United States
Department of
Agriculture

Soil
Conservation
Service

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

Soil Survey of Alexander County, North Carolina

How To Use This Soil Survey

General Soil Map

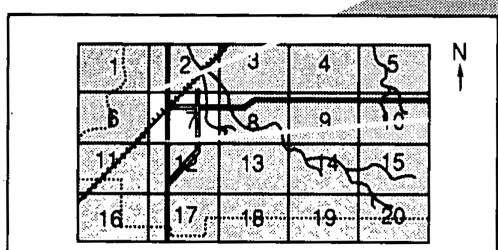
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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.

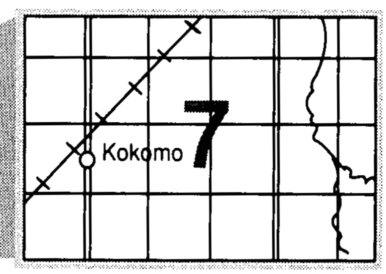
Detailed Soil Maps

The detailed soil maps follow the general soil map. These 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**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.

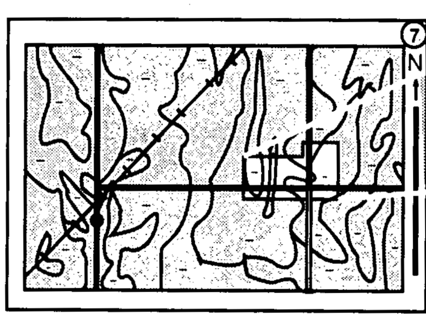


INDEX TO MAP SHEETS

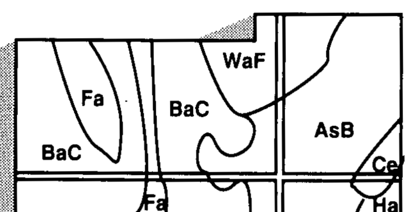


MAP SHEET

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



MAP SHEET



AREA OF INTEREST

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.

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

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

Major fieldwork for this soil survey was completed in 1988. Soil names and descriptions were approved in 1988. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1988. This soil survey was made cooperatively by the Soil Conservation Service; the North Carolina Department of Environment, Health, and Natural Resources; the North Carolina Agricultural Research Service; the North Carolina Cooperative Extension Service; Alexander Soil and Water Conservation District; and the Alexander County Board of Commissioners. It is part of the technical assistance furnished to the Alexander Soil and Water Conservation District. The Alexander 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.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Rocky Face Mountain, a well known landmark in Alexander County. The mountain is in an area of the Cleveland-Ashe-Rock outcrop general soil map unit. The hayland in the foreground is in an area of the Rion general soil map unit.

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Issued March 1995

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Summary of Tables

Foreword

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

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 unstable and need specially designed foundations for buildings or roads. Wet soils are poorly suited to 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 Soil Conservation Service or the North Carolina Cooperative Extension Service.

Richard A. Gallo
State Conservationist
Soil Conservation Service

Soil Survey of Alexander County, North Carolina

By Roy L. Mathis, Jr., Soil Conservation Service

Soils surveyed by Roy L. Mathis, Jr., Soil Conservation Service, and Robert M. Brown, North Carolina Department of Environment, Health, and Natural Resources

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

ALEXANDER COUNTY is a rural county in the northwestern part of the Piedmont of North Carolina (fig. 1). The county has a total surface area of 168,538 acres, or about 259 square miles. The 1980 census reported the population of the county to be 24,999. Taylorsville, the county seat and largest town, had a population of 1,103.

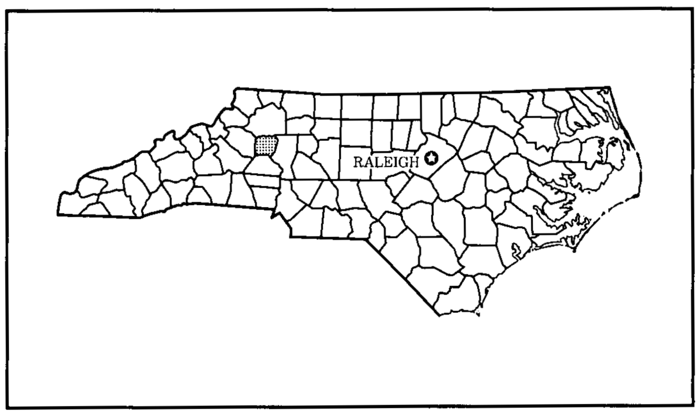

Figure 1.—Location of Alexander County in North Carolina.

General Nature of the County

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

History and Economic Development

The earliest settlers in Alexander County were of Scotch-Irish descent. They came from Pennsylvania and Maryland in the 1750's. Most of them were farmers who settled along the Catawba and South Yadkin Rivers or in the upper part of these river basins.

In 1847, the North Carolina General Assembly passed two laws that formed Alexander County from parts of Iredell, Wilkes, and Caldwell Counties. The county was named in honor of the Alexander family, who were leaders in colonial North Carolina.

In agricultural development the county ranked high in the State long before the Civil War. The major crops were corn, wheat, rye, oats, tobacco, and cotton. Hogs, cattle, and chickens were raised on most farms.

Early industries in the county were extensions of agriculture. Flour and roller mills were a part of most communities. Sawmills were common throughout the county. A tannery was in operation in Taylorsville. The first cotton mill was built in the 1850's *(2)*.

The present agriculture in the county has changed considerably from that of the past. Poultry, dairy, and beef cattle operations account for a large part of the gross farm income. Forest products, hay, tobacco, corn, soybeans, and orchards make up most of the rest.

Although agriculture is important in the economy of the county, furniture and textile manufacturing have become increasingly important in recent years. Industry is now the largest source of employment in the county, with furniture manufacturing as the most important sector. According to the North Carolina Department of Revenue, retail sales reached about 100 million dollars in 1987. North Carolina Cooperative Extension Service figures show gross farm income was about 69 million dollars in 1987 *(14)*.

Physiography, Relief, and Drainage

Most of Alexander County is in the Southern Piedmont major land resource area. The northern part of the county, however, is in the Blue Ridge major land resource area.

The topography of the county is predominantly gently sloping to very steep uplands. Narrow, nearly level flood plains are along most of the streams. Elevations range from about 2,550 feet above sea level on Walnut Knob in the northwestern part of the county to about 840 feet above sea level where the Catawba and South Yadkin Rivers exit the county.

The western and southeastern parts of the county are drained by the Catawba River and its tributaries. The northeastern part is drained by the South Yadkin River and its tributaries.

Water Resources

Alexander County has an abundant supply of water from rivers, streams, lakes, and ground water. Most domestic water supplies are obtained from wells. Drilled and bored wells are the two types of wells used in the county. Most of the industrial and residential water for Taylorsville, Hiddenite, and Stony Point is obtained from a system that takes water from the South Yadkin River. Springs are common in the mountainous areas west and north of Taylorsville *(12)*.

About 3,000 acres along the southern boundary of the county is covered by Lake Hickory and Lookout Shoals Lake on the Catawba River.

Mineral Resources

Alexander County is known for its variety of minerals and gems. The first emerald mine in the United States was opened near Hiddenite. In 1969, a 1,438-carat emerald, the largest to date in North America, was discovered in the Rist Mine near Hiddenite. The "Carolina Emerald," valued at over half a million dollars, also was discovered near Hiddenite *(1)*.

Climate

Alexander County has long, hot summers because moist tropical air from the Gulf of Mexico persistently covers the area. Winters are cool and fairly short. Cold waves are rare and moderate in 1 or 2 days. Precipitation is fairly heavy throughout the year, and prolonged droughts are rare. Summer precipitation, mainly in the form of afternoon thunderstorms, is adequate for all crops.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Hickory, North Carolina, in the period 1951 to 1984. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 40 degrees F and the average daily minimum temperature is 30 degrees. The lowest temperature on record, which occurred at Hickory on January 17, 1977, is -3 degrees. In summer, the average temperature is 76 degrees and the average daily maximum temperature is 86 degrees. The highest recorded temperature, which occurred at Hickory on July 28, 1952, is 105 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 total annual precipitation is about 49 inches. Of this, about 25 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 21 inches. The heaviest 1-day rainfall during the period of record was 4.99 inches at Hickory on June 20, 1967. Thunderstorms occur on about 42 days each year.

The average seasonal snowfall is 10 inches. The greatest snow depth at any one time during the period of record was 15 inches. On an average of 3 days, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 60 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 9 miles per hour, in spring.

