strength. | Improbable: excess fines. | Improbable: excess fines. | Poor: too clayey. |
| Urban land. | | | | |
| W. | | | | |
| Water | | | | |
| WeA: | | | | |
| Wehadkee | Poor: low strength, wetness. | Improbable: excess fines. | Improbable: excess fines. | Poor: wetness. |

Table 13.—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 | Embankments, dikes, and levees | Features affecting-- Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|
| ApB: | | | | | | |
| Appling | Moderate: seepage, slope. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope. | Limitation: soil blowing. | Favorable. |
| ApC: | | | | | | |
| Appling | Severe: slope. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope. | Limitation: slope, soil blowing. | Limitation: slope. |
| BuB: | | | | | | |
| Buncombe | Severe: seepage. | Severe: seepage, piping. | Limitation: deep to water. | Limitation: fast intake, slope, droughty. | Limitation: too sandy, soil blowing. | Limitation: rooting depth, droughty. |
| CaB2: | | | | | | |
| Cecil | Moderate: seepage, slope. | Severe: hard to pack, piping. | Limitation: deep to water. | Limitation: slope. | Favorable | Favorable. |
| CeB: | | | | | | |
| Cecil | Moderate: seepage, slope. | Severe: hard to pack, piping. | Limitation: deep to water. | Limitation: slope. | Favorable | Favorable. |
| Urban land. | | | | | | |
| ChA: | | | | | | |
| Chewacla | Moderate: seepage. | Severe: hard to pack, piping, wetness. | Limitation: flooding. | Limitation: flooding, wetness. | Limitation: wetness. | Limitation: wetness. |
| CpD, CpE: | | | | | | |
| Cliffield | Severe: slope. | Severe: piping. | Limitation: deep to water. | Limitation: large stones, slope, droughty. | Limitation: large stones, slope, depth to rock. | Limitation: large stones, slope, droughty. |
| Pigeonroost | Severe: slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope, too acid, depth to rock. | Limitation: large stones, slope, depth to rock. | Limitation: large stones, slope, depth to rock. |
| CrF: | | | | | | |
| Cliffield | Severe: slope. | Severe: piping. | Limitation: deep to water. | Limitation: large stones, slope, droughty. | Limitation: large stones, slope, depth to rock. | Limitation: large stones, slope, droughty. |
| Rock outcrop. | | | | | | |
| DAM. | | | | | | |
| Dam | | | | | | |

Table 13.—Water Management—Continued

| Map symbol and soil name | Limitations for-- | | Features affecting-- | | | |
|---|---|---|---|---|---|---|
| | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| DoB: | | | | | | |
| Dogue | Severe: seepage. | Severe: wetness. | Limitation: slope, too acid. | Limitation: slope, wetness, soil blowing. | Limitation: wetness. | Favorable. |
| EvD, EvE, EwF: | | | | | | |
| Evard | Severe: slope. | Severe: seepage, piping. | Limitation: deep to water. | Limitation: slope. | Limitation: slope, too sandy. | Limitation: slope. |
| Cowee | Severe: slope. | Severe: piping, thin layer. | Limitation: deep to water. | Limitation: slope, too acid, depth to rock. | Limitation: slope, depth to rock. | Limitation: slope, depth to rock. |
| GrD, GvE: | | | | | | |
| Grover | Severe: slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope, soil blowing. | Limitation: slope, soil blowing. | Limitation: slope. |
| HeB: | | | | | | |
| Helena | Moderate: slope. | Severe: hard to pack. | Limitation: percs slowly, slope, too acid. | Limitation: percs slowly, slope, wetness. | Limitation: percs slowly, wetness. | Limitation: percs slowly. |
| Worsham | Moderate: slope. | Severe: wetness. | Limitation: percs slowly, slope. | Limitation: slope, wetness, soil blowing. | Limitation: percs slowly, wetness. | Limitation: percs slowly, wetness. |
| HhB: | | | | | | |
| Hulett | Moderate: seepage, slope. | Severe: hard to pack, piping. | Limitation: deep to water. | Limitation: percs slowly, slope. | Limitation: percs slowly. | Limitation: percs slowly. |
| HtC: | | | | | | |
| Hulett | Severe: slope. | Severe: hard to pack, piping. | Limitation: deep to water. | Limitation: percs slowly, slope. | Limitation: percs slowly, slope. | Limitation: percs slowly, slope. |
| HuC: | | | | | | |
| Hulett | Severe: slope. | Severe: hard to pack, piping. | Limitation: deep to water. | Limitation: percs slowly, slope. | Limitation: percs slowly, slope. | Limitation: percs slowly, slope. |
| Saw | Severe: seepage, slope. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope, depth to rock, droughty. | Limitation: slope, soil blowing, depth to rock. | Limitation: slope, depth to rock, droughty. |
| HwB: | | | | | | |
| Hulett | Moderate: seepage, slope. | Severe: hard to pack, piping. | Limitation: deep to water. | Limitation: percs slowly, slope. | Limitation: percs slowly. | Limitation: percs slowly. |
| Urban land. | | | | | | |
| MaB2: | | | | | | |
| Madison | Moderate: seepage, slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope. | Limitation: erodes easily. | Limitation: erodes easily. |

Table 13.—Water Management—Continued

| Map symbol and soil name | Limitations for-- Pond reservoir areas | Embankments, dikes, and levees | Features affecting-- Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|
| MaC2: | | | | | | |
| Madison | Severe: slope. | Severe: hard to pack, piping. | Limitation: deep to water. | Limitation: slope. | Limitation: erodes easily, slope. | Limitation: erodes easily, slope. |
| MbB2: | | | | | | |
| Madison | Moderate: seepage, slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope. | Limitation: erodes easily. | Limitation: erodes easily. |
| Bethlehem | Moderate: seepage, slope, depth to rock. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope, soil blowing, droughty. | Limitation: large stones, soil blowing, depth to rock. | Limitation: large stones, depth to rock, droughty. |
| McC2: | | | | | | |
| Madison | Severe: slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope. | Limitation: erodes easily, slope. | Limitation: erodes easily, slope. |
| Bethlehem | Moderate: seepage, slope, depth to rock. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope, soil blowing, droughty. | Limitation: large stones, soil blowing, depth to rock. | Limitation: large stones, depth to rock, droughty. |
| MnB: | | | | | | |
| Madison | Moderate: seepage, slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope. | Limitation: erodes easily. | Limitation: erodes easily. |
| Bethlehem | Moderate: seepage, slope, depth to rock. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope, soil blowing, droughty. | Limitation: large stones, soil blowing, depth to rock. | Limitation: large stones, depth to rock, droughty. |
| Urban land. | | | | | | |
| MoE: | | | | | | |
| Montonia | Severe: slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope, depth to rock. | Limitation: large stones, slope, depth to rock. | Limitation: large stones, slope. depth to rock. |
| PaC2, PaD2: | | | | | | |
| Pacolet | Severe: slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope. | Limitation: slope. | Limitation: slope. |
| PbB2: | | | | | | |
| Pacolet | Moderate: seepage, slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope. | Favorable | Favorable. |
| Bethlehem | Moderate: seepage, slope, depth to rock. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope, soil blowing, droughty. | Limitation: large stones, soil blowing, depth to rock. | Limitation: large stones, depth to rock, droughty. |

Table 13.—Water Management—Continued

| Map symbol and soil name | Limitations for-- Pond reservoir areas | Embankments, dikes, and levees | Features affecting-- Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|
| PbC2, PbD2, PeD: | | | | | | |
| Pacolet | Severe: slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope. | Limitation: slope. | Limitation: slope. |
| Bethlehem | Severe: slope. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope, soil blowing, droughty. | Limitation: large stones, slope, depth to rock. | Limitation: large stones, slope, depth to rock. |
| PrB: | | | | | | |
| Pacolet | Moderate: seepage, slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope. | Favorable | Favorable. |
| Bethlehem | Moderate: seepage, slope, depth to rock. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope, soil blowing, droughty. | Limitation: large stones, soil blowing, depth to rock. | Limitation: large stones, depth to rock, droughty. |
| Urban land. | | | | | | |
| PrC: | | | | | | |
| Pacolet | Severe: slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope. | Limitation: slope. | Limitation: slope. |
| Bethlehem | Severe: slope. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope, soil blowing, droughty. | Limitation: large stones, slope, depth to rock. | Limitation: large stones, slope, depth to rock. |
| Urban land. | | | | | | |
| PsB2: | | | | | | |
| Pacolet | Moderate: seepage, slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope. | Favorable | Favorable. |
| Saw | Severe: seepage. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope, depth to rock. | Limitation: depth to rock. | Limitation: depth to rock. |
| PsC2: | | | | | | |
| Pacolet | Severe: slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope. | Limitation: slope. | Limitation: slope. |
| Saw | Severe: seepage, slope. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope, depth to rock. | Limitation: slope, depth to rock. | Limitation: slope, depth to rock. |
| PtD: | | | | | | |
| Pacolet | Severe: slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope. | Limitation: slope. | Limitation: slope. |
| Saw | Severe: seepage, slope. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope, depth to rock, droughty. | Limitation: slope, soil blowing, depth to rock. | Limitation: slope, depth to rock, droughty. |

Table 13.—Water Management—Continued

| Map symbol and soil name | Limitations for-- Pond reservoir areas | Embankments, dikes, and levees | Features affecting-- Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|
| PuC: | | | | | | |
| Pacolet | Severe: slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope. | Limitation: slope. | Limitation: slope. |
| Urban land. | | | | | | |
| Pw: | | | | | | |
| Pits | Severe: slope, depth to rock. | Slight | Limitation: deep to water. | Limitation: slope, depth to rock. | Limitation: slope, depth to rock. | Limitation: slope, depth to rock. |
| RaE: | | | | | | |
| Rion | Severe: seepage, slope. | Severe: piping. | Limitation: deep to water. | Limitation: fast intake, slope, droughty. | Limitation: slope. | Limitation: slope, droughty. |
| Ashlar | Severe: seepage, slope. | Severe: seepage, piping. | Limitation: deep to water. | Limitation: slope, soil blowing, droughty. | Limitation: slope, soil blowing, depth to rock. | Limitation: slope, depth to rock, droughty. |
| RnE: | | | | | | |
| Rion | Severe: seepage, slope. | Severe: piping. | Limitation: deep to water. | Limitation: fast intake, slope, droughty. | Limitation: slope. | Limitation: slope, droughty. |
| Cliffside | Severe: slope. | Severe: large stones, seepage. | Limitation: deep to water. | Limitation: large stones, slope, droughty. | Limitation: large stones, slope, depth to rock. | Limitation: large stones, slope, droughty. |
| SaC, SaD: | | | | | | |
| Saw | Severe: seepage, slope. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope, depth to rock, droughty. | Limitation: slope, soil blowing, depth to rock. | Limitation: slope, depth to rock, droughty. |
| Wake | Severe: slope, depth to rock. | Severe: seepage. | Limitation: deep to water. | Limitation: fast intake, slope, droughty. | Limitation: slope, too sandy, depth to rock. | Limitation: slope, depth to rock, droughty. |
| TaB: | | | | | | |
| Tatum | Moderate: seepage, slope, depth to rock. | Severe: hard to pack, piping. | Limitation: deep to water. | Limitation: slope. | Limitation: soil blowing. | Favorable. |
| Montonia | Moderate: seepage, slope, depth to rock. | Severe: piping. | Limitation: deep to water. | Limitation: slope, depth to rock. | Limitation: depth to rock. | Limitation: depth to rock. |
| TaC, TaD: | | | | | | |
| Tatum | Severe: slope. | Severe: hard to pack, piping. | Limitation: deep to water. | Limitation: slope. | Limitation: slope, soil blowing. | Limitation: slope. |
| Montonia | Severe: slope. | Severe: piping. | Limitation: deep to water. | Limitation: slope, depth to rock. | Limitation: slope, depth to rock. | Limitation: slope, depth to rock. |

Table 13.—Water Management—Continued

| Map symbol and soil name | Limitations for-- Pond reservoir areas | Embankments, dikes, and levees | Features affecting-- Drainage | Irrigation | Terraces and diversions | Grassed waterways |
|---|---|---|---|---|---|---|
| ToA: Toccoa | Severe: seepage. | Severe: piping. | Limitation: flooding. | Limitation: flooding. | Favorable | Favorable. |
| UdC. Udorthents | | | | | | |
| Ur. Urban land | | | | | | |
| UtB, UuB2: Uwharrie | Moderate: seepage, slope. | Severe: hard to pack. | Limitation: deep to water. | Limitation: erodes easily, slope. | Limitation: erodes easily. | Limitation: erodes easily. |
| UvC: Uwharrie | Severe: slope. | Severe: hard to pack. | Limitation: deep to water. | Limitation: slope. | Limitation: slope. | Limitation: slope. |
| Tatum | Severe: slope. | Severe: hard to pack, piping. | Limitation: deep to water. | Limitation: slope. | Limitation: slope, soil blowing. | Limitation: slope. |
| UwC2: Uwharrie | Severe: slope. | Severe: hard to pack. | Limitation: deep to water. | Limitation: erodes easily, slope. | Limitation: erodes easily, slope. | Limitation: erodes easily, slope. |
| Tatum | Severe: slope. | Severe: hard to pack. | Limitation: deep to water. | Limitation: erodes easily, slope. | Limitation: erodes easily, slope. | Limitation: erodes easily, slope. |
| UxB: Uwharrie | Moderate: seepage, slope. | Severe: hard to pack. | Limitation: deep to water. | Limitation: erodes easily, slope. | Limitation: erodes easily. | Limitation: erodes easily. |
| Urban land. | | | | | | |
| W. Water | | | | | | |
| WeA: Wehadkee | Moderate: seepage. | Severe: piping, wetness. | Limitation: flooding. | Limitation: flooding, wetness, soil blowing. | Limitation: wetness, soil blowing. | Limitation: wetness. |

Table 14.—Engineering Index Properties

(Absence of an entry indicates that the data were not estimated. The symbol > means greater than; < means less than)

| 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 | |
| ApB, ApC: | | | | | | | | | | | | |
| Appling | 0-9 | Sandy loam | SC-SM, SM | A-2 | 0 | 0-5 | 86-100 | 80-100 | 55-91 | 15-35 | 15-35 | NP-7 |
| | 9-29 | 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 |
| | 29-37 | 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 |
| | 37-56 | Sandy clay, clay loam, sandy clay loam. | CL, SC | A-6, A-4, A-7 | 0 | 0-5 | 95-100 | 85-100 | 70-90 | 40-75 | 30-50 | 8-22 |
| | 56-72 | Variable | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BuB: | | | | | | | | | | | | |
| Buncombe | 0-4 | Loamy sand | SM, SP-SM | A-2, A-3 | 0 | 0 | 98-100 | 98-100 | 90-97 | 7-32 | 10-20 | NP |
| | 4-10 | 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 |
| | 10-29 | 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 |
| | 29-43 | 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 |
| | 43-60 | 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 |
| | 60-72 | Sandy loam, loam. | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 0-30 | NP-4 |
| CaB2: | | | | | | | | | | | | |
| Cecil | 0-6 | Sandy clay loam | ML, SC, CL, SM | A-4, A-6 | 0 | 0-5 | 75-100 | 75-100 | 68-95 | 38-81 | 21-40 | 3-17 |
| | 6-39 | 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 |
| | 39-65 | Sandy clay, clay loam, sandy clay loam. | CL, SC | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 85-100 | 70-90 | 40-75 | 30-50 | 8-22 |
| | 65-72 | Sandy loam, loam. | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 0-30 | NP-4 |
| CeB: | | | | | | | | | | | | |
| Cecil | 0-6 | Sandy clay loam | ML, CL, SC, SM | A-6, A-4 | 0 | 0-5 | 75-100 | 75-100 | 68-95 | 38-81 | 21-40 | 3-17 |
| | 6-39 | 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 |
| | 39-65 | Sandy clay, clay loam, sandy clay loam. | CL, SC | A-4, A-7, A-6 | 0 | 0-5 | 95-100 | 85-100 | 70-90 | 40-75 | 30-50 | 8-22 |
| | 65-72 | Sandy loam, loam. | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 0-30 | NP-4 |
| Urban land. | | | | | | | | | | | | |

Table 14.—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 | 0-6 | 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 |
| | 6-15 | Silt loam, silty clay loam, clay loam. | CL, ML | A-4, A-7, A-6 | 0 | 0 | 96-100 | 95-100 | 80-100 | 51-98 | 30-49 | 4-22 |
| | 15-19 | Silt loam, silty clay loam, clay loam. | CL, ML | A-4, A-7, A-6 | 0 | 0 | 96-100 | 95-100 | 80-100 | 51-98 | 30-49 | 4-22 |
| | 19-39 | Silt loam, silty clay loam, clay loam. | CL, ML | A-4, A-6, A-7 | 0 | 0 | 96-100 | 95-100 | 80-100 | 51-98 | 30-49 | 4-22 |
| | 39-50 | Sandy clay loam, loam, sandy loam. | CL, ML, SM, SC-SM | A-4, A-6, A-7-6 | 0 | 0 | 96-100 | 95-100 | 60-100 | 36-70 | 20-45 | 2-15 |
| | 50-72 | Sandy clay loam, loam, sandy loam. | SM, ML, SC-SM, CL | A-4, A-6, A-7-6 | 0 | 0 | 96-100 | 95-100 | 60-100 | 36-70 | 20-45 | 2-15 |
| CpD, CpE: | | | | | | | | | | | | |
| Cliffield | 0-4 | 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 |
| | 4-16 | Very gravelly sandy clay loam, very cobbly clay loam, very gravelly loam. | ML, GM, SM, CL | A-4, A-6, A-2, A-7 | 5-20 | 20-40 | 70-85 | 50-75 | 35-70 | 25-60 | 20-45 | NP-15 |
| | 16-30 | Very gravelly sandy clay loam, very cobbly clay loam, very cobbly loam. | GM, ML, CL, 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 |
| | 30-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pigeonroost | 0-5 | 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 |
| | 5-10 | Gravelly sandy loam. | ML, SC, CL, SM | A-2, A-4 | 0-1 | 5-25 | 70-95 | 60-90 | 40-75 | 25-70 | 20-30 | NP-10 |
| | 10-24 | Loam, sandy clay loam, gravelly loam. | CL, SM, ML, SC | A-4, A-6 | 0-1 | 0-15 | 85-100 | 70-100 | 65-90 | 40-80 | 25-40 | 7-14 |
| | 24-43 | Weathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 43-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Table 14.—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 | 0-4 | Very cobbly sandy loam. | SM | A-4, A-2-4 | 5-20 | 20-40 | 70-85 | 55-80 | 50-60 | 25-45 | 20-35 | NP-10 |
| | 4-16 | Very gravelly sandy clay loam, very cobbly clay loam, very gravelly loam. | GM, ML, CL, 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 |
| | 16-30 | Very gravelly sandy clay loam, very cobbly clay loam, very cobbly loam. | GM, ML, CL, SM | A-2, A-7, A-4, A-6 | 5-20 | 20-40 | 70-85 | 50-75 | 35-70 | 25-60 | 20-45 | NP-15 |
| | 30-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Rock outcrop. | | | | | | | | | | | | |
| DAM. | | | | | | | | | | | | |
| Dam | | | | | | | | | | | | |
| DoB: | | | | | | | | | | | | |
| Dogue | 0-4 | Sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 95-100 | 75-100 | 50-100 | 20-50 | 0-25 | NP-10 |
| | 4-7 | Sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 95-100 | 75-100 | 50-100 | 20-50 | 0-25 | NP-10 |
| | 7-25 | Clay loam, clay, sandy clay. | CH, SC, CL | A-7, A-6 | 0 | 0 | 95-100 | 75-100 | 65-100 | 40-90 | 35-60 | 16-40 |
| | 25-36 | 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 |
| | 36-50 | Sandy clay loam, loam, sandy loam. | CL, ML, SC-SM, SM | A-6, A-4, A-7-6 | 0 | 0 | 96-100 | 95-100 | 60-100 | 36-70 | 20-45 | 2-15 |
| | 50-60 | Loamy sand, sand, coarse sandy loam. | SP-SM, SM | A-2, A-1, A-3 | 0 | 0 | 80-100 | 85-95 | 25-80 | 5-35 | 0-14 | NP |
| EvD, EvE: | | | | | | | | | | | | |
| Evard | 0-6 | Sandy loam | SC-SM, SM | A-2 | 0 | 0-5 | 86-100 | 80-100 | 55-91 | 15-35 | 15-35 | NP-7 |
| | 6-31 | Sandy clay loam, clay loam, loam. | SC, ML, SM, CL | A-2, A-4, A-7-6, A-6 | 0 | 0-2 | 90-100 | 85-100 | 60-95 | 30-70 | 25-45 | 7-18 |
| | 31-43 | Sandy loam, loam, sandy clay loam. | CL, ML, SC-SM | A-4, A-2 | 0 | 0-5 | 80-100 | 75-100 | 60-95 | 20-55 | 0-25 | NP-9 |
| | 43-61 | Sandy loam, loam, loamy sand. | SM | A-4, A-2 | 0 | 0-15 | 75-100 | 70-100 | 60-90 | 15-50 | 0-14 | NP |

Table 14.—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 | |
| EvD, EvE: | | | | | | | | | | | | |
| Cowee | 0-5 | Gravelly sandy loam. | SC-SM, ML, 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 clay loam, gravelly sandy loam, sandy 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 |
| | 10-28 | Gravelly sandy clay loam, gravelly sandy loam, sandy clay loam. | SC, CL, ML, SM | A-6, A-7, A-4, A-2 | 0-2 | 0-15 | 47-99 | 45-90 | 32-85 | 17-60 | 26-50 | 5-22 |
| | 28-35 | Gravelly sandy clay loam, gravelly sandy loam, sandy 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 |
| | 35-60 | Weathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| EwF: | | | | | | | | | | | | |
| Evard | 0-6 | Sandy loam | SC-SM, SM | A-2 | 0 | 0-5 | 86-100 | 80-100 | 55-91 | 15-35 | 15-35 | NP-7 |
| | 6-31 | Sandy clay loam, clay loam, 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 |
| | 31-43 | 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 |
| | 43-61 | 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, SM, SC-SM | A-2-4, A-4, A-5, A-2 | 0-5 | 0-15 | 75-95 | 65-85 | 55-75 | 20-51 | 26-41 | NP-12 |
| | 5-10 | Gravelly sandy clay loam, gravelly sandy loam, sandy clay loam. | SM, CL, SC, ML | A-6, A-7, A-4, A-2 | 0-2 | 0-15 | 47-99 | 45-90 | 32-85 | 17-60 | 26-50 | 5-22 |
| | 10-28 | Gravelly sandy clay loam, gravelly sandy loam, sandy clay loam. | ML, CL, SC, SM | A-6, A-4, A-7, A-2 | 0-2 | 0-15 | 47-99 | 45-90 | 32-85 | 17-60 | 26-50 | 5-22 |
| | 28-35 | Gravelly sandy clay loam, gravelly sandy loam, sandy clay loam. | CL, SM, ML, SC | A-6, A-4, A-7, A-2 | 0-2 | 0-15 | 47-99 | 45-90 | 32-85 | 17-60 | 26-50 | 5-22 |
| | 35-60 | Weathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Table 14.—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 | |
| GrD, GvE: | | | | | | | | | | | | |
| Grover | 0-5 | Gravelly sandy loam. | CL, SM, SC | A-3, A-4 | 0-2 | 2-10 | 70-90 | 55-75 | 40-70 | 20-55 | 20-30 | NP-8 |
| | 5-13 | Sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 95-100 | 75-100 | 50-100 | 20-50 | 0-25 | NP-10 |
| | 13-27 | Sandy clay loam, clay loam, loam. | CL, SC | A-4, A-6 | 0 | 0-5 | 95-100 | 90-100 | 75-95 | 45-80 | 38-65 | 7-15 |
| | 27-35 | Sandy loam, loam, sandy clay loam. | CL, SC, SM | A-2-4, A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 55-90 | 30-70 | 25-50 | 3-13 |
| | 35-57 | Sandy loam, loam, sandy clay loam. | CL, SC, SM | A-2-4, A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 55-90 | 30-70 | 25-50 | 3-13 |
| | 57-72 | Sandy loam, loam, loamy sand. | CL, SC, SM | A-2-4, A-4, A-6 | 0 | 0-5 | 90-100 | 85-100 | 55-90 | 30-70 | 25-50 | 3-13 |
| HeB: | | | | | | | | | | | | |
| Helena | 0-7 | Sandy loam | SC, SC-SM, ML, SM | A-2, A-4 | 0 | 0-5 | 90-100 | 90-100 | 51-95 | 26-75 | 15-35 | NP-10 |
| | 7-14 | 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 |
| | 14-26 | Clay loam, sandy clay, clay. | CH | A-7 | 0 | 0-5 | 95-100 | 95-100 | 73-97 | 56-86 | 50-85 | 24-50 |
| | 26-50 | Clay loam, sandy clay, clay. | CH | A-7 | 0 | 0-5 | 95-100 | 95-100 | 73-97 | 56-86 | 50-85 | 24-50 |
| | 50-56 | Clay loam, sandy clay, clay. | CH | A-7 | 0 | 0-5 | 95-100 | 95-100 | 73-97 | 56-86 | 50-85 | 24-50 |
| | 56-60 | 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 |
| Worsham | 0-5 | Sandy loam | ML, SM, SC, CL | A-2, A-4 | --- | 0-5 | 90-100 | 85-100 | 50-85 | 25-55 | 0-30 | NP-9 |
| | 5-12 | Sandy loam, sandy clay loam, clay loam. | CL, SC | A-2, A-7, A-4, A-6 | --- | 0-10 | 90-95 | 80-95 | 50-90 | 30-70 | 20-50 | 8-30 |
| | 12-20 | Sandy clay loam, sandy clay, clay. | CL, SC, CH | A-2, A-7 | --- | 0-5 | 90-100 | 85-100 | 70-100 | 30-95 | 42-66 | 22-40 |
| | 20-55 | Sandy clay loam, sandy clay, clay. | CL, CH, SC | A-2, A-7 | --- | 0-5 | 90-100 | 85-100 | 70-100 | 30-95 | 42-66 | 22-40 |
| | 55-60 | Sandy loam, sandy clay loam, clay loam. | CL, SC | A-7, A-6, A-4, A-2 | --- | 0-10 | 90-95 | 80-95 | 50-90 | 30-70 | 20-50 | 8-30 |

Table 14.—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 | |
| HhB, HtC: | | | | | | | | | | | | |
| Hulett | 0-8 | Gravelly sandy loam. | ML, SM, SC-SM | A-2, A-4 | 0-5 | 3-10 | 75-95 | 65-85 | 50-80 | 30-60 | 0-30 | NP-7 |
| | 8-19 | Clay loam, clay | CL, MH, ML | A-7 | 0-3 | 0-3 | 90-100 | 85-100 | 68-95 | 60-80 | 40-60 | 10-25 |
| | 19-27 | Clay loam, clay | MH, CL, ML | A-7 | 0-3 | 0-3 | 90-100 | 85-100 | 68-95 | 60-80 | 40-60 | 10-25 |
| | 27-37 | Sandy clay, clay loam, sandy clay loam. | CL, SC | A-4, A-7, A-6 | 0 | 0-5 | 95-100 | 85-100 | 70-90 | 40-75 | 30-50 | 8-22 |
| | 37-56 | Sandy loam, sandy clay loam, loam. | SC-SM, SM | A-2-4, A-4 | 0-3 | 0-3 | 80-100 | 70-100 | 60-80 | 30-50 | 0-28 | NP-7 |
| | 56-72 | Sandy loam, sandy clay loam, loam. | SC-SM, SM | A-2-4, A-4 | 0-3 | 0-3 | 80-100 | 70-100 | 60-80 | 30-50 | 0-28 | NP-7 |
| HuC: | | | | | | | | | | | | |
| Hulett | 0-8 | Gravelly sandy loam. | SC-SM, ML, SM | A-2, A-4 | 0-5 | 3-10 | 75-95 | 65-85 | 50-80 | 30-60 | 0-30 | NP-7 |
| | 8-19 | Clay loam, clay | CL, MH, ML | A-7 | 0-3 | 0-3 | 90-100 | 85-100 | 68-95 | 60-80 | 40-60 | 10-25 |
| | 19-27 | Clay loam, clay | ML, MH, CL | A-7 | 0-3 | 0-3 | 90-100 | 85-100 | 68-95 | 60-80 | 40-60 | 10-25 |
| | 27-37 | Sandy clay, clay loam, sandy clay loam. | CL, SC | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 85-100 | 70-90 | 40-75 | 30-50 | 8-22 |
| | 37-56 | Sandy loam, sandy clay loam, loam. | SC-SM, SM | A-2-4, A-4 | 0-3 | 0-3 | 80-100 | 70-100 | 60-80 | 30-50 | 0-28 | NP-7 |
| | 56-72 | Sandy loam, sandy clay loam, loam. | SC-SM, SM | A-2-4, A-4 | 0-3 | 0-3 | 80-100 | 70-100 | 60-80 | 30-50 | 0-28 | NP-7 |
| Saw | 0-5 | Gravelly sandy clay loam. | SC, CL | A-6, A-2-4, A-4 | 0-1 | 3-10 | 70-90 | 55-75 | 45-70 | 30-55 | 25-40 | 10-20 |
| | 5-21 | Clay, sandy clay, clay loam. | MH, ML | A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 70-95 | 51-75 | 38-65 | 11-30 |
| | 21-31 | Clay, sandy clay, clay loam. | MH, ML | A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 70-95 | 51-75 | 38-65 | 11-30 |
| | 31-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| HwB: | | | | | | | | | | | | |
| Hulett | 0-8 | Gravelly sandy loam. | SM, ML, SC-SM | A-4, A-2 | 0-5 | 3-10 | 75-95 | 65-85 | 50-80 | 30-60 | 0-30 | NP-7 |
| | 8-19 | Clay loam, clay | ML, MH, CL | A-7 | 0-3 | 0-3 | 90-100 | 85-100 | 68-95 | 60-80 | 40-60 | 10-25 |
| | 19-27 | Clay loam, clay | MH, ML, CL | A-7 | 0-3 | 0-3 | 90-100 | 85-100 | 68-95 | 60-80 | 40-60 | 10-25 |
| | 27-37 | Sandy clay, clay loam, sandy clay loam. | CL, SC | A-7, A-4, A-6 | 0 | 0-5 | 95-100 | 85-100 | 70-90 | 40-75 | 30-50 | 8-22 |
| | 37-56 | Sandy loam, sandy clay loam, loam. | SM, SC-SM | A-4, A-2-4 | 0-3 | 0-3 | 80-100 | 70-100 | 60-80 | 30-50 | 0-28 | NP-7 |
| | 56-72 | Sandy loam, sandy clay loam, loam. | SC-SM, SM | A-4, A-2-4 | 0-3 | 0-3 | 80-100 | 70-100 | 60-80 | 30-50 | 0-28 | NP-7 |
| Urban land. | | | | | | | | | | | | |