Severe local storms, including tornadoes, strike occasionally in or near the county. They are short in duration and cause variable and spotty damage. Every few years in summer or autumn, a tropical depression or remnant of a hurricane that has moved inland causes extremely heavy rains for 1 to 3 days.

How This Survey Was Made

This survey was made to provide information about the soils in Alexander County. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; 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 unconsolidated 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 is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. This model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil 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, depth to bedrock, 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. 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.

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.

Soil boundaries are drawn on aerial photographs and each delineation is identified as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in accurately locating boundaries.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. 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 soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called minor soils.

Most inclusions have properties and behavioral patterns 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 (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are identified in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

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

General Soil Map Units

The general soil map at the back of this publication 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. It is named for the major soils. The soils making up one 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. Pacolet-Rion

Gently sloping to steep, well drained soils that have a predominantly clayey or loamy subsoil; on Piedmont uplands

The landscape of this map unit is characterized by winding ridgetops that are separated by short side slopes. Slopes range predominantly from 2 to 45 percent. Creeks flow in winding courses through narrow flood plains.

The less sloping parts of this map unit are used mainly as cropland, pasture, or hayland. The steeper side slopes generally are forested. Most roads run parallel to the ridgetops.

This map unit makes up about 39 percent of the county. It is about 72 percent Pacolet soils, 10 percent Rion soils, and 18 percent soils of minor extent.

The gently sloping to moderately steep Pacolet soils are on ridgetops and side slopes. These soils are very deep and well drained. They have a predominantly clayey subsoil and formed in material weathered from gneiss or schist. Typically, the surface layer is sandy clay loam and is eroded in areas where slopes are less than 15 percent. The surface layer is typically sandy loam in areas where slopes are more than 15 percent.

The strongly sloping to steep Rion soils are typically on side slopes. In a few areas they are on ridgetops or knobs. These soils are very deep and well drained. They have a loamy subsoil and formed in material weathered from gneiss or schist. They have a surface layer of sandy loam.

The minor soils include Chewacla, Riverview, and Masada soils. Chewacla and Riverview soils are on flood plains and are frequently flooded. Masada soils are on old stream terraces.

The major soils are moderately suited to woodland. The Rion soils in areas that have slopes of less than 15 percent are well suited to woodland. Overstory trees are scarlet oak, white oak, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. The understory plants include sourwood, flowering dogwood, American holly, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry.

The slope in some areas of the Pacolet and Rion soils where it exceeds 15 percent is a limitation affecting woodland management. It increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be designed on the contour. Water bars can break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. Depth to the clayey part of the subsoil and the texture of the surface layer also are limitations affecting woodland management on the Pacolet soils. The clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods. The sandy clay loam surface layer in some areas of the Pacolet soils increases the seedling mortality rate. Reinforcement planting may be necessary.

The major soils are moderately suited to most of the field and truck crops commonly grown in the county in areas where slopes are less than 15 percent and are unsuited in areas where slopes are more than 15 percent. The hazard of erosion and the slope are management concerns. Clods form on the sandy clay loam surface layer of the Pacolet soils if the soil is tilled when it is too wet. The germination of seeds also may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

The major soils are well suited to pasture and hay in areas where slopes are less than 15 percent and are moderately suited in areas where slopes are 15 to 25 percent. The Rion soils that have slopes of more than 25 percent are unsuited to pasture and hay. Depth to the clayey subsoil and the texture of the surface layer hinder the establishment of sod on the Pacolet soils. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

The major soils are moderately suited to most urban uses in areas where slopes are less than 15 percent and are poorly suited in areas where slopes are 15 to 25 percent. The Rion soils that have slopes of more than 25 percent are unsuited to most urban uses. The high content of clay and low strength in the subsoil are limitations on the Pacolet soils. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields.

If the Pacolet soils are used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. Providing a gravel base and an adequate wearing surface improves the trafficability of roads and streets on the major soils for year-round use. In areas of the Pacolet and Rion soils that have slopes that exceed about 8 percent, the slope also is a limitation for roads and streets. The steep soils require extensive cutting and filling and detailed site planning.

2. Pacolet-Cecil

Gently sloping to moderately steep, well drained soils that have a predominantly clayey subsoil; on Piedmont uplands

The landscape of this map unit is characterized by broad, winding ridgetops that are separated by short side slopes. Slopes range predominantly from 2 to 25 percent. The drainageways join and become creeks that flow through narrow and moderately wide flood plains.

The less sloping parts of this map unit are used mainly as cropland, pasture, or hayland. The steeper side slopes generally are forested. Most roads run parallel to the ridgetops.

This map unit makes up about 26 percent of the county. It is about 54 percent Pacolet soils, 36 percent Cecil soils, and 10 percent soils of minor extent.

The strongly sloping to moderately steep Pacolet soils are mainly on side slopes. These soils are very deep and well drained. They have a predominantly clayey subsoil and formed in material weathered from gneiss or schist. Typically, the surface layer is sandy clay loam and is eroded in areas where slopes are less than 15 percent. The surface layer is typically sandy loam in areas where slopes are more than 15 percent. The subsoil in the Pacolet soils is thinner than that in the Cecil soils.

The gently sloping Cecil soils are on broad ridgetops. These soils are very deep and well drained. They have a predominantly clayey subsoil and formed in material weathered from gneiss or schist. Typically, they have an eroded surface layer of sandy clay loam.

The minor soils include Riverview, Chewacla, Masada, Davidson, and Rion soils. Riverview and Chewacla soils are on flood plains and are frequently flooded. Masada and Davidson soils are on old stream terraces. Rion soils are on moderately steep or steep side slopes and have a loamy subsoil.

The major soils are moderately suited to woodland. Overstory trees are scarlet oak, white oak, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory plants include sourwood, flowering dogwood, American holly, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry.

Depth to the clayey part of the subsoil and the texture of the surface layer are the main limitations affecting woodland management. The Pacolet soils that have slopes of 15 to 25 percent do not have a surface texture limitation. The clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods. The sandy clay loam surface layer increases the seedling mortality rate. Reinforcement planting may be necessary. The slopes that exceed 15 percent in some areas of the Pacolet soils are a limitation affecting woodland management. They increase the hazard of erosion and limit the use of equipment. Logging roads and skid trails should be designed on the contour. Water bars can break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

The major soils are well suited to most of the field and truck crops commonly grown in the county in areas where slopes are less than 8 percent and are moderately suited in areas where slopes are 8 to 15 percent. The Pacolet soils that have slopes of more than 15 percent are poorly suited to cropland. The texture of the topsoil, the hazard of erosion, and the slope are management concerns. Clods form on the sandy clay loam surface layer if the soil is tilled when it is too wet. The germination of seeds may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

The major soils are well suited to pasture and hay. Depth to the clayey part of the subsoil and the texture of the surface layer hinder the establishment of sod. The Pacolet soils in areas where slopes are 15 to 25 percent do not have a surface texture limitation. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

The major soils are moderately suited to most urban uses in areas where slopes are less than 15 percent. They are poorly suited in areas where slopes are 15 to 25 percent and in areas of the Pacolet soils that have slopes of more than 15 percent. A high content of clay and low strength in the subsoil are the main limitations. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields.

If the major soils are used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. Providing a gravel base and an adequate wearing surface improves the trafficability of roads for year-round use. The slope is a limitation in areas where it is more than about 8 percent and in areas of the Pacolet soils that have 8 to 15 percent slopes. The steep soils require extensive cutting and filling and detailed site planning.

3. Evard-Cowee

Strongly sloping to steep, well drained soils that have a loamy subsoil; in the uplands on mountains

The landscape of this map unit is characterized by narrow mountain ridgetops separated by mountain side slopes. Slopes range from 8 to 60 percent. Rock fragments on the surface of these soils range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Rapidly flowing streams follow winding courses through narrow flood plains in the mountain valleys.

Most of this map unit is used as woodland. A small acreage is used for orchards. Most roads run parallel to the ridgetops or on the contour of side slopes.

This map unit makes up about 22 percent of the county. It is about 40 percent Evard soils, 33 percent Cowee soils, and 27 percent soils of minor extent.

The strongly sloping to steep Evard soils are on the smooth and wide parts of ridgetops and on the smooth and lower parts of side slopes. These soils are very deep and well drained. They have a loamy subsoil and formed in material weathered predominantly from gneiss or schist. Typically, they have a surface layer of gravelly sandy loam.