Table 14.—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 | |
| MaB2, MaC2: | | | | | | | | | | | | |
| Madison | 0-6 | Gravelly sandy clay loam. | CL, SC | A-2-4, A-4, A-6 | 0-1 | 3-10 | 70-90 | 55-75 | 45-70 | 30-55 | 25-40 | 10-20 |
| | 6-24 | Clay, clay loam, sandy clay. | CL, MH | A-7 | 0 | 0-3 | 90-100 | 85-100 | 80-95 | 50-85 | 40-70 | 15-30 |
| | 24-37 | Clay, clay loam, sandy clay. | CL, MH | A-7 | 0 | 0-3 | 90-100 | 85-100 | 80-95 | 50-85 | 40-70 | 15-30 |
| | 37-50 | Loam, sandy clay loam, clay loam. | CL, SC | A-4, A-6 | 0 | 0-3 | 90-100 | 85-100 | 75-90 | 50-80 | 30-40 | 7-20 |
| | 50-72 | Fine sandy loam, sandy loam, loam. | CL-ML, SM | A-2, A-2-4, A-4 | 0 | 0-3 | 85-100 | 80-100 | 55-90 | 30-75 | 25-35 | NP-7 |
| MbB2, McC2: | | | | | | | | | | | | |
| Madison | 0-6 | Gravelly sandy clay loam. | CL, SC | A-2-4, A-4, A-6 | 0-1 | 3-10 | 70-90 | 55-75 | 45-70 | 30-55 | 25-40 | 10-20 |
| | 6-24 | Clay, clay loam, sandy clay. | CL, MH | A-7 | 0 | 0-3 | 90-100 | 85-100 | 80-95 | 50-85 | 40-70 | 15-30 |
| | 24-37 | Clay, clay loam, sandy clay. | MH, CL | A-7 | 0 | 0-3 | 90-100 | 85-100 | 80-95 | 50-85 | 40-70 | 15-30 |
| | 37-50 | Loam, sandy clay loam, clay loam. | CL, SC | A-4, A-6 | 0 | 0-3 | 90-100 | 85-100 | 75-90 | 50-80 | 30-40 | 7-20 |
| | 50-72 | Fine sandy loam, sandy loam, loam. | CL-ML, SM | A-2-4, A-2, A-4 | 0 | 0-3 | 85-100 | 80-100 | 55-90 | 30-75 | 25-35 | NP-7 |
| Bethlehem | 0-8 | Gravelly sandy clay loam. | SP-SM, SM, GP-GM, GM | A-1, A-4, A-2-4 | 0-2 | 0-20 | 50-83 | 35-76 | 20-60 | 10-45 | 15-40 | NP-10 |
| | 8-30 | 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 |
| | 30-34 | Gravelly sandy clay loam, very gravelly sandy clay loam. | GC-GM, SC, GC, SC-SM | A-6, A-4, A-1, A-2 | 0-5 | 0-20 | 50-85 | 30-85 | 25-82 | 20-50 | 25-49 | 5-16 |
| | 34-45 | Weathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 45-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MnB: | | | | | | | | | | | | |
| Madison | 0-6 | Gravelly sandy clay loam. | CL, SC | A-2-4, A-6, A-4 | 0-1 | 3-10 | 70-90 | 55-75 | 45-70 | 30-55 | 25-40 | 10-20 |
| | 6-24 | Clay, clay loam, sandy clay. | MH, CL | A-7 | 0 | 0-3 | 90-100 | 85-100 | 80-95 | 50-85 | 40-70 | 15-30 |
| | 24-37 | Clay, clay loam, sandy clay. | MH, CL | A-7 | 0 | 0-3 | 90-100 | 85-100 | 80-95 | 50-85 | 40-70 | 15-30 |
| | 37-50 | Loam, sandy clay loam, clay loam. | SC, CL | A-4, A-6 | 0 | 0-3 | 90-100 | 85-100 | 75-90 | 50-80 | 30-40 | 7-20 |
| | 50-72 | Fine sandy loam, sandy loam, loam. | SM, CL-ML | A-2, A-2-4, A-4 | 0 | 0-3 | 85-100 | 80-100 | 55-90 | 30-75 | 25-35 | NP-7 |

Table 14.—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 | |
| MnB: | | | | | | | | | | | | |
| Bethlehem------- | 0-5 | Gravelly sandy clay loam. | GP-GM, GM, SM, SP-SM | A-1, A-2-4, A-4 | 0-2 | 0-20 | 50-83 | 35-76 | 20-60 | 10-45 | 15-40 | NP-10 |
| | 5-18 | 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 |
| | 18-27 | Clay, clay loam, gravelly clay. | GC-GM, GC, SC, 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 |
| | 27-60 | Weathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 60-65 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Urban land. | | | | | | | | | | | | |
| MoE: | | | | | | | | | | | | |
| Montonia-------- | 0-3 | Very channery silt loam. | ML, SM, GM | A-4, A-2-4 | 0 | 5-15 | 60-90 | 55-85 | 45-80 | 30-80 | 20-35 | NP-10 |
| | 3-8 | Channery clay loam, channery silt loam, loam. | CL, ML | A-6, A-7 | 0 | 0-10 | 75-100 | 60-90 | 55-85 | 50-85 | 30-50 | 10-20 |
| | 8-19 | Channery loam, channery silty clay loam, channery clay loam. | GC, CL, SC, SM | A-2, A-6, A-7 | 0 | 5-15 | 60-90 | 50-80 | 50-80 | 30-70 | 25-50 | 10-20 |
| | 19-29 | Channery loam, channery silty clay loam, channery clay loam. | GC, SC, CL, SM | A-2, A-7, A-6 | 0 | 5-15 | 60-90 | 50-80 | 50-80 | 30-70 | 25-50 | 10-20 |
| | 29-42 | Weathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 42-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PaC2, PaD2: | | | | | | | | | | | | |
| Pacolet--------- | 0-7 | Sandy clay loam | SC-SM, SC | A-4, A-6 | 0-1 | 0-1 | 95-100 | 90-100 | 65-87 | 36-50 | 20-40 | 4-17 |
| | 7-28 | Sandy clay, clay loam, clay. | MH, ML, CL | A-6, A-7 | 0-1 | 0-1 | 80-100 | 80-100 | 60-100 | 51-75 | 38-65 | 11-33 |
| | 28-44 | Clay loam, sandy clay loam, sandy loam. | SC-SM, SC, CL, CL-ML | A-2, A-4, A-6 | 0-1 | 0-2 | 80-100 | 70-100 | 60-80 | 30-60 | 20-35 | 5-15 |
| | 44-60 | 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 |
| | 60-72 | 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 14.—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, PbC2: | | | | | | | | | | | | |
| Pacolet | 0-7 | Sandy clay loam | SC-SM, SC | A-4, A-6 | 0-1 | 0-1 | 95-100 | 90-100 | 65-87 | 36-50 | 20-40 | 4-17 |
| | 7-28 | 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 |
| | 28-44 | Clay loam, sandy clay loam, sandy loam. | CL-ML, CL, SC, SC-SM | A-2, A-4, A-6 | 0-1 | 0-2 | 80-100 | 70-100 | 60-80 | 30-60 | 20-35 | 5-15 |
| | 44-60 | Sandy loam, fine sandy loam, loam. | SM, SC-SM | A-4, A-2-4 | 0-1 | 0-2 | 80-100 | 70-100 | 60-90 | 25-50 | 0-28 | NP-6 |
| | 60-72 | 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 | 0-8 | 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 |
| | 8-30 | 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 |
| | 30-34 | Gravelly sandy clay loam, very gravelly sandy clay loam. | GC-GM, GC, SC, SC-SM | A-1, A-2, A-6, A-4 | 0-5 | 0-20 | 50-85 | 30-85 | 25-82 | 20-50 | 25-49 | 5-16 |
| | 34-45 | Weathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 45-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PbD2, PeD: | | | | | | | | | | | | |
| Pacolet | 0-8 | Sandy clay loam | SC-SM, SC | A-6, A-4 | 0-1 | 0-1 | 95-100 | 90-100 | 65-87 | 36-50 | 20-40 | 4-17 |
| | 8-27 | Sandy clay, clay loam, clay. | ML, MH, CL | A-6, A-7 | 0-1 | 0-1 | 80-100 | 80-100 | 60-100 | 51-75 | 38-65 | 11-33 |
| | 27-50 | Sandy clay, clay loam, clay. | CL-ML, SC, SC-SM, CL | A-4, A-2, A-6 | 0-1 | 0-2 | 80-100 | 70-100 | 60-80 | 30-60 | 20-35 | 5-15 |
| | 50-72 | Sandy loam, fine sandy loam, loam. | SM, SC-SM | A-2-4, A-4 | 0-1 | 0-2 | 80-100 | 70-100 | 60-90 | 25-50 | 0-28 | NP-6 |
| Bethlehem | 0-8 | Gravelly sandy clay loam. | GP-GM, 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 |
| | 8-30 | Clay, clay loam, gravelly clay. | CH, MH, CL, ML | A-6, A-7 | 0 | 0-10 | 65-100 | 60-100 | 55-100 | 50-85 | 38-65 | 14-30 |
| | 30-34 | 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 |
| | 34-45 | Weathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 45-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Table 14.—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 | |
| PrB, PrC: | | | | | | | | | | | | |
| Pacolet | 0-7 | Sandy clay loam | SC, SC-SM | A-6, A-4 | 0-1 | 0-1 | 95-100 | 90-100 | 65-87 | 36-50 | 20-40 | 4-17 |
| | 7-28 | 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 |
| | 28-44 | Clay loam, sandy clay loam, sandy loam. | CL-ML, SC, SC-SM, CL | A-6, A-4, A-2 | 0-1 | 0-2 | 80-100 | 70-100 | 60-80 | 30-60 | 20-35 | 5-15 |
| | 44-60 | 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 |
| | 60-72 | 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 |
| Bethlehem | 0-8 | 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 |
| | 8-30 | 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 |
| | 30-34 | Gravelly sandy clay loam, very gravelly sandy clay loam. | GC-GM, GC, SC, SC-SM | A-4, A-6, A-1, A-2 | 0-5 | 0-20 | 50-85 | 30-85 | 25-82 | 20-50 | 25-49 | 5-16 |
| | 34-45 | Weathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 45-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Urban land. | | | | | | | | | | | | |
| PsB2: | | | | | | | | | | | | |
| Pacolet | 0-7 | Sandy clay loam | SC-SM, SC | A-4, A-6 | 0-1 | 0-1 | 95-100 | 90-100 | 65-87 | 36-50 | 20-40 | 4-17 |
| | 7-28 | Sandy clay, clay loam, clay. | CL, ML, MH | A-7, A-6 | 0-1 | 0-1 | 80-100 | 80-100 | 60-100 | 51-75 | 38-65 | 11-33 |
| | 28-44 | 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 |
| | 44-60 | Sandy loam, fine sandy loam, loam. | SM, SC-SM | A-4, A-2-4 | 0-1 | 0-2 | 80-100 | 70-100 | 60-90 | 25-50 | 0-28 | NP-6 |
| | 60-72 | Sandy loam, fine sandy loam, loam. | SM, SC-SM | A-4, A-2-4 | 0-1 | 0-2 | 80-100 | 70-100 | 60-90 | 25-50 | 0-28 | NP-6 |
| Saw | 0-5 | Gravelly sandy clay loam. | CL, SC | A-2-4, A-6, A-4 | 0-1 | 3-10 | 70-90 | 55-75 | 45-70 | 30-55 | 25-40 | 10-20 |
| | 5-21 | Clay, sandy clay, clay loam. | ML, MH | A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 70-95 | 51-75 | 38-65 | 11-30 |
| | 21-31 | Clay, sandy clay, clay loam. | MH, ML | A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 70-95 | 51-75 | 38-65 | 11-30 |
| | 31-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Table 14.—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 | |
| PsC2: | | | | | | | | | | | | |
| Pacolet | 0-8 | 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 |
| | 8-27 | Sandy clay, clay loam, clay. | MH, ML, CL | A-7, A-6 | 0-1 | 0-1 | 80-100 | 80-100 | 60-100 | 51-75 | 38-65 | 11-33 |
| | 27-50 | Sandy clay, clay loam, clay. | SC-SM, CL, SC, CL-ML | A-2, A-4, A-6 | 0-1 | 0-2 | 80-100 | 70-100 | 60-80 | 30-60 | 20-35 | 5-15 |
| | 50-72 | Sandy loam, fine sandy loam, loam. | SM, SC-SM | A-2-4, A-4 | 0-1 | 0-2 | 80-100 | 70-100 | 60-90 | 25-50 | 0-28 | NP-6 |
| Saw | 0-5 | Gravelly sandy clay loam. | CL, SC | A-4, A-2-4, A-6 | 0-1 | 3-10 | 70-90 | 55-75 | 45-70 | 30-55 | 25-40 | 10-20 |
| | 5-21 | Clay, sandy clay, clay loam. | MH, ML | A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 70-95 | 51-75 | 38-65 | 11-30 |
| | 21-31 | Clay, sandy clay, clay loam. | MH, ML | A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 70-95 | 51-75 | 38-65 | 11-30 |
| | 31-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| PtD: | | | | | | | | | | | | |
| Pacolet | 0-7 | Sandy clay loam | SC-SM, SC | A-6, A-4 | 0-1 | 0-1 | 95-100 | 90-100 | 65-87 | 36-50 | 20-40 | 4-17 |
| | 7-28 | 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 |
| | 28-44 | Clay loam, sandy clay loam, sandy loam. | CL-ML, CL, SC, SC-SM | A-4, A-6, A-2 | 0-1 | 0-2 | 80-100 | 70-100 | 60-80 | 30-60 | 20-35 | 5-15 |
| | 44-60 | Sandy loam, fine sandy loam, loam. | SM, SC-SM | A-4, A-2-4 | 0-1 | 0-2 | 80-100 | 70-100 | 60-90 | 25-50 | 0-28 | NP-6 |
| | 60-72 | Sandy loam, fine sandy loam, loam. | SM, SC-SM | A-4, A-2-4 | 0-1 | 0-2 | 80-100 | 70-100 | 60-90 | 25-50 | 0-28 | NP-6 |
| Saw | 0-5 | Gravelly sandy clay loam. | CL, SC | A-2-4, A-4, A-6 | 0-1 | 3-10 | 70-90 | 55-75 | 45-70 | 30-55 | 25-40 | 10-20 |
| | 5-21 | Clay, sandy clay, clay loam. | MH, ML | A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 70-95 | 51-75 | 38-65 | 11-30 |
| | 21-31 | Clay, sandy clay, clay loam. | MH, ML | A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 70-95 | 51-75 | 38-65 | 11-30 |
| | 31-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Table 14.—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 | |
| PuC: | | | | | | | | | | | | |
| Pacolet | 0-7 | 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 |
| | 7-28 | 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 |
| | 28-44 | Clay loam, sandy clay loam, sandy loam. | CL-ML, CL, SC, SC-SM | A-2, A-4, A-6 | 0-1 | 0-2 | 80-100 | 70-100 | 60-80 | 30-60 | 20-35 | 5-15 |
| | 44-60 | 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 |
| | 60-72 | 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 |
| Urban land. | | | | | | | | | | | | |
| Pw: | | | | | | | | | | | | |
| Pits | 0-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | 0-14 | --- |
| RaE: | | | | | | | | | | | | |
| Rion | 0-8 | Gravelly loamy sand. | SM, SP-SM | A-1-b, A-2, A-3 | 0-5 | 2-10 | 70-90 | 55-75 | 40-60 | 8-30 | 0-14 | NP |
| | 8-22 | Gravelly sandy loam, gravelly sandy clay loam, gravelly clay loam. | SC, SC-SM | A-2, A-1-b, A-4, A-6 | 0-2 | 2-10 | 70-90 | 60-75 | 40-60 | 20-45 | 20-35 | 5-15 |
| | 22-34 | Gravelly sandy loam, gravelly sandy clay loam, gravelly clay loam. | SC, SC-SM | A-4, A-1-b, A-2, A-6 | 0-2 | 2-10 | 70-90 | 60-75 | 40-60 | 20-45 | 20-35 | 5-15 |
| | 34-44 | Gravelly sandy loam, gravelly sandy clay loam, gravelly clay loam. | SC, SC-SM | A-2, A-1-b, A-6, A-4 | 0-2 | 2-10 | 70-90 | 60-75 | 40-60 | 20-45 | 20-35 | 5-15 |
| | 44-60 | Gravelly sandy loam, gravelly sandy clay loam, gravelly loamy sand. | SP-SC, SM, SP-SM, SC | A-1-b, A-2, A-4, A-6 | 0-2 | 2-10 | 70-90 | 55-75 | 40-60 | 10-45 | 0-30 | NP-12 |
| Ashlar | 0-3 | 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 | 15-25 | NP-6 |
| | 3-6 | Sandy loam, fine sandy loam, gravelly sandy loam. | GM, SC-SM, GC-GM, SM | A-4, A-2 | 0 | 0-8 | 55-100 | 50-100 | 30-75 | 15-50 | 15-25 | NP-6 |
| | 6-18 | Sandy loam, fine sandy loam, gravelly sandy loam. | SC-SM, GM, SM, GC-GM | A-2, A-4 | 0 | 0-8 | 55-100 | 50-100 | 30-75 | 15-50 | 15-25 | NP-6 |
| | 18-29 | Weathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 29-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Table 14.—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 | |
| RnE: | | | | | | | | | | | | |
| Rion | 0-8 | Gravelly loamy sand. | SM, SP-SM | A-3, A-1-b, A-2 | 0-5 | 2-10 | 70-90 | 55-75 | 40-60 | 8-30 | 0-14 | NP |
| | 8-22 | Gravelly sandy loam, gravelly sandy clay loam, gravelly clay loam. | SC, SC-SM | A-4, A-2, A-1-b, A-6 | 0-2 | 2-10 | 70-90 | 60-75 | 40-60 | 20-45 | 20-35 | 5-15 |
| | 22-34 | Gravelly sandy loam, gravelly sandy clay loam, gravelly clay loam. | SC, SC-SM | A-1-b, A-4, A-2, A-6 | 0-2 | 2-10 | 70-90 | 60-75 | 40-60 | 20-45 | 20-35 | 5-15 |
| | 34-44 | Gravelly sandy loam, gravelly sandy clay loam, gravelly clay loam. | SC-SM, SC | A-4, A-1-b, A-6, A-2 | 0-2 | 2-10 | 70-90 | 60-75 | 40-60 | 20-45 | 20-35 | 5-15 |
| | 44-60 | Gravelly sandy loam, gravelly sandy clay loam, gravelly loamy sand. | SM, SP-SC, SC, SP-SM | A-2, A-1-b, A-4, A-6 | 0-2 | 2-10 | 70-90 | 55-75 | 40-60 | 10-45 | 0-30 | NP-12 |
| Cliffside | 0-7 | Very cobbly sandy loam. | SC, SC-SM, SM | A-2-4, A-1-b, A-4 | 0-15 | 20-40 | 70-85 | 50-65 | 30-60 | 15-50 | 15-35 | NP-10 |
| | 7-16 | Very gravelly sandy loam. | SC-SM, SC, SM | A-1-b, A-2-4, A-4 | 0-15 | 20-40 | 70-85 | 50-65 | 30-60 | 15-50 | 15-35 | NP-10 |
| | 16-30 | Very cobbly sandy clay loam, very gravelly sandy clay loam, very gravelly sandy 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 |
| | 30-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| SaC, SaD: | | | | | | | | | | | | |
| Saw | 0-5 | Gravelly sandy clay loam. | CL, SC | A-4, A-2-4, A-6 | 0-1 | 3-10 | 70-90 | 55-75 | 45-70 | 30-55 | 25-40 | 10-20 |
| | 5-21 | Clay, sandy clay, clay loam. | MH, ML | A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 70-95 | 51-75 | 38-65 | 11-30 |
| | 21-31 | Clay, sandy clay, clay loam. | MH, ML | A-6, A-7 | 0 | 0-5 | 85-100 | 80-100 | 70-95 | 51-75 | 38-65 | 11-30 |
| | 31-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Wake | 0-7 | Loamy sand | GP-GM, GM, SM, SP-SM | A-3, A-1, A-2 | 0 | 0-4 | 60-85 | 80-90 | 30-70 | 5-15 | 10-20 | NP |
| | 7-14 | Sandy loam, fine sandy loam, gravelly sandy loam. | SC-SM, SM, GC-GM, GM | A-2, A-4 | 0 | 0-8 | 55-100 | 50-100 | 30-75 | 15-50 | 15-25 | NP-6 |
| | 14-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Table 14.—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 | |
| TaB, TaC, TaD: | | | | | | | | | | | | |
| Tatum | 0-4 | Gravelly silt loam. | GM, ML, SM | A-4 | --- | 0-10 | 60-80 | 55-75 | 45-75 | 40-70 | 18-32 | NP-10 |
| | 4-13 | Gravelly silty clay loam, silty clay, gravelly clay. | GM, GC, MH, SM | A-7 | --- | 0-10 | 60-100 | 55-95 | 50-95 | 45-90 | 50-80 | 20-45 |
| | 13-31 | Silty clay loam, silty clay, gravelly clay. | GM, GC, MH, SM | A-7 | --- | 0-10 | 60-100 | 55-95 | 50-95 | 45-90 | 50-80 | 20-45 |
| | 31-42 | Silty clay loam, silty clay, gravelly clay. | MH, GC, SM, GM | A-7 | --- | 0-10 | 60-100 | 55-95 | 50-95 | 45-90 | 50-80 | 20-45 |
| | 42-54 | Channery clay loam, channery silt loam, loam. | CL, ML | A-7, A-6 | 0 | 0-10 | 75-100 | 60-90 | 55-85 | 50-85 | 30-50 | 10-20 |
| | 54-62 | Weathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 62-65 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Montonia | 0-3 | Very channery silt loam. | ML, GM, SM | A-4, A-2-4 | 0 | 5-15 | 60-90 | 55-85 | 45-80 | 30-80 | 20-35 | NP-10 |
| | 3-8 | Channery clay loam, channery silt loam, loam. | CL, ML | A-6, A-7 | 0 | 0-10 | 75-100 | 60-90 | 55-85 | 50-85 | 30-50 | 10-20 |
| | 8-19 | Channery loam, channery silty clay loam, channery clay loam. | GC, SC, CL, SM | A-2, A-6, A-7 | 0 | 5-15 | 60-90 | 50-80 | 50-80 | 30-70 | 25-50 | 10-20 |
| | 19-29 | Channery loam, channery silty clay loam, channery clay loam. | GC, SC, CL, SM | A-2, A-7, A-6 | 0 | 5-15 | 60-90 | 50-80 | 50-80 | 30-70 | 25-50 | 10-20 |
| | 29-42 | Weathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 42-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ToA: | | | | | | | | | | | | |
| Toccoa | 0-7 | Sandy loam----- | ML | A-4 | 0 | 0 | 98-100 | 95-100 | 75-90 | 55-80 | 0-30 | NP-4 |
| | 7-17 | Sandy loam, loam. | ML, SM | A-2, A-4 | 0 | 0 | 95-100 | 90-100 | 60-100 | 30-55 | 0-30 | NP-4 |
| | 17-28 | Loamy sand, loamy fine sand, sand. | SP-SM, SM | A-2, A-3 | 0 | 0 | 98-100 | 98-100 | 98-100 | 7-32 | 10-20 | NP |
| | 28-38 | Sandy loam, loam. | SM, SP-SM | A-2, A-3 | 0 | 0 | 98-100 | 98-100 | 98-100 | 7-32 | 10-20 | NP |
| | 38-46 | Gravelly loamy sand, loamy sand, sand. | SM, SP-SM | A-1-b, A-2, A-3 | 0-5 | 2-10 | 70-90 | 55-75 | 40-60 | 8-30 | 0-14 | NP |
| | 46-60 | Silt loam, silty clay loam. | SM, SP-SM | A-2, A-3 | 0 | 0 | 98-100 | 98-100 | 98-100 | 7-32 | 10-20 | NP |