The strongly sloping to steep Cowee soils are on knobs, narrow ridgetops, shoulder slopes, nose slopes, and side slopes. These soils are moderately deep over soft bedrock and are well drained. They have a loamy subsoil and formed in material weathered predominantly from schist or gneiss. Typically, they have a surface layer of gravelly sandy loam.

The minor soils include Hayesville, Ashe, Saluda, Cleveland, Braddock, Tate, and French soils. Hayesville soils are on strongly sloping ridgetops and have a predominantly clayey subsoil. Ashe, Cleveland, and Saluda soils are predominantly on side slopes. Ashe soils are moderately deep over hard bedrock. Cleveland soils are shallow over hard bedrock. Saluda soils are shallow over soft bedrock. Braddock soils are predominantly on colluvial foot slopes and have a predominantly clayey subsoil. Tate soils are on stream terraces and foot slopes. French soils are on narrow flood plains and are somewhat poorly drained.

The major soils are moderately suited to trees. Overstory trees include white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, blackgum, and eastern white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier. The slope is the main limitation affecting woodland management. It increases the hazard of erosion. Logging roads and skid trails should be designed on the contour. Water bars can break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. The depth to bedrock results in a moderate windthrow hazard on the Cowee soils. Thinning should be held to a minimum on the Cowee soils, or the stands should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable.

The major soils are poorly suited to most cultivated crops in areas where slopes are 8 to 25 percent and are unsuited in areas where slopes are more than 25 percent. The slope increases the hazard of erosion and limits the use of equipment. In areas used for orchards, the trees should be planted on the contour. Establishing a cover of grasses around the trees helps to control erosion. Stones on the surface can hinder mowing.

The major soils are moderately suited to pasture and hay in areas where slopes are less than 25 percent and are unsuited in areas where slopes are more than 25 percent. The slope and the stones on the surface are the main limitations. The slope increases the hazard of erosion and limits the use of equipment. Stones hinder the establishment of sod and mowing.

The major soils are poorly suited to most urban uses because of the slope, the hazard of erosion, and rock fragments on or near the surface. The depth to bedrock also is a limitation in the Cowee soils. Areas used for building site development should be carefully selected. Most of the soils that have slopes of more than 15 percent require substantial cutting and filling and detailed site planning. The Evard soils that have slopes of less than 15 percent can be used for septic tank absorption fields if the fields are properly installed and designed.

4. Hibriten-Bethlehem-Pacolet

Gently sloping to steep, well drained soils that have a loamy or predominantly clayey subsoil; on Piedmont uplands

The landscape of this map unit is characterized by narrow ridgetops that are separated by side slopes. Slopes range predominantly from 2 to 60 percent. Creeks flow in winding courses through narrow flood plains.

The less sloping parts of this map unit are used mainly as cropland, pasture, or hayland. The steeper side slopes generally are forested. Most roads run parallel to the ridgetops.

This map unit makes up about 9 percent of the county. It is about 44 percent Hibriten soils, 26 percent Bethlehem soils, 23 percent Pacolet soils, and 7 percent soils of minor extent.

The strongly sloping to steep Hibriten soils are typically on side slopes. In some places they are on strongly sloping ridgetops or on knobs. These soils are moderately deep and well drained. They have a loamy subsoil with many gravel and cobbles and formed in material weathered from sillimanite schist. They average more than 35 percent coarse fragments, by volume, throughout. Typically, they have a surface layer of very cobbly sandy loam.

The gently sloping to strongly sloping Bethlehem soils are on narrow ridgetops and side slopes. These soils are moderately deep and well drained. They have a predominantly clayey subsoil and are weathered predominantly from sillimanite schist. Typically, they have a surface layer of gravelly sandy loam.

The gently sloping to moderately steep Pacolet soils are on narrow ridgetops and side slopes. These soils are very deep and well drained. They have a predominantly clayey subsoil and formed in material weathered from gneiss or schist. Typically, the surface layer is sandy clay loam and is eroded in areas where slopes are less than 15 percent. The surface layer is typically sandy loam in areas where slopes are more than 15 percent.

The minor soils include Chewacla, Riverview, Masada, and Rion soils. Chewacla and Riverview soils are on flood plains and are frequently flooded. Masada soils are on old stream terraces and have a predominantly clayey subsoil. Rion soils are on side slopes and are very deep.

The major soils are moderately suited to woodland. Overstory trees are chestnut oak, Virginia pine, black oak, scarlet oak, hickory, shortleaf pine, eastern white pine, white oak, and red maple. Understory plants include sourwood, flowering dogwood, American holly, sassafras, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry.

The depth to bedrock is the main limitation affecting woodland management on the Bethlehem and Hibriten soils. It results in a moderate windthrow hazard, particularly for pine and other trees that have a taproot. Thinning should be held to a minimum, or the stands should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. Rock fragments in the surface layer of the Hibriten soils limit the amount of water available for plant growth and increase the seedling mortality rate. Reinforcement planting may be necessary. Depth to the clayey part of the subsoil and the texture of the surface layer are limitations affecting woodland management on the Pacolet soils. The clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods. The sandy clay loam texture of some of the Pacolet soils increases the seedling mortality rate. Reinforcement planting may be necessary. The slope in areas where it is more than 15 percent also is a limitation affecting woodland management. The steep slopes increase the hazard of erosion and limit the use of equipment. Logging roads and skid trails should be designed on the contour. Water bars can break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

The Pacolet and Bethlehem soils in areas that have slopes of less than 15 percent are moderately suited to most of the field and truck crops commonly grown in the county. The Pacolet soils in areas that have slopes of more than 15 percent and the Hibriten soils in areas that have slopes of 8 to 15 percent are poorly suited to cropland. The Hibriten soils in areas that have slopes of more than 15 percent are unsuited to cropland. The slope and the hazard of erosion are the main management concerns. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation. The texture of the surface layer also is a limitation affecting field crops on the Pacolet soils. Clods form on the sandy clay loam surface layer of some of the Pacolet soils if the soil is tilled when it is too wet. The germination of seeds also may not be uniform across the field. The large amount of coarse fragments in the soil limits the amount of water available for plant growth.

The Bethlehem and Pacolet soils that have slopes of less than 25 percent are moderately suited to pasture and hay. The Hibriten soils that have slopes of less than 25 percent are poorly suited to pasture and hay and are unsuited in areas where slopes are more than 25 percent. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition. The large amount of coarse fragments in the soil limits the amount of water available for plant growth on the Hibriten soils.

The Bethlehem and Pacolet soils that have slopes of less than 15 percent are moderately suited to most urban uses. The slope, a high content of clay, and low strength in the subsoil are the main limitations. The moderate permeability in the clayey part of the subsoil in the Pacolet soils can be overcome by increasing the size of the absorption area in septic tank absorption fields. The Bethlehem soils are poorly suited to septic tank absorption fields because of the depth to bedrock.

If the Pacolet and Bethlehem soils are used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. Providing a gravel base and an adequate wearing surface improves the trafficability of roads for year-round use. The slope also is a limitation in areas of these soils where the slope exceeds about 8 percent. The Pacolet soils that have slopes of more than 15 percent and the Hibriten soils that have slopes of less than 15 percent are poorly suited to most urban uses. The Hibriten soils that have slopes of more than 15 percent are unsuited to most urban uses. The depth to bedrock and the high content of coarse fragments are the main limitations on the Hibriten soils.

5. Rion

Gently sloping to moderately steep, well drained soils that have a loamy subsoil; on Piedmont uplands

The landscape of this map unit is characterized by broad ridgetops that are separated by side slopes. Slopes range predominantly from 2 to 25 percent. Creeks flow in winding courses through narrow flood plains.

The less sloping parts of this map unit are used mainly as cropland, pasture, or hayland. The steeper side slopes generally are forested. Most roads run parallel to the ridgetops.

This map unit makes up about 3 percent of the county. It is about 67 percent Rion soils and 33 percent soils of minor extent.

The gently sloping to moderately steep Rion soils are on ridgetops and side slopes. These soils are very deep and well drained. They have a loamy subsoil and formed in material weathered predominantly from granitic gneiss. They have a surface layer of sandy loam.

The minor soils include Chewacla, Wehadkee, Wedowee, and Pacolet soils. Chewacla and Wehadkee soils are on flood plains and are frequently flooded. Wedowee and Pacolet soils are on ridgetops and side slopes and have a predominantly clayey subsoil.