Table 14.—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 | |
| UdC. | | | | | | | | | | | | |
| Udorthents | | | | | | | | | | | | |
| Ur. | | | | | | | | | | | | |
| Urban land | | | | | | | | | | | | |
| UtB: | | | | | | | | | | | | |
| Uwharrie | 0-5 | Silt loam | CL-ML, ML | A-4 | 0 | 0-5 | 90-100 | 90-100 | 85-100 | 60-90 | 25-40 | NP-10 |
| | 5-8 | Silt loam | ML, CL-ML | A-4 | 0 | 0-5 | 90-100 | 90-100 | 85-100 | 60-90 | 25-40 | NP-10 |
| | 8-15 | Silt loam, silty clay loam, clay loam. | MH, ML | A-6, A-4, A-7 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 60-95 | 32-61 | 4-28 |
| | 15-36 | Silty clay, silty clay loam, clay. | CH, MH, CL | A-7 | 0 | 0-5 | 95-100 | 95-100 | 90-100 | 75-95 | 40-80 | 20-40 |
| | 36-50 | Silty clay, silty clay loam, clay loam. | CH, CL, MH | A-6, A-7 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 70-95 | 30-60 | 10-35 |
| | 50-72 | Silt loam, silty clay loam, clay loam. | MH, ML | A-6, A-4, A-7 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 60-95 | 32-61 | 4-28 |
| UuB2: | | | | | | | | | | | | |
| Uwharrie | 0-4 | Silty clay loam | CL-ML, ML | A-4 | 0 | 0-5 | 90-100 | 90-100 | 85-100 | 60-90 | 25-40 | NP-10 |
| | 4-13 | Silt loam, silty clay loam, clay loam. | MH, ML | A-4, A-7, A-6 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 60-95 | 32-61 | 4-28 |
| | 13-39 | Silty clay, silty clay loam, clay. | CH, CL, MH | A-7 | 0 | 0-5 | 95-100 | 95-100 | 90-100 | 75-95 | 40-80 | 20-40 |
| | 39-58 | Silty clay, silty clay loam, clay loam. | CH, MH, CL | A-7, A-6 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 70-95 | 30-60 | 10-35 |
| | 58-72 | Silt loam, silty clay loam, clay loam. | MH, ML | A-6, A-4, A-7 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 60-95 | 32-61 | 4-28 |
| UvC: | | | | | | | | | | | | |
| Uwharrie | 0-5 | Silt loam | CL-ML, ML | A-4 | 0 | 0-5 | 90-100 | 90-100 | 85-100 | 60-90 | 25-40 | NP-10 |
| | 5-8 | Silt loam | ML, CL-ML | A-4 | 0 | 0-5 | 90-100 | 90-100 | 85-100 | 60-90 | 25-40 | NP-10 |
| | 8-15 | Silt loam, silty clay loam, clay loam. | MH, ML | A-6, A-4, A-7 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 60-95 | 32-61 | 4-28 |
| | 15-36 | Silty clay, silty clay loam, clay. | CH, MH, CL | A-7 | 0 | 0-5 | 95-100 | 95-100 | 90-100 | 75-95 | 40-80 | 20-40 |
| | 36-50 | Silty clay, silty clay loam, clay loam. | CH, CL, MH | A-6, A-7 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 70-95 | 30-60 | 10-35 |
| | 50-72 | Silt loam, silty clay loam, clay loam. | MH, ML | A-4, A-6, A-7 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 60-95 | 32-61 | 4-28 |

Table 14.—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 | |
| UvC: | | | | | | | | | | | | |
| Tatum | 0-4 | Gravelly silt loam. | GM, ML, SM | A-4 | --- | 0-10 | 60-80 | 55-75 | 45-75 | 40-70 | 18-32 | NP-10 |
| | 4-13 | Gravelly silty clay loam, silty clay, gravelly clay. | GC, SM, GM, MH | A-7 | --- | 0-10 | 60-100 | 55-95 | 50-95 | 45-90 | 50-80 | 20-45 |
| | 13-31 | Silty clay loam, silty clay, gravelly clay. | GC, GM, SM, MH | A-7 | --- | 0-10 | 60-100 | 55-95 | 50-95 | 45-90 | 50-80 | 20-45 |
| | 31-42 | Silty clay loam, silty clay, gravelly clay. | GM, GC, MH, SM | A-7 | --- | 0-10 | 60-100 | 55-95 | 50-95 | 45-90 | 50-80 | 20-45 |
| | 42-54 | Channery clay loam, channery silt loam, loam. | CL, ML | A-6, A-7 | 0 | 0-10 | 75-100 | 60-90 | 55-85 | 50-85 | 30-50 | 10-20 |
| | 54-62 | Weathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 62-65 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| UwC2: | | | | | | | | | | | | |
| Uwharrie | 0-4 | Silty clay loam | ML, CL-ML | A-4 | 0 | 0-5 | 90-100 | 90-100 | 85-100 | 60-90 | 25-40 | NP-10 |
| | 4-13 | Silt loam, silty clay loam, clay loam. | MH, ML | A-4, A-6, A-7 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 60-95 | 32-61 | 4-28 |
| | 13-39 | Silty clay, silty clay loam, clay. | CH, CL, MH | A-7 | 0 | 0-5 | 95-100 | 95-100 | 90-100 | 75-95 | 40-80 | 20-40 |
| | 39-58 | Silty clay, silty clay loam, clay loam. | CH, MH, CL | A-7, A-6 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 70-95 | 30-60 | 10-35 |
| | 58-72 | Silt loam, silty clay loam, clay loam. | MH, ML | A-4, A-7, A-6 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 60-95 | 32-61 | 4-28 |
| Tatum | 0-4 | Silty clay loam | ML, CL-ML | A-4 | 0 | 0-5 | 90-100 | 90-100 | 85-100 | 60-90 | 25-40 | NP-10 |
| | 4-14 | Silty clay, silty clay loam, clay. | CH, CL, MH | A-7 | 0 | 0-5 | 95-100 | 95-100 | 90-100 | 75-95 | 40-80 | 20-40 |
| | 14-36 | Silty clay loam, silty clay, gravelly clay. | GM, GC, MH, SM | A-7 | --- | 0-10 | 60-100 | 55-95 | 50-95 | 45-90 | 50-80 | 20-45 |
| | 36-47 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 47-60 | Unweathered bedrock. | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Table 14.—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 | |
| UxB: | | | | | | | | | | | | |
| Uwharrie | 0-4 | Silty clay loam | ML, CL-ML | A-4 | 0 | 0-5 | 90-100 | 90-100 | 85-100 | 60-90 | 25-40 | NP-10 |
| | 4-13 | Silt loam, silty clay loam, clay loam. | MH, ML | A-4, A-7, A-6 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 60-95 | 32-61 | 4-28 |
| | 13-39 | Silty clay, silty clay loam, clay. | CH, CL, MH | A-7 | 0 | 0-5 | 95-100 | 95-100 | 90-100 | 75-95 | 40-80 | 20-40 |
| | 39-58 | Silty clay, silty clay loam, clay loam. | CH, MH, CL | A-7, A-6 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 70-95 | 30-60 | 10-35 |
| | 58-72 | Silt loam, silty clay loam, clay loam. | MH, ML | A-4, A-6, A-7 | 0 | 0-5 | 90-100 | 90-100 | 90-100 | 60-95 | 32-61 | 4-28 |
| Urban land. | | | | | | | | | | | | |
| W. | | | | | | | | | | | | |
| Water | | | | | | | | | | | | |
| WeA: | | | | | | | | | | | | |
| Wehadkee | 0-6 | Loam | SM, SC-SM, SC | A-4, A-2 | 0 | 0 | 100 | 95-100 | 60-90 | 30-50 | 20-30 | NP-10 |
| | 6-22 | Silty clay loam, loam, sandy clay loam. | ML, CL, SC, CL-ML | A-7, A-4, A-6 | 0 | 0 | 100 | 99-100 | 85-100 | 45-98 | 25-58 | 6-25 |
| | 22-35 | Silty clay loam, loam, sandy clay loam. | CL, SC, ML, CL-ML | A-6, A-4, A-7 | 0 | 0 | 100 | 99-100 | 85-100 | 45-98 | 25-58 | 6-25 |
| | 35-50 | Loamy sand, sand, sandy loam. | SM, SP-SM | A-3, A-2, A-1 | 0 | 0 | 80-100 | 85-95 | 25-80 | 5-35 | 0-14 | NP |
| | 50-61 | Loamy sand, sand, sandy loam. | SM, SP-SM | A-2, A-3, A-1 | 0 | 0 | 80-100 | 85-95 | 25-80 | 5-35 | 0-14 | NP |