The Rion soils are moderately suited to trees. Overstory trees include white oak, scarlet oak, black oak, southern red oak, red maple, yellow-poplar, hickory, and Virginia pine. Understory plants include sourwood, flowering dogwood, American holly, eastern redcedar, honeysuckle, wild grape, poison ivy, blackberry, and greenbrier. Where it is more than 15 percent, the slope is the main limitation affecting woodland management. The steeper slopes increase the hazard of erosion and limit the use of equipment. Logging roads and skid trails should be designed on the contour. Water bars can break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

The Rion soils in areas where slopes are less than 8 percent are well suited to most of the field and truck crops commonly grown in the county and are moderately suited in areas where slopes are 8 to 15 percent. The Rion soils are preferred by tobacco farmers. The slope and the hazard of erosion are the main management concerns. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

The Rion soils are well suited to pasture and hay in areas where slopes are less than 15 percent, are moderately suited in areas where slopes are 15 to 25 percent, and are unsuited in areas where slopes are more than 25 percent. The slope is the main limitation. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

The Rion soils are moderately suited to most urban uses in areas where slopes are less than 15 percent, are poorly suited in areas where slopes are 15 to 25 percent, and are unsuited in areas where slopes are more than 25 percent. Providing a gravel base and an adequate wearing surface improves the trafficability of roads. The moderately steep soils require extensive cutting and filling and detailed site planning.

6. Cleveland-Ashe-Rock outcrop

Strongly sloping to very steep, somewhat excessively drained soils that have a loamy subsoil and areas of Rock outcrop; in the uplands on mountains

The landscape of this map unit is characterized by narrow mountain ridgetops that have long mountain side slopes. Rock fragments on the surface of these soils range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Areas of Rock outcrop are common on some of the steeper side slopes. Slopes range predominantly from 8 to 90 percent.

Most of this map unit supports low-grade hardwoods and pines. Roads are generally absent.

This map unit makes up about 1 percent of the county. It is about 45 percent Cleveland soils, 35 percent Ashe soils, 10 percent Rock outcrop, and 10 percent soils of minor extent.

The strongly sloping to very steep Cleveland soils are on knobs and narrow parts of ridgetops and on shoulder slopes and nose slopes. These soils also are on side slopes that are irregular in shape and that contain many areas of Rock outcrop. They are shallow and somewhat excessively drained. They formed in material weathered predominantly from gneiss and schist. These soils have a surface layer and subsoil of gravelly sandy loam.

The strongly sloping to very steep Ashe soils are on the smooth and wide parts of ridgetops and on the smooth and low parts of side slopes. These soils are moderately deep and somewhat excessively drained. They formed in material weathered predominantly from gneiss and schist. They have a surface layer of gravelly sandy loam and a loamy subsoil.

The minor soils include Evard and Cowee soils on smooth ridgetops and side slopes. These soils have more clay in the subsoil than the major soils. Evard soils are very deep, and Cowee soils are moderately deep over soft bedrock.

The major soils are poorly suited to trees. Overstory trees include chestnut oak, scarlet oak, Virginia pine, hickory, black locust, and white oak. Understory plants include mountain laurel, sassafras, eastern redcedar, greenbrier, blueberry, sourwood, flowering dogwood, wild grape, blackberry, honeysuckle, and needlegrass.

The slope, droughtiness, the depth to bedrock, and Rock outcrop are the main limitations affecting woodland management. The slope increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be designed on the contour. Water bars can break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. Droughtiness increases the seedling mortality rate. Reinforcement planting may be needed. Because of the depth to bedrock, the windthrow hazard is moderate on the Ashe soils and severe on the Cleveland soils. Thinning should be held to a minimum on these soils, or the stands should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. When the Cleveland soils are in a complex that has areas of Rock outcrop, they are unsuited to commercial timber production.

The major soils are unsuited to cultivated crops, pasture, hay, and most urban uses because of the slope, droughtiness, the depth to bedrock, Rock outcrop, and stones on or near the surface.

Broad Land Use Considerations

The soils in Alexander County vary widely in their suitability for major land uses. About 10 percent of the county is used for cultivated crops, mainly corn, soybeans, small grain, and tobacco. This cropland is concentrated mainly in general soil map units 1, 2, 4, and 5. Soils that have slopes of less than 15 percent generally are moderately suited to most of the field and truck crops commonly grown in the county. The slope and the hazard of erosion are the main limitations. The Hibriten soils, however, are poorly suited because of rock fragments in the soil.

About 21 percent of the county is used as pasture and hayland. General soil map units 1, 2, 4, and 5 are moderately suited to grasses and legumes on slopes of less than 25 percent, but the Hibriten soils are poorly suited to pasture and hayland.

About 65 percent of the county is used as woodland. General soil map units 1, 2, 3, 4, and 5 are moderately suited to commercial timber production. Slopes of more than 15 percent are a limitation affecting woodland production.

About 4 percent of the county is urban or built-up land. Cecil, Pacolet, Rion, and Bethlehem soils on slopes of less than 15 percent are moderately suited to most urban uses. The Bethlehem soils that are mainly in general soil map units 1, 2, 4, and 5 are poorly suited to septic tank absorption fields. Because of the slope, general soil map units 3 and 6 are poorly suited to urban uses.

The suitability of the soils for recreational uses varies, depending on the intensity of expected use and the properties of the soil. The soils in general soil map units 1, 2, and 5 are well suited to intensive recreational development on slopes of less than 15 percent. The soils in general soil map unit 4 are moderately suited to less intensive recreational development on slopes of less than 15 percent. The soils in general soil map units 3 and 6 are poorly suited to intensive recreational uses because of the predominance of the steeper slopes. The soils in general soil map units 1, 2, 3, 4, and 5 are suited to extensive recreational uses, such as hiking or horseback riding. Small areas of soils that are suited to intensive recreational development may be present in general soil map units that are poorly suited to recreational development.

Detailed Soil Map Units

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

The map units on the detailed soil maps represent areas on the landscape and consist mainly of the dominant soils for which the unit is named.

Symbols identifying the soil precede the map unit names in the soil descriptions. The descriptions include general facts about the soils and give 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 or of the underlying material, 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 or of the underlying material. They also can differ in slope, stoniness, wetness, 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, 2 to 8 percent slopes, eroded, is a phase of the Pacolet series.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Evard-Cowee complex, 8 to 25 percent slopes, stony, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Braddock and Hayesville clay loams, 15 to 25 percent slopes, eroded, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included contrasting soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas* that are part of a complex. Such areas have little or no soil material and support little or no vegetation. The Rock outcrop part of Cleveland-Rock outcrop complex, 8 to 90 percent slopes, is an example. Miscellaneous areas that are part of a soil complex are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and suitabilities for many uses. The "Glossary" defines many of the terms used in describing the soils.

AcD—Ashe-Cleveland complex, 8 to 25 percent slopes, stony. This map unit consists of somewhat excessively drained, strongly sloping and moderately steep Ashe and Cleveland soils on ridgetops in the mountains. The Ashe soil is moderately deep, and the Cleveland soil is shallow. Rock fragments on the surface of these soils range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Individual areas are long and narrow or irregular in shape and range from 5 to about 50 acres in size. The Ashe soil makes up about 45 percent of the map unit, and the Cleveland soil makes up about 45 percent. These soils occur as areas so intricately mixed that separating them is not practical at the scale selected for mapping.

Typically, the surface layer of the Ashe soil is gravelly sandy loam about 5 inches thick. It is dark brown in the upper part and brown in the lower part. The subsoil is yellowish brown sandy loam about 21 inches thick. Hard bedrock is at a depth of about 26 inches.

The Ashe soil is moderately rapidly permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to hard bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Typically, the surface layer of the Cleveland soil is brown gravelly sandy loam about 7 inches thick. The subsoil is dark yellowish brown gravelly sandy loam about 5 inches thick. Hard bedrock is at a depth of about 12 inches.

The Cleveland soil is moderately rapidly permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to hard bedrock is 10 to 20 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with these soils in mapping are small areas of Cowee soils. These soils are intermingled with areas of the Ashe and Cleveland soils. These included soils have more clay in the subsoil than the Ashe and Cleveland soils. They are on the wide parts of ridgetops. Also included are some areas of soils that have more than 35 percent rock fragments throughout; scattered, small areas of soils that have a very stony or very bouldery surface; and areas of Rock outcrop. Included areas make up about 10 percent of this map unit.

Most of the acreage in this map unit is used as woodland. A few areas are used as pasture.

The Ashe and Cleveland soils are poorly suited to trees. Overstory trees include chestnut oak, scarlet oak, northern red oak, Virginia pine, hickory, pitch pine, and white oak. Understory plants include mountain laurel, sassafras, eastern redcedar, greenbrier, blueberry, sourwood, flowering dogwood, wild grape, blackberry, honeysuckle, and needlegrass.

The slope, droughtiness, and the depth to bedrock are the main limitations affecting timber production. The slope increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be designed on the contour. Water bars help to break the flow of water along roads. In exposed areas applying fertilizer and seeding help to control erosion. Droughtiness increases the seedling mortality rate. Reinforcement planting may be needed. Because of the depth to bedrock, the windthrow hazard is moderate on the Ashe soil and severe on the Cleveland soil. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable.

These soils are unsuited to cultivated crops, pasture, hay, and most urban uses. The slope, droughtiness, the depth to bedrock, and rock fragments on or near the surface are the major limitations.

The Ashe soil is in capability subclass VIe, and the Cleveland soil is in capability subclass VIIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 2R in areas of the Ashe soil and 2D in areas of the Cleveland soil.

AcE—Ashe-Cleveland complex, 25 to 60 percent slopes, stony. This map unit consists of somewhat excessively drained, steep Ashe and Cleveland soils on side slopes in the mountains. The Ashe soil is moderately deep, and the Cleveland soil is shallow. Rock fragments on the surface of these soils range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Individual areas are irregular in shape and range from 5 to about 50 acres in size. The Ashe soil makes up about 45 percent of the map unit, and the Cleveland soil makes up about 45 percent. These soils occur as areas so intricately mixed that separating them is not practical at the scale selected for mapping.

Typically, the surface layer of the Ashe soil is gravelly sandy loam 5 inches thick. It is dark brown in the upper part and brown in the lower part. The subsoil is yellowish brown sandy loam about 21 inches thick. Hard bedrock is at a depth of about 26 inches.

The Ashe soil is moderately rapidly permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to hard bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Typically, the surface layer of the Cleveland soil is brown gravelly sandy loam about 7 inches thick. The subsoil is dark yellowish brown gravelly sandy loam about 5 inches thick. Hard bedrock is below a depth of about 12 inches.

The Cleveland soil is moderately rapidly permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to hard bedrock is 10 to 20 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with these soils in mapping are small areas of Cowee soils. These soils are intermingled with areas of the Ashe and Cleveland soils. These included soils have more clay in the subsoil than the Ashe and Cleveland soils. They are on the smooth and low parts of side slopes. Also included are some areas of soils that have more than 35 percent rock fragments throughout; scattered, small areas of soils that have a very stony or very bouldery surface; and areas of Rock outcrop. Included areas make up about 10 percent of this map unit.

Most of the acreage in this map unit is used as woodland. A few areas are used as pasture.

The Ashe and Cleveland soils are poorly suited to trees. Overstory trees include chestnut oak, scarlet oak, northern red oak, Virginia pine, hickory, pitch pine, and white oak. Understory plants include mountain laurel, sassafras, eastern redcedar, greenbrier, blueberry, sourwood, flowering dogwood, wild grape, blackberry, honeysuckle, and needlegrass.

The slope, droughtiness, and the depth to bedrock are the main limitations affecting timber production. The slope increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on these slopes. In most areas extensive grading is needed to establish roads or trails. Logging roads and skid trails should be designed on the contour. Water bars help to break the flow of water along roads. In exposed areas applying fertilizer and seeding help to control erosion. Droughtiness increases the seedling mortality rate. Reinforcement planting may be needed. Because of the depth to bedrock, the windthrow hazard is moderate on the Ashe soil and severe on the Cleveland soil. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable.

These soils are unsuited to cultivated crops, pasture, hay, and most urban uses. The slope, droughtiness, the depth to bedrock, and rock fragments on or near the surface are the major limitations.

The capability subclass is VIIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 2R.

BeB—Bethlehem gravelly sandy loam, 2 to 8 percent slopes. This moderately deep, well drained, gently sloping soil is on Piedmont ridgetops, generally in the southwestern part of the county. Individual areas are irregular in shape and range from 4 to about 40 acres in size.

Typically, the surface layer is strong brown gravelly sandy loam about 8 inches thick. The next 4 inches is yellowish red sandy clay loam. The subsoil is red clay about 13 inches thick. The next 6 inches is red very gravelly sandy clay loam. Soft bedrock is at a depth of about 31 inches. In some eroded areas the surface layer is gravelly sandy clay loam.

This soil is moderately permeable. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Pacolet and Hibriten soils. Pacolet soils are very deep and are on the wide part of the ridgetops. Hibriten soils average more than 35 percent rock fragments throughout. They are on knobs. Also included are some areas of soils that have soft bedrock at a depth of 40 to 60 inches and soils that have a loamy subsoil or have a high content of mica in the lower part. Included soils make up about 15 to 25 percent of this map unit.

Most of the acreage of the Bethlehem soil is used as cropland, hayland, or pasture. Some small areas are used as woodland.

This soil is suited to woodland. Overstory trees include chestnut oak, Virginia pine, black oak, white oak, scarlet oak, hickory, shortleaf pine, eastern white pine, and red maple. Understory plants include sourwood, flowering dogwood, American holly, sassafras, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry.

The depth to bedrock is the main limitation affecting timber production. It results in a moderate windthrow hazard, particularly for pine and other trees that have a taproot. Thinning should be held to a minimum, or the stand should not be thinned at all. A management plan for the periodic removal of windthrown trees is advisable.

This soil is suited to most of the field and truck crops commonly grown in the county. The slope, the hazard of erosion, the irregular topography, and narrow ridgetops are management concerns. Coarse fragments in the surface layer and the depth to bedrock limit the amount of water available for plant growth. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, and field borders improve tilth, conserve moisture, help to control erosion, and minimize offsite damage caused by sedimentation. Because of the irregular topography and narrow ridgetops, fields are small. Farming on the contour and stripcropping are difficult in these small fields.

This soil is suited to pasture and hay. Coarse fragments in the surface layer and the depth to bedrock limit the amount of water available for plant growth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to most urban uses. The depth to bedrock, a high content of clay, and low strength in the subsoil are the main limitations. The depth to bedrock affects the ease of digging, filling, and compacting. It should be examined carefully at construction sites. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface. The soil is poorly suited to septic tank absorption fields because of the depth to bedrock.

The capability subclass is IIIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 7D.

BeC—Bethlehem gravelly sandy loam, 8 to 15 percent slopes. This moderately deep, well drained, strongly sloping soil is on Piedmont side slopes and ridgetops, generally in the southwestern part of the county. Individual areas are irregular in shape and range from 4 to about 50 acres in size.

Typically, the surface layer is strong brown gravelly sandy loam about 8 inches thick. The next 4 inches is yellowish red sandy clay loam. The subsoil is red clay about 13 inches thick. The next 6 inches is red very gravelly sandy clay loam. Soft bedrock is at a depth of about 31 inches. In some eroded areas the surface layer is gravelly sandy clay loam.

This soil is moderately permeable. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Pacolet, Hibriten, and Chewacla soils. Pacolet soils are very deep and are on smooth parts of side slopes. Hibriten soils average more than 35 percent rock fragments throughout. They are on knobs, shoulder slopes, and nose slopes. Chewacla soils are on flood plains and are somewhat poorly drained. They have a loamy subsoil. Also included are some scattered areas of soils that may have soft bedrock at a depth of 40 to 60 inches and a few scattered areas of soils that have a loamy subsoil or have a high content of mica in the lower part. Included soils make up about 15 to 25 percent of this map unit.

Most of the acreage of the Bethlehem soil is used as woodland. Some areas are used as pasture.

This soil is suited to woodland. Overstory trees include chestnut oak, Virginia pine, black oak, white oak, scarlet oak, hickory, shortleaf pine, eastern white pine, and red maple. Understory plants include sourwood, flowering dogwood, American holly, sassafras, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry.

The depth to bedrock is the main limitation affecting timber production. It results in a moderate windthrow hazard, particularly for pine and other trees that have a taproot. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable.

This soil is suited to most of the field and truck crops commonly grown in the county. The slope, the hazard of erosion, the irregular topography, and the narrow side slopes and ridgetops are management concerns. Rock fragments in the surface layer and the depth to bedrock limit the amount of water available for plant growth. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation. Because of the irregular topography and the narrow side slopes and ridgetops, fields are small. Farming on the contour and stripcropping are difficult in these small fields.