Table 15.—Physical and Chemical 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)

| Map symbol and soil name | Depth | Clay | Moist bulk density | Permeability (Ksat) | Available water capacity | Linear extensibility | Organic matter | Erosion factors | | | Wind erodibility group | Wind erodibility index | Soil reaction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Kw | Kf | T | | | |
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | | pH |
| ApB, ApC: | | | | | | | | | | | | | |
| Appling | 0-9 | 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 | 4.5-6.5 |
| | 9-29 | 35-60 | 1.25-1.45 | 0.57-1.98 | 0.15-0.17 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 29-37 | 35-60 | 1.25-1.45 | 0.57-1.98 | 0.15-0.17 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 37-56 | 20-45 | 1.25-1.45 | 0.57-1.98 | 0.12-0.16 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 56-72 | --- | --- | 0.57-1.98 | --- | --- | --- | --- | --- | | | | --- |
| BuB: | | | | | | | | | | | | | |
| Buncombe | 0-4 | 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 | 4.5-6.5 |
| | 4-10 | 3-12 | 1.60-1.75 | 5.95-19.98 | 0.03-0.07 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | | 4.5-6.5 |
| | 10-29 | 3-12 | 1.60-1.75 | 5.95-19.98 | 0.03-0.07 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | | 4.5-6.5 |
| | 29-43 | 3-12 | 1.60-1.75 | 5.95-19.98 | 0.03-0.07 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | | 4.5-6.5 |
| | 43-60 | 3-12 | 1.60-1.75 | 5.95-19.98 | 0.03-0.07 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | | 4.5-6.5 |
| | 60-72 | 2-19 | 1.40-1.50 | 1.98-5.95 | 0.09-0.12 | 0.0-2.9 | --- | .20 | .20 | | | | 4.5-6.5 |
| CaB2: | | | | | | | | | | | | | |
| Cecil | 0-6 | 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 | 4.5-6.5 |
| | 6-39 | 35-70 | 1.30-1.50 | 0.57-1.98 | 0.13-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 39-65 | 20-45 | 1.25-1.45 | 0.57-1.98 | 0.12-0.16 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 65-72 | 2-19 | 1.40-1.50 | 1.98-5.95 | 0.09-0.12 | 0.0-2.9 | --- | .20 | .20 | | | | 4.5-5.5 |
| CeB: | | | | | | | | | | | | | |
| Cecil | 0-6 | 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 | 4.5-6.5 |
| | 6-39 | 35-70 | 1.30-1.50 | 0.57-1.98 | 0.13-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 39-65 | 20-45 | 1.25-1.45 | 0.57-1.98 | 0.12-0.16 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 65-72 | 2-19 | 1.40-1.50 | 1.98-5.95 | 0.09-0.12 | 0.0-2.9 | --- | .20 | .20 | | | | 4.5-5.5 |
| Urban land. | | | | | | | | | | | | | |
| ChA: | | | | | | | | | | | | | |
| Chewacla | 0-6 | 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 | 4.5-6.5 |
| | 6-15 | 18-35 | 1.30-1.50 | 0.57-1.98 | 0.15-0.24 | 0.0-2.9 | 0.5-2.0 | .32 | .32 | | | | 4.5-6.5 |
| | 15-19 | 18-35 | 1.30-1.50 | 0.57-1.98 | 0.15-0.24 | 0.0-2.9 | 0.5-2.0 | .32 | .32 | | | | 4.5-6.5 |
| | 19-39 | 18-35 | 1.30-1.50 | 0.57-1.98 | 0.15-0.24 | 0.0-2.9 | 0.5-2.0 | .32 | .32 | | | | 4.5-6.5 |
| | 39-50 | 18-35 | 1.30-1.60 | 0.57-1.98 | 0.12-0.20 | 0.0-2.9 | 0.5-2.0 | .28 | .28 | | | | 4.5-6.5 |
| | 50-72 | 18-35 | 1.30-1.60 | 0.57-1.98 | 0.12-0.20 | 0.0-2.9 | 0.5-2.0 | .28 | .28 | | | | 4.5-6.5 |
| CpD, CpE: | | | | | | | | | | | | | |
| Cliffield | 0-4 | 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 | 3.5-5.5 |
| | 4-16 | 10-35 | 1.20-1.60 | 0.57-1.98 | 0.10-0.13 | 0.0-2.9 | 0.5-1.0 | .10 | .28 | | | | 3.5-5.5 |
| | 16-30 | 10-35 | 1.20-1.60 | 0.57-1.98 | 0.10-0.13 | 0.0-2.9 | 0.5-1.0 | .10 | .28 | | | | 3.5-5.5 |
| | 30-60 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| Pigeonroost | 0-5 | 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 | 4.5-6.0 |
| | 5-10 | 8-20 | 1.35-1.60 | 1.98-5.95 | 0.10-0.15 | 0.0-2.9 | 1.0-5.0 | .15 | .24 | | | | 4.5-6.0 |
| | 10-24 | 18-35 | 1.30-1.50 | 0.57-1.98 | 0.12-0.18 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 24-43 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| | 43-60 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |

Table 15.—Physical and Chemical 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 | | | Wind erodibility group | Wind erodibility index | Soil reaction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Kw | Kf | T | | | |
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | | pH |
| CrF: | | | | | | | | | | | | | |
| Cliffield | 0-4 | 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 | 3.5-5.5 |
| | 4-16 | 10-35 | 1.20-1.60 | 0.57-1.98 | 0.10-0.13 | 0.0-2.9 | 0.5-1.0 | .10 | .28 | | | | 3.5-5.5 |
| | 16-30 | 10-35 | 1.20-1.60 | 0.57-1.98 | 0.10-0.13 | 0.0-2.9 | 0.5-1.0 | .10 | .28 | | | | 3.5-5.5 |
| | 30-60 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| Rock outcrop. | | | | | | | | | | | | | |
| DAM. | | | | | | | | | | | | | |
| DAM | | | | | | | | | | | | | |
| DoB: | | | | | | | | | | | | | |
| Dogue | 0-4 | 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 | 3.5-6.5 |
| | 4-7 | 5-10 | 1.35-1.50 | 1.98-5.95 | 0.08-0.15 | 0.0-2.9 | 0.2-0.8 | .28 | .28 | | | | 3.5-5.5 |
| | 7-25 | 35-50 | 1.45-1.60 | 0.20-0.57 | 0.12-0.19 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | | 3.5-5.5 |
| | 25-36 | 35-50 | 1.45-1.60 | 0.20-0.57 | 0.12-0.19 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | | 3.5-5.5 |
| | 36-50 | 18-35 | 1.30-1.60 | 0.57-1.98 | 0.12-0.20 | 0.0-2.9 | 0.5-2.0 | .28 | .28 | | | | 3.5-5.5 |
| | 50-60 | 2-16 | 1.30-1.55 | 5.95-19.98 | 0.06-0.09 | 0.0-2.9 | 0.5-1.0 | .15 | .20 | | | | 3.5-5.5 |
| EvD, EvE, EwF: | | | | | | | | | | | | | |
| Evard | 0-6 | 5-20 | 1.40-1.65 | 1.98-5.95 | 0.10-0.15 | 0.0-2.9 | 0.5-2.0 | .24 | .24 | 5 | 8 | 0 | 4.5-6.0 |
| | 6-31 | 18-35 | 1.30-1.50 | 0.57-1.98 | 0.15-0.18 | 0.0-2.9 | 0.0-0.5 | .24 | .28 | | | | 4.5-6.0 |
| | 31-43 | 12-20 | 1.20-1.40 | 0.57-1.98 | 0.08-0.18 | 0.0-2.9 | 0.0-0.5 | .24 | .28 | | | | 4.5-6.0 |
| | 43-61 | 5-20 | 1.20-1.40 | 0.57-1.98 | 0.05-0.17 | 0.0-2.9 | 0.0-0.5 | .24 | .32 | | | | 4.5-6.0 |
| 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 | 3.5-5.5 |
| | 5-10 | 18-35 | 1.30-1.60 | 0.57-1.98 | 0.12-0.18 | 0.0-2.9 | 0.5-1.0 | .24 | .28 | | | | 3.5-5.5 |
| | 10-28 | 18-35 | 1.30-1.60 | 0.57-1.98 | 0.12-0.18 | 0.0-2.9 | 0.5-1.0 | .24 | .28 | | | | 3.5-5.5 |
| | 28-35 | 18-35 | 1.30-1.60 | 0.57-1.98 | 0.12-0.18 | 0.0-2.9 | 0.5-1.0 | .24 | .28 | | | | 3.5-5.5 |
| | 35-60 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| GrD, GvE: | | | | | | | | | | | | | |
| Grover | 0-5 | 7-20 | 1.30-1.50 | 1.98-5.95 | 0.07-0.12 | 0.0-2.9 | 0.5-2.0 | .20 | .32 | 3 | 3 | 86 | 4.5-5.5 |
| | 5-13 | 5-10 | 1.35-1.50 | 1.98-5.95 | 0.08-0.15 | 0.0-2.9 | 0.2-0.8 | .28 | .28 | | | | 4.5-5.5 |
| | 13-27 | 18-35 | 1.25-1.40 | 0.57-1.98 | 0.12-0.14 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 27-35 | 10-30 | 1.60-1.70 | 0.57-1.98 | 0.10-0.14 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 35-57 | 10-30 | 1.60-1.70 | 0.57-1.98 | 0.10-0.14 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 57-72 | 10-30 | 1.60-1.70 | 0.57-1.98 | 0.10-0.14 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| HeB: | | | | | | | | | | | | | |
| Helena | 0-7 | 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 | 3.5-6.5 |
| | 7-14 | 5-20 | 1.58-1.62 | 1.98-5.95 | 0.10-0.12 | 0.0-2.9 | 0.2-0.8 | .24 | .24 | | | | 3.5-5.5 |
| | 14-26 | 35-60 | 1.44-1.55 | 0.06-0.20 | 0.13-0.15 | 6.0-8.9 | 0.0-0.5 | .28 | .28 | | | | 3.5-5.5 |
| | 26-50 | 35-60 | 1.44-1.55 | 0.06-0.20 | 0.13-0.15 | 6.0-8.9 | 0.0-0.5 | .28 | .28 | | | | 3.5-5.5 |
| | 50-56 | 35-60 | 1.44-1.55 | 0.06-0.20 | 0.13-0.15 | 6.0-8.9 | 0.0-0.5 | .28 | .28 | | | | 3.5-5.5 |
| | 56-60 | 20-35 | 1.46-1.56 | 0.20-0.57 | 0.13-0.15 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | | 3.5-5.5 |
| Worsham | 0-5 | 10-20 | 1.25-1.55 | 1.98-5.95 | 0.10-0.15 | 0.0-2.9 | 1.0-2.0 | .28 | .28 | 4 | 3 | 86 | 4.5-6.5 |
| | 5-12 | 10-40 | 1.20-1.50 | 0.20-0.57 | 0.08-0.19 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 12-20 | 30-55 | 1.35-1.65 | 0.00-0.06 | 0.10-0.16 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 20-55 | 30-55 | 1.35-1.65 | 0.00-0.06 | 0.10-0.16 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 55-60 | 10-40 | 1.20-1.50 | 0.20-0.57 | 0.08-0.19 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| HhB, HtC: | | | | | | | | | | | | | |
| Hulett | 0-8 | 7-20 | 1.20-1.50 | 5.95-19.98 | 0.07-0.09 | 0.0-2.9 | 0.5-2.0 | .15 | .24 | 4 | 8 | 0 | 4.5-6.0 |
| | 8-19 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.13-0.16 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 19-27 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.13-0.16 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 27-37 | 20-45 | 1.25-1.45 | 0.57-1.98 | 0.12-0.16 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 37-56 | 10-25 | 1.20-1.50 | 0.00-0.57 | 0.08-0.15 | 0.0-2.9 | 0.0-0.2 | .28 | --- | | | | --- |
| | 56-72 | 10-25 | 1.20-1.50 | 0.00-0.57 | 0.08-0.15 | 0.0-2.9 | 0.0-0.2 | .28 | --- | | | | --- |

Table 15.—Physical and Chemical 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 | | | Wind erodibility group | Wind erodibility index | Soil reaction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Kw | Kf | T | | | |
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | | pH |
| HuC: | | | | | | | | | | | | | |
| Hulett | 0-8 | 7-20 | 1.20-1.50 | 5.95-19.98 | 0.07-0.09 | 0.0-2.9 | 0.5-2.0 | .15 | .24 | 4 | 8 | 0 | 4.5-6.0 |
| | 8-19 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.13-0.16 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 19-27 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.13-0.16 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 27-37 | 20-45 | 1.25-1.45 | 0.57-1.98 | 0.12-0.16 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 37-56 | 10-25 | 1.20-1.50 | 0.00-0.57 | 0.08-0.15 | 0.0-2.9 | 0.0-0.2 | .28 | --- | | | | --- |
| | 56-72 | 10-25 | 1.20-1.50 | 0.00-0.57 | 0.08-0.15 | 0.0-2.9 | 0.0-0.2 | .28 | --- | | | | --- |
| Saw | 0-5 | 20-35 | 1.20-1.50 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.5-2.0 | .20 | .32 | 2 | 3 | 86 | 4.5-6.5 |
| | 5-21 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 21-31 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 31-60 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |
| HwB: | | | | | | | | | | | | | |
| Hulett | 0-8 | 7-20 | 1.20-1.50 | 5.95-19.98 | 0.07-0.09 | 0.0-2.9 | 0.5-2.0 | .15 | .24 | 4 | 8 | 0 | 4.5-6.0 |
| | 8-19 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.13-0.16 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 19-27 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.13-0.16 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 27-37 | 20-45 | 1.25-1.45 | 0.57-1.98 | 0.12-0.16 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 37-56 | 10-25 | 1.20-1.50 | 0.00-0.57 | 0.08-0.15 | 0.0-2.9 | 0.0-0.2 | .28 | --- | | | | --- |
| | 56-72 | 10-25 | 1.20-1.50 | 0.00-0.57 | 0.08-0.15 | 0.0-2.9 | 0.0-0.2 | .28 | --- | | | | --- |
| Urban land. | | | | | | | | | | | | | |
| MaB2: | | | | | | | | | | | | | |
| Madison | 0-6 | 20-35 | 1.20-1.50 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.5-2.0 | .20 | .32 | 3 | 5 | 56 | 4.5-6.5 |
| | 6-24 | 30-60 | 1.20-1.40 | 0.57-1.98 | 0.13-0.18 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 24-37 | 30-60 | 1.20-1.40 | 0.57-1.98 | 0.13-0.18 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 37-50 | 15-35 | 1.30-1.40 | 0.57-1.98 | 0.12-0.16 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 50-72 | 8-20 | 1.30-1.50 | 0.57-1.98 | 0.10-0.14 | 0.0-2.9 | 0.0-0.2 | .37 | .37 | | | | 4.5-6.0 |
| MaC2: | | | | | | | | | | | | | |
| Madison | 0-6 | 20-35 | 1.20-1.50 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.5-2.0 | .20 | .32 | 3 | 6 | 48 | 4.5-6.5 |
| | 6-24 | 30-60 | 1.20-1.40 | 0.57-1.98 | 0.13-0.18 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 24-37 | 30-60 | 1.20-1.40 | 0.57-1.98 | 0.13-0.18 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 37-50 | 15-35 | 1.30-1.40 | 0.57-1.98 | 0.12-0.16 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 50-72 | 8-20 | 1.30-1.50 | 0.57-1.98 | 0.10-0.14 | 0.0-2.9 | 0.0-0.2 | .37 | .37 | | | | 4.5-6.0 |
| MbB2, McC2: | | | | | | | | | | | | | |
| Madison | 0-6 | 20-35 | 1.20-1.50 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.5-2.0 | .20 | .32 | 3 | 5 | 56 | 4.5-6.5 |
| | 6-24 | 30-60 | 1.20-1.40 | 0.57-1.98 | 0.13-0.18 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 24-37 | 30-60 | 1.20-1.40 | 0.57-1.98 | 0.13-0.18 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 37-50 | 15-35 | 1.30-1.40 | 0.57-1.98 | 0.12-0.16 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 50-72 | 8-20 | 1.30-1.50 | 0.57-1.98 | 0.10-0.14 | 0.0-2.9 | 0.0-0.2 | .37 | .37 | | | | 4.5-6.0 |
| Bethlehem | 0-8 | 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 | 4.5-6.5 |
| | 8-30 | 35-60 | 1.25-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .32 | | | | 4.5-5.5 |
| | 30-34 | 20-35 | 1.40-1.60 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.0-0.5 | .20 | .28 | | | | 4.5-5.5 |
| | 34-45 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| | 45-60 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |
| MnB: | | | | | | | | | | | | | |
| Madison | 0-6 | 20-35 | 1.20-1.50 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.5-2.0 | .20 | .32 | 3 | 5 | 56 | 4.5-6.5 |
| | 6-24 | 30-60 | 1.20-1.40 | 0.57-1.98 | 0.13-0.18 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 24-37 | 30-60 | 1.20-1.40 | 0.57-1.98 | 0.13-0.18 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 37-50 | 15-35 | 1.30-1.40 | 0.57-1.98 | 0.12-0.16 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-6.0 |
| | 50-72 | 8-20 | 1.30-1.50 | 0.57-1.98 | 0.10-0.14 | 0.0-2.9 | 0.0-0.2 | .37 | .37 | | | | 4.5-6.0 |