This soil is suited to pasture and hay. Rock fragments in the surface layer and the depth to bedrock limit the amount of water available for plant growth. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to most urban uses. The depth to bedrock, the slope, a high content of clay, and low strength in the subsoil are the main limitations. The depth to bedrock affects the ease of digging, filling, and compacting. It should be examined carefully at construction sites. Strongly sloping areas require extensive cutting and filling and detailed site planning. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface. The soil is poorly suited to septic tank absorption fields because of the depth to bedrock.

The capability subclass is IVe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 7D.

BrC—Bethlehem-Urban land complex, 2 to 15 percent slopes. This map unit consists of a moderately deep, well drained, gently sloping and strongly sloping Bethlehem soil intermingled with Urban land. The unit is on Piedmont ridgetops and side slopes, primarily in and around small communities and housing developments in the southwestern part of the county. Individual areas are irregular in shape and range from 10 to about 50 acres in size. The Bethlehem soil makes up about 45 percent of the map unit, and the Urban land makes up about 30 percent. The Bethlehem soil and Urban land occur as areas so intricately mixed that separating them is not practical at the scale selected for mapping.

The Bethlehem soil consists of undisturbed areas between buildings, roads, streets, and parking lots. Typically, the soil has a surface layer of strong brown gravelly sandy loam about 8 inches thick. The next 4 inches is yellowish red sandy clay loam. The subsoil is red clay about 13 inches thick. The next 6 inches is red very gravelly sandy clay loam. Soft bedrock is at a depth of about 31 inches. In some eroded areas the surface layer is gravelly sandy clay loam.

The Bethlehem soil is moderately permeable. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

The Urban land consists of areas where the soil is largely covered by concrete, asphalt, buildings, or other structures.

Included in this map unit are small areas of Udorthents and Pacolet and Hibriten soils. Udorthents, which consist of areas of cut and fill material, are adjacent to the Urban land. Pacolet soils are very deep. They are on the wide parts of some ridgetops and side slopes. Hibriten soils average more than 35 percent rock fragments throughout. They are on knobs, shoulder slopes, and nose slopes. Also included are some scattered areas of soils that have soft bedrock at a depth of 40 to 60 inches and a few scattered areas of soils that have a loamy subsoil or a high content of mica in the lower part. Included soils make up about 25 percent of this map unit.

Most of the acreage in this map unit is used for yards, gardens, recreational purposes, and landscaping in and around the Urban land. The open areas make up from 500 to about 7,000 square feet in size. They are too small for commercial wood production, cropland, pasture, or hayland.

The Bethlehem soil is suited to most urban uses. The depth to bedrock, the slope, a high content of clay, and low strength in the subsoil are the main limitations. The depth to bedrock affects the ease of digging, filling, and compacting. It should be carefully examined at the construction site. Extensive cutting and filling and detailed site planning are required where the slope exceeds 8 percent. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The Bethlehem soil is poorly suited to septic tank absorption fields because of the depth to bedrock. In undisturbed areas it is suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens, but cut, filled, or compacted areas may be poorly suited. Because the open areas are small, onsite investigation to determine the limitations of this map unit is needed.

The capability subclass is IVe in areas of the Bethlehem soil and VIIIs in areas of Urban land. This map unit has not been assigned a woodland ordination symbol.

BsC2—Braddock and Hayesville clay loams, 6 to 15 percent slopes, eroded. This map unit consists of very deep, well drained, gently sloping and strongly sloping Braddock and Hayesville soils on low mountain ridges, foot slopes, and high stream terraces in mountain valleys. Most areas are somewhat elongated and range from 4 to about 40 acres in size. Some areas are dominantly Braddock soil, some are dominantly Hayesville soil, and some are made up of both soils. These soils were not separated in mapping because they respond similarly to most kinds of use and management.

The Braddock soil is on foot slopes and high stream terraces. The Hayesville soil is on foot slopes, ridges, and nose slopes. Individual areas do not have a regular repeating pattern of these landscape positions.

Typically, the Braddock soil has a surface layer of yellowish red clay loam about 6 inches thick. The subsoil is red clay to a depth of 36 inches, mottled yellowish red and strong brown clay to a depth of 46 inches, yellowish red clay to a depth of 54 inches, and yellowish red gravelly clay loam that has light yellowish brown mottles to a depth of 60 inches. In some uneroded areas that have not been cultivated, the surface layer is sandy loam.

The Braddock soil is moderately permeable. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is more than 60 inches and commonly is more than 80 inches. The seasonal high water table is at a depth of more than 6 feet. Reaction is very

Figure 2.—An apple orchard in an area of Braddock and Hayesville clay loams, 6 to 15 percent slopes, eroded.

strongly acid or strongly acid, except where the surface layer has been limed.

Typically, the Hayesville soil has a surface layer of reddish brown clay loam about 7 inches thick. The upper part of the subsoil is red clay about 24 inches thick. The lower part is red clay loam about 10 inches thick. The underlying material to a depth of 60 inches is mottled strong brown and yellowish brown saprolite that has a texture of sandy loam.

The Hayesville soil is moderately permeable in the subsoil and moderately rapidly permeable in the underlying material. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with these soils in mapping are small areas of Evard soils. These included soils have a loamy subsoil. They are on side slopes and narrow ridgetops. Also included are a few areas of soils that have a loamy subsoil and are along drainageways and some scattered areas of soils that have stones on the surface. Included soils make up about 10 percent of this map unit.

Most of the acreage in this map unit is used as woodland. Some areas are used for pasture, hay, or orchards (fig. 2).

The Braddock and Hayesville soils are moderately suited to woodland. Overstory trees include Virginia pine, scarlet oak, white oak, red maple, eastern white pine, yellow-poplar, pitch pine, and chestnut oak. Understory plants include mountain laurel, greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

The texture of the surface layer and depth to the clayey part of the subsoil are the main limitations affecting timber production. The clay loam in the surface layer increases the seedling mortality rate. Reinforcement planting may be necessary. The clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods.

These soils are moderately suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, the hazard of erosion, and the slope are management concerns. Clods may form if the clay loam surface layer is tilled when the soil is too wet. Also, the germination of seeds may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation. If the soils are used for orchards, the trees should be planted on the contour and a cover of grasses is needed around the trees to control erosion.

These soils are moderately suited to pasture and hay. The slope, the hazard of erosion, depth to the clayey part of the subsoil, and the texture of the surface layer are management concerns in establishing sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

These soils are moderately suited to most urban uses. The slope, a high content of clay, the moderate permeability, and low strength in the subsoil are the main limitations. The moderate shrink-swell potential in the subsoil of the Braddock soil also is a limitation. Strongly sloping areas require extensive cutting and filling and detailed site planning. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields.

Structural damage on the Braddock soil can be prevented by designing roads, foundations, and footings so that they can withstand shrinking and swelling in the subsoil, by diverting runoff away from buildings, or by backfilling with material that has a low shrink-swell potential.

If the soils are used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is IVe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6C.

BsD2—Braddock and Hayesville clay loams, 15 to 25 percent slopes, eroded. This map unit consists of very deep, well drained, moderately steep Braddock and Hayesville soils on low mountain side slopes, foot slopes, and high stream terraces. Most areas are somewhat elongated and range from 4 to about 40 acres in size. Some areas are dominantly Braddock soil, some are dominantly Hayesville soil, and some are made up of both soils. These soils were not separated in mapping because they respond similarly to most kinds of use and management.

The Braddock soil is on colluvial foot slopes and high stream terraces, and the Hayesville soil is on side slopes and nose slopes. Individual areas do not have a regular repeating pattern of these landscape positions.

Typically, the Braddock soil has a surface layer of yellowish red clay loam about 6 inches thick. The subsoil is red clay to a depth of 36 inches, mottled yellowish red and strong brown clay to a depth of 46 inches, yellowish red clay to a depth of 54 inches, and yellowish red gravelly clay loam that has light yellowish brown mottles to a depth of 60 inches. In some uneroded areas that have not been cultivated, the surface layer is sandy loam.

The Braddock soil is moderately permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is more than 60 inches and commonly is more than 80 inches. The seasonal high water table is at a depth of more than 6 feet. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

Typically, the Hayesville soil has a surface layer of reddish brown clay loam about 7 inches thick. The subsoil to a depth of about 41 inches is red clay. The next 10 inches is red clay loam. The underlying material to a depth of 60 inches is mottled strong brown and yellowish brown saprolite that has a texture of sandy loam.

The Hayesville soil is moderately permeable in the subsoil and moderately rapidly permeable in the underlying material. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with these soils in mapping are small areas of Evard soils. These included soils have a loamy subsoil. They are on side slopes and nose slopes. Also included are a few soils that have a loamy subsoil and are along drainageways and some areas of soils that have stones on the surface. Included soils make up about 10 percent of this map unit.

Most of the acreage in this map unit is used as woodland. Some areas are used for pasture, hay, or orchards.

The Braddock and Hayesville soils are moderately suited to woodland. Overstory trees include Virginia pine, scarlet oak, white oak, red maple, eastern white pine, pitch pine, yellow-poplar, and chestnut oak. Understory plants include mountain laurel, greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

The slope, the texture of the surface layer, and depth to the clayey part of the subsoil are the main limitations affecting timber production. The slope increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be designed on the contour. Water bars help to break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. The clay loam in the surface layer increases the seedling mortality rate. Reinforcement planting may be necessary. The clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods.

These soils are poorly suited to most of the field and truck crops commonly grown in the county. The slope, the texture of the surface layer, and the hazard of erosion are the main management concerns. If the soils are used for orchards, the trees should be planted on the contour and a cover of grasses is needed around the trees to control erosion.

These soils are moderately suited to pasture and hay. The slope, depth to the clayey part of the subsoil, and the texture of the surface layer are management concerns in establishing sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

These soils are poorly suited to most urban uses. The slope, a high content of clay, the moderate permeability, and low strength in the subsoil are the main limitations. The moderate shrink-swell potential of the Braddock soil also is a limitation. Moderately steep areas require extensive cutting and filling and detailed site planning. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields.

Structural damage on the Braddock soil can be prevented by designing roads, foundations, and footings so that they can withstand shrinking and swelling in the subsoil, by diverting runoff away from buildings, or by backfilling with material that has a low shrink-swell potential.

If the soils are used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is VIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6C in areas of the Braddock soil and 6R in areas of the Hayesville soil.

BuA—Buncombe loamy sand, 0 to 3 percent slopes, occasionally flooded. This very deep, excessively drained, nearly level and gently sloping soil is on Piedmont flood plains, adjacent to the larger streams in the county. Most areas are long and narrow and range from 4 to about 50 acres in size.

Typically, the surface layer is dark yellowish brown loamy sand about 7 inches thick. The underlying material to a depth of 60 inches is loamy sand. It is dark yellowish brown in the upper part and brownish yellow in the lower part.

This soil is rapidly permeable. Surface runoff is slow in bare or unprotected areas. The shrink-swell potential of the underlying material is low. The depth to bedrock is more than 60 inches and commonly is more than 80 inches. The seasonal high water table is at a depth of more than 6 feet. The soil is occasionally flooded for very brief periods. Reaction is very strongly acid to slightly acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Riverview and Chewacla soils. The included soils have loamy horizons that extend to a depth of more than 40 inches. Riverview soils are away from stream channels, often in a slightly lower landscape position. Chewacla soils are somewhat poorly drained. They are in depressions. Also included are a few borrow areas that have been excavated for sand. The borrow areas may consist of small pits or mounds, unless they are reshaped. Included soils make up about 20 percent of this map unit.

Most of the Buncombe soil is used as woodland. Some areas have been cleared of trees and are used as pasture.

This soil is suited to woodland. Overstory trees include American sycamore, green ash, red maple, yellow-poplar, river birch, black walnut, and black willow. Understory plants include alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, giant cane, poison ivy, and wild grape.

The texture of the surface layer is the main limitation affecting timber production. The loamy sand in the surface layer and the occasional flooding limit the use of planting or harvesting equipment. The equipment should be operated only during dry periods. The loamy sand in the surface layer also increases the seedling mortality rate. Reinforcement planting may be needed.

This soil is poorly suited to most of the field and truck crops commonly grown in the county. Droughtiness, leaching of nutrients, and the flooding are management concerns. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and improve fertility, the available water capacity, and tilth. Split applications of fertilizer are needed to offset the effects of leaching of nutrients.

This soil is suited to pasture and hay. Droughtiness and the flooding can be management concerns on this soil. Grasses should be selected that are more tolerant of drought. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses. The flooding is the main hazard.

The capability subclass is IVw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8S.

CeB2—Cecil sandy clay loam, 2 to 8 percent slopes, eroded. This very deep, well drained, gently sloping soil is on broad Piedmont ridgetops. Individual areas are irregular in shape and range from 4 to more than 500 acres in size.

Typically, the surface layer is strong brown sandy clay loam about 8 inches thick. The subsoil extends to a depth of 60 inches. The upper part is yellowish red clay. The next part is red clay that has strong brown mottles. The lower part is red clay loam that has strong brown mottles. In some uneroded areas the surface layer is sandy loam. In other areas the soil has a strong brown subsoil.

This soil is moderately permeable. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Pacolet and Davidson soils. Pacolet soils have a thinner subsoil than the Cecil soil. They are on the narrow part of ridgetops. Davidson soils have a dark red subsoil. They are on high stream terraces. Also included are areas of soils that have a high content of mica in the lower part. Included soils make up about 10 percent of this map unit.

Most of the acreage of the Cecil soil is used for cultivated crops, pasture (fig. 3), or hay. Many areas are used for urban development.

This soil is suited to woodland. Overstory trees include scarlet oak, white oak, black oak, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory plants include sourwood, flowering dogwood, American holly, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry.

Depth to the clayey part of the subsoil and the texture of the surface layer are the main limitations affecting timber production. Depth to the clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods. The sandy clay loam in the surface layer increases the seedling mortality rate. Reinforcement planting may be necessary.

This soil is well suited to most of the field and truck crops commonly grown in the county. The texture of the surface layer, the hazard of erosion, and the slope are management concerns. Clods form if the sandy clay loam surface layer is tilled when the soil is too wet. Also, the germination of seeds may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This soil is well suited to pasture and hay. Depth to the clayey part of the subsoil and the texture of the surface layer are management concerns in establishing sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to most urban uses. A high content of clay and low strength in the subsoil are the main limitations. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is IIIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 7C.

CfB—Cecil-Urban land complex, 2 to 8 percent slopes. This map unit consists of a very deep, well drained, gently sloping Cecil soil intermingled with Urban land. The unit is on Piedmont ridgetops, primarily in and around small towns and housing developments throughout the county. Individual areas generally are

Figure 3.—A pastured area of Cecil sandy clay loam, 2 to 8 percent slopes, eroded.

irregular in shape and range from 10 to about 50 acres in size. The Cecil soil makes up about 50 percent of the map unit, and Urban land makes up about 30 percent. The Cecil soil and Urban land occur as areas so intricately mixed that separating them is not practical at the scale selected for mapping.

The Cecil soil consists of undisturbed areas between buildings, roads, streets, and parking lots. Typically, the surface layer is strong brown sandy clay loam about 8 inches thick. The subsoil extends to a depth of 60 inches. The upper part is yellowish red clay. The next part is red clay that has strong brown mottles. The lower part is red clay loam that has strong brown mottles. In some uneroded areas the surface layer is sandy loam.

The Cecil soil is moderately permeable. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

The Urban land consists of areas where the soil is largely covered by concrete, asphalt, buildings, or other structures.

Included with this map unit are small areas of Udorthents and Pacolet soils. Udorthents, which consists of areas of cut and fill material, are adjacent to the Urban land. Pacolet soils have a thinner subsoil than the Cecil soil. They are on the narrow part of ridgetops. Also included are a few areas of soils that have a high content of mica in the lower part. Included soils make up about 20 percent of this map unit.

Most of the acreage in this map unit is used for yards, gardens, recreational purposes, and landscaping in and around the Urban land. The open areas make up from 500 to 7,000 square feet in size. They are too small for commercial wood production, cropland, pasture, or hay.

The Cecil soil is suited to most urban uses. A high content of clay and low strength in the subsoil are the main limitations. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

In undisturbed areas the Cecil soil is suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens, but cut, filled, or compacted areas may be poorly suited. Because the open areas are small, onsite investigation to determine the limitations of this map unit is needed.

The capability subclass is IIIe in areas of the Cecil soil and VIIIs in areas of Urban land. This map unit has not been assigned a woodland ordination symbol.

ChA—Chewacla loam, 0 to 2 percent slopes, frequently flooded. This very deep, somewhat poorly drained, nearly level soil is on flood plains in the Piedmont. Most areas are long and narrow and range from 4 to more than 200 acres in size.