Table 15.—Physical and Chemical 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 | | | Wind erodibility group | Wind erodibility index | Soil reaction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Kw | Kf | T | | | |
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | | pH |
| MnB: | | | | | | | | | | | | | |
| Bethlehem----- | 0-5 | 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 | 4.5-6.5 |
| | 5-18 | 35-60 | 1.25-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .32 | | | | 4.5-5.5 |
| | 18-27 | 20-35 | 1.40-1.60 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.0-0.5 | .20 | .28 | | | | 4.5-5.5 |
| | 27-60 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| | 60-65 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |
| Urban land. | | | | | | | | | | | | | |
| MoE: | | | | | | | | | | | | | |
| Montonia------ | 0-3 | 5-20 | 1.40-1.60 | 0.57-1.98 | 0.12-0.18 | 0.0-2.9 | 0.5-3.0 | .15 | .37 | 3 | 8 | 0 | 4.5-6.5 |
| | 3-8 | 20-35 | 1.30-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.0-0.5 | .20 | .32 | | | | 4.5-6.5 |
| | 8-19 | 10-35 | 1.30-1.60 | 0.57-1.98 | 0.12-0.18 | 0.0-2.9 | 0.0-0.5 | .20 | .32 | | | | 4.5-6.0 |
| | 19-29 | 10-35 | 1.30-1.60 | 0.57-1.98 | 0.12-0.18 | 0.0-2.9 | 0.0-0.5 | .20 | .32 | | | | 4.5-6.0 |
| | 29-42 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| | 42-60 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |
| PaC2, PaD2: | | | | | | | | | | | | | |
| Pacolet------- | 0-7 | 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 | 4.5-6.5 |
| | 7-28 | 35-65 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 28-44 | 15-30 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 44-60 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 60-72 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| PbB2, PbC2: | | | | | | | | | | | | | |
| Pacolet------- | 0-7 | 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 | 4 | 86 | 4.5-6.5 |
| | 7-28 | 35-65 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 28-44 | 15-30 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 44-60 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 60-72 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| Bethlehem----- | 0-8 | 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 | 4.5-6.5 |
| | 8-30 | 35-60 | 1.25-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .32 | | | | 4.5-5.5 |
| | 30-34 | 20-35 | 1.40-1.60 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.0-0.5 | .20 | .28 | | | | 4.5-5.5 |
| | 34-45 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| | 45-60 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |
| PbD2: | | | | | | | | | | | | | |
| Pacolet------- | 0-8 | 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 | 4 | 86 | 4.5-6.5 |
| | 8-27 | 35-65 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 27-50 | 15-30 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 50-72 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| Bethlehem----- | 0-8 | 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 | 4.5-6.5 |
| | 8-30 | 35-60 | 1.25-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .32 | | | | 4.5-5.5 |
| | 30-34 | 20-35 | 1.40-1.60 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.0-0.5 | .20 | .28 | | | | 4.5-5.5 |
| | 34-45 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| | 45-60 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |
| PeD: | | | | | | | | | | | | | |
| Pacolet------- | 0-8 | 20-35 | 1.30-1.50 | 0.57-1.98 | 0.10-0.14 | 0.0-2.9 | 0.5-1.0 | .24 | .24 | 3 | 4 | 86 | 4.5-6.5 |
| | 8-27 | 35-65 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 27-50 | 15-30 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 50-72 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| Bethlehem----- | 0-8 | 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 | 4.5-6.5 |
| | 8-30 | 35-60 | 1.25-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .32 | | | | 4.5-5.5 |
| | 30-34 | 20-35 | 1.40-1.60 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.0-0.5 | .20 | .28 | | | | 4.5-5.5 |
| | 34-45 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| | 45-60 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |

Table 15.—Physical and Chemical 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 | | | Wind erodibility group | Wind erodibility index | Soil reaction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Kw | Kf | T | | | |
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | | pH |
| PrB, PrC: | | | | | | | | | | | | | |
| Pacolet | 0-7 | 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 | 4 | 86 | 4.5-6.5 |
| | 7-28 | 35-65 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 28-44 | 15-30 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 44-60 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 60-72 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| Bethlehem | 0-8 | 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 | 4.5-6.5 |
| | 8-30 | 35-60 | 1.25-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .32 | | | | 4.5-5.5 |
| | 30-34 | 20-35 | 1.40-1.60 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.0-0.5 | .20 | .28 | | | | 4.5-5.5 |
| | 34-45 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| | 45-60 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |
| Urban land. | | | | | | | | | | | | | |
| PsB2: | | | | | | | | | | | | | |
| Pacolet | 0-7 | 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 | 4 | 86 | 4.5-6.5 |
| | 7-28 | 35-65 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 28-44 | 15-30 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 44-60 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 60-72 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| Saw | 0-5 | 20-35 | 1.20-1.50 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.5-2.0 | .20 | .32 | 2 | 5 | 56 | 4.5-6.5 |
| | 5-21 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 21-31 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 31-60 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |
| PsC2: | | | | | | | | | | | | | |
| Pacolet | 0-8 | 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 | 4 | 86 | 4.5-6.5 |
| | 8-27 | 35-65 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 27-50 | 15-30 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 50-72 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| Saw | 0-5 | 20-35 | 1.20-1.50 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.5-2.0 | .20 | .32 | 2 | 5 | 56 | 4.5-6.5 |
| | 5-21 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 21-31 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 31-60 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |
| PtD: | | | | | | | | | | | | | |
| Pacolet | 0-7 | 20-35 | 1.30-1.50 | 0.57-1.98 | 0.10-0.14 | 0.0-2.9 | 0.5-1.0 | .24 | .24 | 3 | 4 | 86 | 4.5-6.5 |
| | 7-28 | 35-65 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 28-44 | 15-30 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 44-60 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 60-72 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| Saw | 0-5 | 20-35 | 1.20-1.50 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.5-2.0 | .20 | .32 | 2 | 3 | 86 | 4.5-6.5 |
| | 5-21 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 21-31 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 31-60 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |
| PuC: | | | | | | | | | | | | | |
| Pacolet | 0-7 | 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 | 4.5-6.5 |
| | 7-28 | 35-65 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 28-44 | 15-30 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 44-60 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 60-72 | 10-25 | 1.20-1.50 | 0.57-1.98 | 0.08-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| Urban land. | | | | | | | | | | | | | |

Table 15.—Physical and Chemical 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 | | | Wind erodibility group | Wind erodibility index | Soil reaction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Kw | Kf | T | | | |
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | | pH |
| Pw: | | | | | | | | | | | | | |
| Pits | 0-60 | 0-0 | --- | 0.00-0.00 | 0.00-0.00 | --- | --- | --- | --- | - | 8 | 0 | --- |
| RaE: | | | | | | | | | | | | | |
| Rion | 0-8 | 2-15 | 1.30-1.50 | 1.98-5.95 | 0.05-0.07 | 0.0-2.9 | 0.5-2.0 | .15 | .32 | 3 | 2 | 134 | 4.5-6.5 |
| | 8-22 | 18-35 | 1.30-1.50 | 0.57-1.98 | 0.07-0.14 | 0.0-2.9 | 0.0-0.5 | .17 | .37 | | | | 4.5-6.5 |
| | 22-34 | 18-35 | 1.30-1.50 | 0.57-1.98 | 0.07-0.14 | 0.0-2.9 | 0.0-0.5 | .17 | .37 | | | | 4.5-6.5 |
| | 34-44 | 18-35 | 1.30-1.50 | 0.57-1.98 | 0.07-0.14 | 0.0-2.9 | 0.0-0.5 | .17 | .37 | | | | 4.5-6.5 |
| | 44-60 | 2-20 | 1.30-1.50 | 1.98-5.95 | 0.05-0.11 | 0.0-2.9 | 0.0-0.5 | .17 | .32 | | | | 4.5-6.5 |
| Ashlar | 0-3 | 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 | 4.5-6.0 |
| | 3-6 | 5-15 | 1.30-1.55 | 1.98-5.95 | 0.04-0.14 | 0.0-2.9 | 0.0-0.5 | .24 | .28 | | | | 4.5-6.0 |
| | 6-18 | 5-15 | 1.30-1.55 | 1.98-5.95 | 0.04-0.14 | 0.0-2.9 | 0.0-0.5 | .24 | .28 | | | | 3.5-5.5 |
| | 18-29 | --- | --- | 0.00-5.95 | --- | --- | --- | --- | --- | | | | --- |
| | 29-60 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |
| RnE: | | | | | | | | | | | | | |
| Rion | 0-8 | 2-15 | 1.30-1.50 | 1.98-5.95 | 0.05-0.07 | 0.0-2.9 | 0.5-2.0 | .15 | .32 | 3 | 2 | 134 | 4.5-6.5 |
| | 8-22 | 18-35 | 1.30-1.50 | 0.57-1.98 | 0.07-0.14 | 0.0-2.9 | 0.0-0.5 | .17 | .37 | | | | 4.5-6.5 |
| | 22-34 | 18-35 | 1.30-1.50 | 0.57-1.98 | 0.07-0.14 | 0.0-2.9 | 0.0-0.5 | .17 | .37 | | | | 4.5-6.5 |
| | 34-44 | 18-35 | 1.30-1.50 | 0.57-1.98 | 0.07-0.14 | 0.0-2.9 | 0.0-0.5 | .17 | .37 | | | | 4.5-6.5 |
| | 44-60 | 2-20 | 1.30-1.50 | 1.98-5.95 | 0.05-0.11 | 0.0-2.9 | 0.0-0.5 | .17 | .32 | | | | 4.5-6.5 |
| Cliffside | 0-7 | 7-20 | 1.30-1.60 | 1.98-5.95 | 0.06-0.12 | 0.0-2.9 | 0.5-2.0 | .10 | .24 | 2 | 3 | 86 | 4.5-5.5 |
| | 7-16 | 7-20 | 1.30-1.60 | 1.98-5.95 | 0.06-0.12 | 0.0-2.9 | 0.5-1.0 | .10 | .24 | | | | 4.5-5.5 |
| | 16-30 | 10-35 | 1.25-1.60 | 0.57-1.98 | 0.10-0.13 | 0.0-2.9 | 0.0-0.5 | .10 | .28 | | | | 4.5-5.5 |
| | 30-60 | --- | --- | 0.06-0.20 | --- | --- | --- | --- | --- | | | | --- |
| SaC, SaD: | | | | | | | | | | | | | |
| Saw | 0-5 | 20-35 | 1.20-1.50 | 0.57-1.98 | 0.08-0.12 | 0.0-2.9 | 0.5-2.0 | .20 | .32 | 2 | 3 | 86 | 4.5-6.5 |
| | 5-21 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 21-31 | 35-60 | 1.30-1.50 | 0.57-1.98 | 0.12-0.15 | 0.0-2.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-6.0 |
| | 31-60 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |
| Wake | 0-7 | 3-12 | 1.65-1.80 | 5.95-19.98 | 0.03-0.08 | 0.0-2.9 | 0.5-1.0 | .15 | .20 | 1 | 2 | 134 | 4.5-6.5 |
| | 7-14 | 5-15 | 1.30-1.55 | 1.98-5.95 | 0.04-0.14 | 0.0-2.9 | 0.0-0.5 | .24 | .28 | | | | 4.5-6.0 |
| | 14-60 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| TaB, TaC, TaD: | | | | | | | | | | | | | |
| Tatum | 0-4 | 12-27 | 1.10-1.40 | 0.57-1.98 | 0.10-0.17 | 0.0-2.9 | 0.5-2.0 | .20 | .37 | 4 | 3 | 86 | 4.5-6.5 |
| | 4-13 | 27-60 | 1.40-1.45 | 0.57-1.98 | 0.08-0.12 | 3.0-5.9 | 0.0-0.5 | .28 | .32 | | | | 4.5-5.5 |
| | 13-31 | 27-60 | 1.40-1.45 | 0.57-1.98 | 0.08-0.12 | 3.0-5.9 | 0.0-0.5 | .28 | .32 | | | | 4.5-5.5 |
| | 31-42 | 27-60 | 1.40-1.45 | 0.57-1.98 | 0.08-0.12 | 3.0-5.9 | 0.0-0.0 | .28 | .32 | | | | 4.5-5.5 |
| | 42-54 | 20-35 | 1.30-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.0-0.0 | .20 | .32 | | | | 4.5-5.5 |
| | 54-62 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| | 62-65 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| Montonia | 0-3 | 5-20 | 1.40-1.60 | 0.57-1.98 | 0.12-0.18 | 0.0-2.9 | 0.5-3.0 | .15 | .37 | 3 | 5 | 56 | 4.5-6.5 |
| | 3-8 | 20-35 | 1.30-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.0-0.5 | .20 | .32 | | | | 4.5-6.5 |
| | 8-19 | 10-35 | 1.30-1.60 | 0.57-1.98 | 0.12-0.18 | 0.0-2.9 | 0.0-0.5 | .20 | .32 | | | | 4.5-6.0 |
| | 19-29 | 10-35 | 1.30-1.60 | 0.57-1.98 | 0.12-0.18 | 0.0-2.9 | 0.0-0.5 | .20 | .32 | | | | 4.5-6.0 |
| | 29-42 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| | 42-60 | --- | --- | 0.00-0.01 | --- | --- | --- | --- | --- | | | | --- |

Table 15.—Physical and Chemical 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 | | | Wind erodibility group | Wind erodibility index | Soil reaction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Kw | Kf | T | | | |
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | | pH |
| ToA: | | | | | | | | | | | | | |
| Toccoa | 0-7 | 7-17 | 1.35-1.45 | 1.98-5.95 | 0.09-0.12 | 0.0-2.9 | 1.0-2.0 | .24 | .24 | 5 | 5 | 56 | 5.1-6.5 |
| | 7-17 | 2-19 | 1.40-1.50 | 1.98-5.95 | 0.09-0.12 | 0.0-2.9 | --- | .20 | .20 | | | | 5.1-6.5 |
| | 17-28 | 3-12 | 1.60-1.75 | 5.95-19.98 | 0.03-0.07 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | | 5.1-6.5 |
| | 28-38 | 3-12 | 1.60-1.75 | 5.95-19.98 | 0.03-0.07 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | | 5.1-6.5 |
| | 38-46 | 2-15 | 1.30-1.50 | 1.98-5.95 | 0.05-0.07 | 0.0-2.9 | 0.5-2.0 | .15 | .32 | | | | 5.1-6.5 |
| | 46-60 | 3-12 | 1.60-1.75 | 5.95-19.98 | 0.03-0.07 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | | 5.1-6.5 |
| UdC. | | | | | | | | | | | | | |
| Udorthents | | | | | | | | | | | | | |
| Ur. | | | | | | | | | | | | | |
| Urban land | | | | | | | | | | | | | |
| UtB: | | | | | | | | | | | | | |
| Uwharrie | 0-5 | 10-27 | 1.20-1.45 | 0.57-1.98 | 0.16-0.20 | 0.0-2.9 | 1.0-3.0 | .43 | .43 | 4 | 5 | 56 | 4.5-6.5 |
| | 5-8 | 10-27 | 1.20-1.45 | 0.57-1.98 | 0.16-0.20 | 0.0-2.9 | 0.5-1.0 | .43 | .43 | | | | 4.5-5.5 |
| | 8-15 | 15-35 | 1.20-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.2-0.8 | .32 | .32 | | | | 4.5-5.5 |
| | 15-36 | 35-60 | 1.25-1.55 | 0.57-1.98 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-5.5 |
| | 36-50 | 27-50 | 1.30-1.60 | 0.57-1.98 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 50-72 | 15-35 | 1.20-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-5.5 |
| UuB2: | | | | | | | | | | | | | |
| Uwharrie | 0-4 | 10-27 | 1.20-1.45 | 0.57-1.98 | 0.16-0.20 | 0.0-2.9 | 1.0-3.0 | .43 | .43 | 3 | 6 | 48 | 4.5-6.5 |
| | 4-13 | 15-35 | 1.20-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.2-0.8 | .32 | .32 | | | | 4.5-5.5 |
| | 13-39 | 35-60 | 1.25-1.55 | 0.57-1.98 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-5.5 |
| | 39-58 | 27-50 | 1.30-1.60 | 0.57-1.98 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 58-72 | 15-35 | 1.20-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-5.5 |
| UvC: | | | | | | | | | | | | | |
| Uwharrie | 0-5 | 10-27 | 1.20-1.45 | 0.57-1.98 | 0.16-0.20 | 0.0-2.9 | 1.0-3.0 | .43 | .43 | 4 | 5 | 56 | 4.5-6.5 |
| | 5-8 | 10-27 | 1.20-1.45 | 0.57-1.98 | 0.16-0.20 | 0.0-2.9 | 0.5-1.0 | .43 | .43 | | | | 4.5-5.5 |
| | 8-15 | 15-35 | 1.20-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.2-0.8 | .32 | .32 | | | | 4.5-5.5 |
| | 15-36 | 35-60 | 1.25-1.55 | 0.57-1.98 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-5.5 |
| | 36-50 | 27-50 | 1.30-1.60 | 0.57-1.98 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 50-72 | 15-35 | 1.20-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-5.5 |
| Tatum | 0-4 | 12-27 | 1.10-1.40 | 0.57-1.98 | 0.10-0.17 | 0.0-2.9 | 0.5-2.0 | .20 | .37 | 4 | 3 | 86 | 4.5-6.5 |
| | 4-13 | 27-60 | 1.40-1.45 | 0.57-1.98 | 0.08-0.12 | 3.0-5.9 | 0.0-0.5 | .28 | .32 | | | | 4.5-5.5 |
| | 13-31 | 27-60 | 1.40-1.45 | 0.57-1.98 | 0.08-0.12 | 3.0-5.9 | 0.0-0.5 | .28 | .32 | | | | 4.5-5.5 |
| | 31-42 | 27-60 | 1.40-1.45 | 0.57-1.98 | 0.08-0.12 | 3.0-5.9 | 0.0-0.0 | .28 | .32 | | | | 4.5-5.5 |
| | 42-54 | 20-35 | 1.30-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.0-0.0 | .20 | .32 | | | | 4.5-5.5 |
| | 54-62 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| | 62-65 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| UwC2: | | | | | | | | | | | | | |
| Uwharrie | 0-4 | 10-27 | 1.20-1.45 | 0.57-1.98 | 0.16-0.20 | 0.0-2.9 | 1.0-3.0 | .43 | .43 | 3 | 6 | 48 | 4.5-6.5 |
| | 4-13 | 15-35 | 1.20-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.2-0.8 | .32 | .32 | | | | 4.5-5.5 |
| | 13-39 | 35-60 | 1.25-1.55 | 0.57-1.98 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-5.5 |
| | 39-58 | 27-50 | 1.30-1.60 | 0.57-1.98 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 58-72 | 15-35 | 1.20-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-5.5 |
| Tatum | 0-4 | 10-27 | 1.20-1.45 | 0.57-1.98 | 0.16-0.20 | 0.0-2.9 | 1.0-3.0 | .43 | .43 | 3 | 6 | 48 | 4.5-6.5 |
| | 4-14 | 35-60 | 1.25-1.55 | 0.57-1.98 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-5.5 |
| | 14-36 | 27-60 | 1.40-1.45 | 0.57-1.98 | 0.08-0.12 | 3.0-5.9 | 0.0-0.5 | .28 | .32 | | | | 4.5-5.5 |
| | 36-47 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |
| | 47-60 | --- | --- | 0.00-0.06 | --- | --- | --- | --- | --- | | | | --- |

Table 15.—Physical and Chemical 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 | | | Wind erodibility group | Wind erodibility index | Soil reaction |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Kw | Kf | T | | | |
| | In | Pct | g/cc | In/hr | In/in | Pct | Pct | | | | | | pH |
| UxB: | | | | | | | | | | | | | |
| Uwharrie | 0-4 | 10-27 | 1.20-1.45 | 0.57-1.98 | 0.16-0.20 | 0.0-2.9 | 1.0-3.0 | .43 | .43 | 3 | 6 | 48 | 4.5-6.5 |
| | 4-13 | 15-35 | 1.20-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.2-0.8 | .32 | .32 | | | | 4.5-5.5 |
| | 13-39 | 35-60 | 1.25-1.55 | 0.57-1.98 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-5.5 |
| | 39-58 | 27-50 | 1.30-1.60 | 0.57-1.98 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | | 4.5-5.5 |
| | 58-72 | 15-35 | 1.20-1.50 | 0.57-1.98 | 0.14-0.19 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | | 4.5-5.5 |
| Urban land. | | | | | | | | | | | | | |
| W. | | | | | | | | | | | | | |
| Water | | | | | | | | | | | | | |
| 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 | 4.5-7.3 |
| | 6-22 | 18-35 | 1.30-1.50 | 0.57-1.98 | 0.16-0.20 | 0.0-2.9 | 0.0-2.0 | .32 | .32 | | | | 4.5-7.3 |
| | 22-35 | 18-35 | 1.30-1.50 | 0.57-1.98 | 0.16-0.20 | 0.0-2.9 | 0.0-2.0 | .32 | .32 | | | | 4.5-7.3 |
| | 35-50 | 2-16 | 1.30-1.55 | 5.95-19.98 | 0.06-0.09 | 0.0-2.9 | 0.5-1.0 | .15 | .20 | | | | 4.5-7.3 |
| | 50-61 | 2-16 | 1.30-1.55 | 5.95-19.98 | 0.06-0.09 | 0.0-2.9 | 1.0-3.0 | .15 | .20 | | | | 4.5-7.3 |

**Table 16.—Water Features**

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

| Map symbol and soil name | Hydrologic group | Month | Water table | | Flooding | |
|---|---|---|---|---|---|---|
| | | | Upper limit | Lower limit | Duration | Frequency |
| | | | Ft | Ft | | |
| ApB, ApC: | | | | | | |
| Appling | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| BuB: | | | | | | |
| Buncombe | A | | | | | |
| | | January | --- | --- | Very brief | Rare |
| | | February | --- | --- | Very brief | Rare |
| | | March | --- | --- | Very brief | Rare |
| | | April | --- | --- | Very brief | Rare |
| | | May | --- | --- | Very brief | Rare |
| | | June | --- | --- | Very brief | Rare |
| | | July | --- | --- | Very brief | Rare |
| | | August | --- | --- | Very brief | Rare |
| | | September | --- | --- | Very brief | Rare |
| | | October | --- | --- | Very brief | Rare |
| | | November | --- | --- | Very brief | Rare |
| | | December | --- | --- | Very brief | Rare |
| CaB2: | | | | | | |
| Cecil | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| CeB: | | | | | | |
| Cecil | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Urban land | --- | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| ChA: | | | | | | |
| Chewacla | C | | | | | |
| | | January | 0.5-2.0 | >6.0 | Brief | Occasional |
| | | February | 0.5-2.0 | >6.0 | Brief | Occasional |
| | | March | 0.5-2.0 | >6.0 | Brief | Occasional |
| | | April | 0.5-2.0 | >6.0 | Brief | Occasional |
| | | May | 0.5-2.0 | >6.0 | Very brief | Rare |
| | | June | 1.5-2.0 | >6.0 | Very brief | Rare |
| | | July | 3.0-4.0 | >6.0 | Very brief | Rare |
| | | August | 3.3-4.5 | >6.0 | Very brief | Rare |
| | | September | 3.3-4.5 | >6.0 | Very brief | Rare |
| | | October | 1.5-2.0 | >6.0 | Very brief | Rare |
| | | November | 0.5-2.0 | >6.0 | Brief | Occasional |
| | | December | 0.5-2.0 | >6.0 | Brief | Occasional |
| CpD, CpE: | | | | | | |
| Cliffield | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Pigeonroost | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |

Table 16.—Water Features—Continued

| Map symbol and soil name | Hydrologic group | Month | Water table | | Flooding | |
|---|---|---|---|---|---|---|
| | | | Upper limit | Lower limit | Duration | Frequency |
| | | | Ft | Ft | | |
| CrF: | | | | | | |
| Cliffield | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Rock outcrop | --- | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| DAM: | | | | | | |
| Dam | --- | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| DoB: | | | | | | |
| Dogue | C | | | | | |
| | | January | 1.5-3.0 | >6.0 | Brief | Rare |
| | | February | 1.5-3.0 | >6.0 | Brief | Rare |
| | | March | 1.5-3.0 | >6.0 | Brief | Rare |
| | | April | 2.0-3.0 | >6.0 | Brief | Rare |
| | | May | 2.5-3.0 | >6.0 | Very brief | Rare |
| | | June | 4.0-6.0 | >6.0 | Very brief | Rare |
| | | July | --- | --- | Very brief | Rare |
| | | August | --- | --- | Very brief | Rare |
| | | September | --- | --- | Very brief | Rare |
| | | October | 4.0-6.0 | >6.0 | Very brief | Rare |
| | | November | 2.0-3.0 | >6.0 | Brief | Rare |
| | | December | 1.5-3.0 | >6.0 | Brief | Rare |
| EvD, EvE, EwF: | | | | | | |
| Evard | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Cowee | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| GrD, GvE: | | | | | | |
| Grover | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| HeB: | | | | | | |
| Helena | C | | | | | |
| | | January | 1.5-2.5 | 2.5-3.5 | --- | None |
| | | February | 1.5-2.5 | 2.5-3.5 | --- | None |
| | | March | 1.5-2.5 | 2.5-3.5 | --- | None |
| | | April | 1.5-2.5 | 2.5-3.5 | --- | None |
| | | May | 2.5-3.5 | 2.5-3.5 | --- | None |
| | | June | 4.0-6.0 | >6.0 | --- | None |
| | | October | 2.5-3.5 | 2.5-3.5 | --- | None |
| | | November | 1.5-2.5 | 2.5-3.5 | --- | None |
| | | December | 1.5-2.5 | 2.5-3.5 | --- | None |
| Worsham | D | | | | | |
| | | January | 0.0-1.0 | >6.0 | --- | None |
| | | February | 0.0-1.0 | >6.0 | --- | None |
| | | March | 0.0-1.0 | >6.0 | --- | None |
| | | April | 0.5-1.0 | >6.0 | --- | None |
| | | May | 0.5-1.0 | >6.0 | --- | None |
| | | June | 1.0-2.0 | >6.0 | --- | None |
| | | July | 1.0-2.0 | >6.0 | --- | None |
| | | August | 1.0-2.0 | >6.0 | --- | None |
| | | September | 1.0-2.0 | >6.0 | --- | None |
| | | October | 0.5-1.0 | >6.0 | --- | None |
| | | November | 0.0-1.0 | >6.0 | --- | None |
| | | December | 0.0-1.0 | >6.0 | --- | None |

Table 16.—Water Features—Continued

| Map symbol and soil name | Hydrologic group | Month | Water table | | Flooding | |
|---|---|---|---|---|---|---|
| | | | Upper limit | Lower limit | Duration | Frequency |
| | | | Ft | Ft | | |
| HhB, HtC: | | | | | | |
| Hulett | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| HuC: | | | | | | |
| Hulett | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Saw | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| HwB: | | | | | | |
| Hulett | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Urban land | --- | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| MaB2, MaC2: | | | | | | |
| Madison | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| MbB2, McC2: | | | | | | |
| Madison | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Bethlehem | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| MnB: | | | | | | |
| Madison | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Bethlehem | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Urban land | --- | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| MoE: | | | | | | |
| Montonia | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| PaC2, PaD2: | | | | | | |
| Pacolet | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| PbB2, PbC2, PbD2, PeD: | | | | | | |
| Pacolet | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Bethlehem | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| PrB, PrC: | | | | | | |
| Pacolet | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Bethlehem | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |

Table 16.—Water Features—Continued

| Map symbol and soil name | Hydrologic group | Month | Water table | | Flooding | |
|---|---|---|---|---|---|---|
| | | | Upper limit | Lower limit | Duration | Frequency |
| | | | Ft | Ft | | |
| PrB, PrC: | | | | | | |
| Urban land | --- | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| PsB2, PsC2, PtD: | | | | | | |
| Pacolet | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Saw | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| PuC: | | | | | | |
| Pacolet | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Urban land | --- | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Pw: | | | | | | |
| Pits | --- | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| RaE: | | | | | | |
| Rion | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Ashlar | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| RnE: | | | | | | |
| Rion | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Cliffside | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| SaC, SaD: | | | | | | |
| Saw | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Wake | D | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| TaB, TaC, TaD: | | | | | | |
| Tatum | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Montonia | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |

Table 16.—Water Features—Continued

| Map symbol and soil name | Hydrologic group | Month | Water table | | Flooding | |
|---|---|---|---|---|---|---|
| | | | Upper limit | Lower limit | Duration | Frequency |
| | | | Ft | Ft | | |
| ToA: | | | | | | |
| Toccoa | B | | | | | |
| | | January | 2.5-5.0 | >6.0 | Brief | Occasional |
| | | February | 2.5-5.0 | >6.0 | Brief | Occasional |
| | | March | 2.5-5.0 | >6.0 | Brief | Occasional |
| | | April | 2.5-5.0 | >6.0 | Brief | Occasional |
| | | May | 3.0-5.0 | >6.0 | Brief | Occasional |
| | | June | 4.0-5.0 | >6.0 | Brief | Rare |
| | | July | 4.5-5.0 | >6.0 | Brief | Rare |
| | | August | 4.5-5.0 | >6.0 | Brief | Rare |
| | | September | 4.5-5.0 | >6.0 | Brief | Rare |
| | | October | 2.5-5.0 | >6.0 | Brief | Occasional |
| | | November | 2.5-5.0 | >6.0 | Brief | Occasional |
| | | December | 2.5-5.0 | >6.0 | Brief | Occasional |
| UdC: | | | | | | |
| Udorthents | --- | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Ur: | | | | | | |
| Urban land | --- | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| UtB, UuB2: | | | | | | |
| Uwharrie | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| UvC, UwC2: | | | | | | |
| Uwharrie | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Tatum | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| UxB: | | | | | | |
| Uwharrie | B | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| Urban land | --- | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| W: | | | | | | |
| Water | --- | | | | | |
| | | Jan-Dec | --- | --- | --- | None |
| WeA: | | | | | | |
| Wehadkee | D | | | | | |
| | | January | 0.0-1.0 | >6.0 | Long | Frequent |
| | | February | 0.0-1.0 | >6.0 | Long | Frequent |
| | | March | 0.0-1.0 | >6.0 | Long | Frequent |
| | | April | 0.5-1.0 | >6.0 | Long | Frequent |
| | | May | 0.5-1.0 | >6.0 | Long | Frequent |
| | | June | 1.0-2.0 | >6.0 | Long | Frequent |
| | | July | 1.0-2.0 | >6.0 | Brief | Occasional |
| | | August | 1.0-2.0 | >6.0 | Brief | Occasional |
| | | September | 1.0-2.0 | >6.0 | Brief | Occasional |
| | | October | 0.5-1.0 | >6.0 | Brief | Occasional |
| | | November | 0.0-1.0 | >6.0 | Long | Frequent |
| | | December | 0.0-1.0 | >6.0 | 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 | | | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|---|---|
| | Kind | Depth to top | Thickness | Hardness | | Uncoated steel | Concrete |
| | | In | In | | | | |
| ApB, ApC: | | | | | | | |
| Appling | --- | --- | --- | --- | None | Moderate | Moderate |
| BuB: | | | | | | | |
| Buncombe | --- | --- | --- | --- | None | Low | Moderate |
| CaB2: | | | | | | | |
| Cecil | --- | --- | --- | --- | None | High | High |
| CeB: | | | | | | | |
| Cecil | --- | --- | --- | --- | None | High | High |
| Urban land. | | | | | | | |
| ChA: | | | | | | | |
| Chewacla | --- | --- | --- | --- | None | High | Moderate |
| CpD, CpE: | | | | | | | |
| Cliffield | Bedrock (lithic) | 20-40 | --- | --- | Moderate | Moderate | High |
| Pigeonroost | Bedrock (paralithic) | 20-40 | --- | --- | Moderate | Moderate | High |
| CrF: | | | | | | | |
| Cliffield | Bedrock (lithic) | 20-40 | --- | --- | Moderate | Moderate | High |
| Rock outcrop. | | | | | | | |
| DAM: | | | | | | | |
| Dam | --- | --- | --- | --- | --- | --- | --- |
| DoB: | | | | | | | |
| Dogue | --- | --- | --- | --- | None | High | High |
| EvD, EvE, EwF: | | | | | | | |
| Evard | --- | --- | --- | --- | Moderate | Moderate | High |
| Cowee | Bedrock (paralithic) | 20-40 | --- | --- | Moderate | Moderate | High |
| GrD, GvE: | | | | | | | |
| Grover | --- | --- | --- | --- | None | Moderate | Moderate |
| HeB: | | | | | | | |
| Helena | --- | --- | --- | --- | None | High | High |
| Worsham | --- | --- | --- | --- | None | High | Moderate |
| HhB, HtC: | | | | | | | |
| Hulett | --- | --- | --- | --- | None | High | Moderate |
| HuC: | | | | | | | |
| Hulett | --- | --- | --- | --- | None | High | Moderate |
| Saw | Bedrock (lithic) | 20-40 | --- | --- | None | Moderate | Moderate |

Table 17.—Soil Features—Continued

| Map symbol and soil name | Restrictive layer | | | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|---|---|
| | Kind | Depth to top | Thick-ness | Hardness | | Uncoated steel | Concrete |
| | | In | In | | | | |
| HwB: | | | | | | | |
| Hulett | --- | --- | --- | --- | None | High | Moderate |
| Urban land. | | | | | | | |
| MaB2, MaC2: | | | | | | | |
| Madison | --- | --- | --- | --- | None | High | Moderate |
| MbB2, McC2: | | | | | | | |
| Madison | --- | --- | --- | --- | None | High | Moderate |
| Bethlehem | Bedrock (paralithic) | 20-40 | --- | --- | None | Moderate | High |
| MnB: | | | | | | | |
| Madison | --- | --- | --- | --- | None | High | Moderate |
| Bethlehem | Bedrock (paralithic) | 20-40 | --- | --- | None | Moderate | High |
| Urban land. | | | | | | | |
| MoE: | | | | | | | |
| Montonia | Bedrock (paralithic) | 20-40 | --- | --- | None | Moderate | High |
| PaC2, PaD2: | | | | | | | |
| Pacolet | --- | --- | --- | --- | None | High | High |
| PbB2, PbC2, PbD2, PeD: | | | | | | | |
| Pacolet | --- | --- | --- | --- | None | High | High |
| Bethlehem | Bedrock (paralithic) | 20-40 | --- | --- | None | Moderate | High |
| PrB, PrC: | | | | | | | |
| Pacolet | --- | --- | --- | --- | None | High | High |
| Bethlehem | Bedrock (paralithic) | 20-40 | --- | --- | None | Moderate | High |
| Urban land. | | | | | | | |
| PsB2, PsC2, PtD: | | | | | | | |
| Pacolet | --- | --- | --- | --- | None | High | High |
| Saw | Bedrock (lithic) | 20-40 | --- | --- | None | Moderate | Moderate |
| PuC: | | | | | | | |
| Pacolet | --- | --- | --- | --- | None | High | High |
| Urban land. | | | | | | | |
| Pw: | | | | | | | |
| Pits | Bedrock (lithic) | 0-0 | --- | Indurated | None | --- | --- |
| RaE: | | | | | | | |
| Rion | --- | --- | --- | --- | None | Moderate | High |
| Ashlar | Bedrock (lithic) | 20-40 | --- | --- | None | Low | High |

Table 17.—Soil Features—Continued

| Map symbol and soil name | Restrictive layer | | | | Potential for frost action | Risk of corrosion | |
|---|---|---|---|---|---|---|---|
| | Kind | Depth to top | Thick-ness | Hardness | | Uncoated steel | Concrete |
| | | In | In | | | | |
| RnE: | | | | | | | |
| Rion | --- | --- | --- | --- | None | Moderate | High |
| Cliffside | Bedrock (lithic) | 20-40 | --- | --- | None | Moderate | High |
| SaC, SaD: | | | | | | | |
| Saw | Bedrock (lithic) | 20-40 | --- | --- | None | Moderate | Moderate |
| Wake | Bedrock (lithic) | 8-20 | --- | --- | None | Moderate | Moderate |
| TaB, TaC, TaD: | | | | | | | |
| Tatum | Bedrock (paralithic) | 40-60 | --- | --- | None | High | High |
| Montonia | Bedrock (paralithic) | 20-40 | --- | --- | None | Moderate | High |
| ToA: | | | | | | | |
| Toccoa | --- | --- | --- | --- | None | Low | Moderate |
| UdC. | | | | | | | |
| Udorthents | | | | | | | |
| Ur. | | | | | | | |
| Urban land | | | | | | | |
| UtB, UuB2: | | | | | | | |
| Uwharrie | --- | --- | --- | --- | None | Moderate | Moderate |
| UvC, UwC2: | | | | | | | |
| Uwharrie | --- | --- | --- | --- | None | Moderate | Moderate |
| Tatum | Bedrock (paralithic) | 40-60 | --- | --- | None | High | High |
| UxB: | | | | | | | |
| Uwharrie | --- | --- | --- | --- | None | Moderate | Moderate |
| Urban land. | | | | | | | |
| W: | | | | | | | |
| Water | --- | --- | --- | --- | Low | --- | --- |
| WeA: | | | | | | | |
| Wehadkee | --- | --- | --- | --- | None | High | Moderate |

**Table 18.—Engineering Index Test Data**

(Dashes indicate that data were not available. LL means liquid limit; PI means plasticity index)

| Soil name, horizon, depth in inches, and lab sample number | Grain size distribution | | | | | | | | | | | | | | | | | | LL | PI | Unified classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Percentage smaller than-- | | | | Percentage passing sieve-- | | | | | | | | | | | | | | | | |
| | .002 mm | .005 mm | .02 mm | .05 mm | No. 200 | No. 140 | No. 60 | No. 40 | No. 20 | No. 10 | No. 4 | 3/8 inch | 1/2 inch | 3/4 inch | 1 inch | 1 1/2 inch | 3 inch | | | | |
| | | | | | | | | | | | | | | | | | | | Pct | | |
| Bethlehem gravelly sandy clay loam:* | | | | | | | | | | | | | | | | | | | | | |
| Ap----- 0 to 8 (FY-97 702) | 14 | 22 | 27 | 30 | 34 | 36 | 49 | 57 | 65 | 71 | 84 | 92 | 94 | 97 | 98 | 99 | 100 | | --- | --- | --- |
| Bt----- 8 to 30 (FY-97 706) | 59 | 65 | 71 | 74 | 78 | --- | --- | --- | --- | 100 | --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |
| Hulett gravelly sandy loam:* | | | | | | | | | | | | | | | | | | | | | |
| Ap----- 0 to 8 (FY-97 698) | 18 | 27 | 35 | 36 | 37 | 39 | 45 | 54 | 68 | 100 | --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |
| Bt1---- 8 to 19 (FY-97 705) | 67 | 73 | 80 | 84 | 84 | --- | --- | --- | --- | 100 | --- | --- | --- | --- | --- | --- | --- | | 78 | 41 | MH |
| C1----- 37 to 56 (FY-97 700) | 13 | 25 | 40 | 53 | 56 | --- | --- | --- | --- | 100 | --- | --- | --- | --- | --- | --- | --- | | NP | --- | ML |
| Madison gravelly sandy clay loam:* | | | | | | | | | | | | | | | | | | | | | |
| Ap----- 0 to 5 (FY-97 693) | 17 | 27 | 32 | 34 | 36 | 38 | 51 | 61 | 73 | 81 | 94 | 97 | 97 | 99 | 100 | | | | NP | --- | SM |
| Bt----- 5 to 29 (FY-97 701) | 53 | 60 | 71 | 78 | 78 | --- | --- | --- | --- | 100 | --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |
| C------ 45 to 72 (FY-97 697) | 25 | 33 | 49 | 56 | 60 | --- | --- | --- | --- | 100 | --- | --- | --- | --- | --- | --- | --- | | NP | --- | ML |
| Montonia very channery silt loam:* | | | | | | | | | | | | | | | | | | | | | |
| A------ 0 to 3 (FY-97 694) | 9 | 19 | 34 | 48 | 51 | 53 | 57 | 59 | 61 | 62 | 73 | 82 | 86 | 92 | 96 | 99 | 100 | | --- | --- | --- |
| AB----- 3 to 8 (FY-97 695) | 9 | 19 | 35 | 47 | 49 | 48 | 51 | 52 | 54 | 55 | 72 | 87 | 92 | 97 | 99 | 100 | --- | | --- | --- | --- |
| Bt----- 8 to 19 (FY-97 704) | 24 | 35 | 52 | 60 | 62 | 64 | 67 | 69 | 72 | 76 | 95 | 98 | 99 | 100 | --- | --- | --- | | 38 | 14 | CL |
| BC----- 19 to 29 (FY-97 709) | 40 | 54 | 73 | 84 | 86 | --- | --- | --- | --- | 100 | --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |
| Pacolet sandy clay loam:* | | | | | | | | | | | | | | | | | | | | | |
| Ap----- 0 to 7 (FY-97 708) | 17 | 24 | 30 | 37 | 38 | 40 | 57 | 64 | 67 | 72 | 92 | 95 | 96 | 98 | 100 | --- | --- | | NP | --- | SM |
| Bt----- 7 to 28 (FY-97 703) | 47 | 57 | 61 | 68 | 71 | --- | --- | --- | --- | 100 | --- | --- | --- | --- | --- | --- | --- | | 46 | 22 | CL |
| C------ 44 to 72 (FY-97 707) | 16 | 20 | 26 | 34 | 36 | 37 | 70 | 90 | 98 | 100 | --- | --- | --- | --- | --- | --- | --- | | --- | --- | --- |

See footnotes at end of table.

Table 18.—Engineering Index Test Data—Continued

| Soil name, horizon, depth in inches, and lab sample number | Grain size distribution | | | | | | | | | | | | | | | | | LL | PI | Unified classification |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Percentage smaller than-- | | | | Percentage passing sieve-- | | | | | | | | | | | | | | | |
| | .002 mm | .005 mm | .02 mm | .05 mm | No. 200 | No. 140 | No. 60 | No. 40 | No. 20 | No. 10 | No. 4 | 3/8 inch | 1/2 inch | 3/4 inch | 1 inch | 1 1/2 inch | 3 inch | | | |
| | | | | | | | | | | | | | | | | | | Pct | | |
| Saw gravelly sandy clay loam:** | | | | | | | | | | | | | | | | | | | | |
| Ap----- 0 to 5 (FY-97 696) | 25 | 33 | 42 | 47 | 49 | 50 | 65 | 78 | 95 | 100 | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bt----- 5 to 22 (FY-97 699) | 47 | 58 | 63 | 67 | 72 | --- | --- | --- | --- | 100 | --- | --- | --- | --- | --- | --- | --- | 50 | 21 | CH |

* Location of the pedon sampled is the same as that given for the typical pedon in the section "Soil Series and Their Morphology."

** Location of pedon sampled: Highway 18 North, 3.5 miles north of Falston, right on Secondary Road 1609, 0.8 mile to Rockdale, left onto a private road to the house at the end of the road, 250 feet northwest in woods.

**Table 19.—Classification of the Soils**

**(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series)**

| Soil name | Family or higher taxonomic class |
|---|---|
| Appling | Fine, kaolinitic, thermic Typic Kanhapludults |
| *Ashlar | Coarse-loamy, mixed, semiactive, thermic, shallow Typic Dystrudepts |
| Bethlehem | Fine, kaolinitic, thermic Typic Kanhapludults |
| Buncombe | Mixed, thermic Typic Udipsamments |
| Cecil | Fine, kaolinitic, thermic Typic Kanhapludults |
| Chewacla | Fine-loamy, mixed, active, thermic Fluvaquentic Dystrudepts |
| 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 |
| Evard | Fine-loamy, parasesquic, mesic Typic Hapludults |
| Grover | Fine-loamy, micaceous, thermic Typic Hapludults |
| Helena | Fine, mixed, semiactive, thermic Aquic Hapludults |
| Hulett | Fine, kaolinitic, thermic Typic Hapludults |
| Madison | Fine, kaolinitic, thermic Typic Kanhapludults |
| Montonia | Fine-loamy, mixed, semiactive, thermic Typic Hapludults |
| 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 |
| Tatum | Fine, kaolinitic, thermic Typic Hapludults |
| Toccoa | Coarse-loamy, mixed, active, nonacid, thermic Typic Udifluvents |
| Udorthents | Udorthents |
| Uwharrie | Fine, mixed, semiactive, thermic Typic Hapludults |
| *Wake | Loamy, mixed, thermic Lithic Udorthents |
| Wehadkee | Fine-loamy, mixed, active, nonacid, thermic Fluvaquentic Endoaquepts |
| Worsham | Fine, mixed, active, thermic Typic Endoaquults |

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