Typically, the surface layer is brown loam about 8 inches thick. The subsoil is about 33 inches thick. The upper part is brown loam that has strong brown and grayish brown mottles. The next part is dark gray loam that has yellowish red mottles. The lower part is dark gray sandy clay loam that has yellowish red mottles. The underlying material to a depth of 60 inches is gray and yellowish brown very gravelly loamy sand. In some areas the soil has a thin layer of sandy overwash. In other areas reaction is neutral. In places the soil is occasionally flooded.

This soil is moderately permeable. Surface runoff is slow in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of 0.5 foot to 1.5 feet. The soil is frequently flooded for brief periods. Reaction is very strongly acid to slightly acid to a depth of 40 inches, except where the surface layer has been limed, and is very strongly acid to mildly alkaline below a depth of 40 inches.

Included with this soil in mapping are small areas of Buncombe, Riverview, Wehadkee, Dogue, and French soils. The excessively drained, sandy Buncombe and well drained Riverview soils are adjacent to the deeper stream channels. The poorly drained Wehadkee soils are in depressions. The moderately well drained Dogue soils are on low stream terraces. They have a predominantly clayey subsoil. French soils are underlain by gravelly sediments within a depth of 40 inches. They are along streams that flow out of the mountains. Also included are soils that have less than 18 percent clay in the subsoil. Included soils make up about 25 percent of this map unit.

Most of the larger areas of the Chewacla soil are used as pasture, hayland, or cropland. The smaller areas are used mainly as woodland.

This soil is suited to woodland. Overstory trees include American sycamore, green ash, red maple, yellow-poplar, river birch, blackgum, sweetgum, and black willow. Understory plants include alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, giant cane, poison ivy, and wild grape.

The depth to a seasonal high water table is the main limitation affecting timber production. The high water table and the frequent flooding limit the use of planting or harvesting equipment. The equipment should be operated only during dry periods. The seasonal high water table limits the rooting depth and results in a moderate windthrow hazard. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable.

This soil is suited to most of the field and truck crops commonly grown in the county. The wetness and the flooding are management concerns. A surface and subsurface drainage system may be needed to improve productivity. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and improve fertility, the available water capacity, and tilth.

This soil is suited to pasture and hay. The wetness and the flooding are the main management concerns. A surface and subsurface drainage system may be needed to improve productivity. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses. The flooding and the wetness are severe limitations.

The capability subclass is IVw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8W.

CnF—Cleveland-Rock outcrop complex, 8 to 90 percent slopes. This map unit consists of areas of a somewhat excessively drained, strongly sloping to very steep Cleveland soil intermingled with areas of Rock outcrop on mountain side slopes. Stones and boulders are on the surface of the Cleveland soil. Individual areas are irregular in shape and range from 5 to more than 250 acres in size. The Cleveland soil makes up about 45 percent of the map unit, and Rock outcrop makes up about 40 percent. Rock outcrop is so intricately mixed with the Cleveland soil that separating them is not practical at the scale selected for mapping.

The Cleveland soil is commonly in areas of the map unit that support trees and other vegetation. Areas of Rock outcrop are scattered throughout the map unit but generally are on the steepest part of the landscape.

Typically, the Cleveland soil has a surface layer of brown gravelly sandy loam about 7 inches thick. The subsoil is dark yellowish brown gravelly sandy loam about 5 inches thick. Hard, granitic gneiss bedrock is at a depth of about 12 inches.

The Cleveland soil is moderately rapidly permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to hard bedrock is 10 to 20 inches. The seasonal high water table is at a depth of more than 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included in this map unit are small areas of Ashe soils. These soils are intermingled with areas of the Cleveland soil and Rock outcrop. The included soils have hard bedrock at a depth of 20 to 40 inches. They are on smooth slopes away from areas of Rock outcrop. Also included are soils that have bedrock within a depth of 10 inches and are adjacent to some areas of Rock outcrop. Included soils make up about 15 percent of this map unit.

All of the acreage in this map unit supports low-grade hardwoods and pine. This map unit is unsuited to commercial wood production. Overstory trees include scarlet oak, chestnut oak, northern red oak, hickory, blackjack oak, pitch pine, and Virginia pine. Understory plants include mountain laurel, blueberry, galax, arrowwood, eastern redcedar, and sourwood.

The slope, the depth to bedrock, and Rock outcrop are the main limitations affecting timber production. The slope results in a severe hazard of erosion. The slope and areas of Rock outcrop severely limit the use of equipment. Because of the depth to bedrock, grading of any type of road would require blasting. Operating wheeled or tracked equipment is hazardous, and routes must be chosen with extreme care. The depth to bedrock and droughty condition of the Cleveland soil increases the seedling mortality rate. Also because of the depth to bedrock, the windthrow hazard is severe.

This map unit is unsuited to cultivated crops, pasture, hay, and urban uses because of the slope, the depth to bedrock, and Rock outcrop.

The Cleveland soil is in capability subclass VIIe, and Rock outcrop is in capability subclass VIIIs. Based on chestnut oak as the indicator species, the woodland ordination symbol is 2R in areas of the Cleveland soil. Rock outcrop has not been assigned a woodland ordination symbol.

CsD—Cowee-Saluda complex, 8 to 25 percent slopes, stony. This map unit consists of well drained, strongly sloping and moderately steep Cowee and Saluda soils on ridgetops in the mountains. The Cowee soil is moderately deep, and the Saluda soil is shallow. Rock fragments on the surface of these soils range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Individual areas are long and narrow or irregular in shape and range from 5 to more than 250 acres in size. The Cowee soil makes up about 70 percent of the map unit, and the Saluda soil makes up about 15 percent. These soils occur as areas so intricately mixed that separating them is not practical at the scale selected for mapping.

The Cowee soil is typically on the broad parts of ridgetops. The Saluda soil is typically on knobs and the narrow parts of ridgetops. In many places both soils are in the same landscape position.

Typically, the Cowee soil has a surface layer of dark brown gravelly sandy loam about 3 inches thick. The subsurface layer is strong brown gravelly sandy loam about 4 inches thick. The subsoil is red clay loam about 13 inches thick. The next 10 inches is red sandy clay loam. Soft bedrock is at a depth of about 30 inches.

The Cowee soil is moderately permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Typically, the Saluda soil has a surface layer of very dark grayish brown gravelly sandy loam about 2 inches thick. The next 4 inches is strong brown gravelly sandy loam. The subsoil is yellowish red sandy clay loam and clay loam about 12 inches thick. Soft bedrock is at a depth of about 18 inches.

The Saluda soil is moderately permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft bedrock is 10 to 20 inches. The depth to hard bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

Included with these soils in mapping are small, intermingled areas of Evard and Ashe soils. Evard soils have bedrock below a depth of 60 inches. They are on the broad parts of ridgetops. Ashe soils have hard bedrock at a depth of 20 to 40 inches. They are on knobs and at the end of some ridges. Also included are a few areas of soils intermingled with areas of the Cowee and Saluda soils that have a texture of clay in some part of the subsoil, a few scattered areas of soils that have a high content of mica in the lower part, and scattered areas of soils that have a very stony or very bouldery surface. Included soils make up about 15 percent of this map unit.

Most of the acreage in this map unit is used as woodland. Some small areas are used as pasture.

The Cowee and Saluda soils are moderately suited to trees. Overstory trees include chestnut oak, scarlet oak, black oak, white oak, black locust, hickory, red maple, Virginia pine, blackgum, Table Mountain pine, and pitch pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, ladyfern, and greenbrier.

The slope and the depth to bedrock are the main limitations affecting timber production. The slope increases the hazard of erosion and limits the use of equipment. Logging roads and skid trails should be designed on the contour. Water bars help to break the flow of water along roads. In exposed areas applying fertilizer and seeding help to control erosion. Because of the depth to bedrock, the windthrow hazard is moderate on the Cowee soil and severe on the Saluda soil. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. The depth to bedrock reduces the effective rooting depth and increases the seedling mortality rate in areas of the Saluda soil. Reinforcement planting may be needed.

These soils are poorly suited to most cultivated crops. The slope, the depth to bedrock, and rock fragments on the surface are the main limitations. Because of the slope, erosion is a severe hazard if these soils are used as cropland. The shallow root zone in the Saluda soil limits the amount of water available for plant growth. Rock fragments on the surface are a limitation during cultivation.

These soils are poorly suited to pasture and hay. The slope and rock fragments on the surface are the main limitations. The rock fragments limit the establishment of sod and mowing. The shallow root zone in the Saluda soil limits the amount of water available for plant growth.

These soils are poorly suited to most urban uses because of the depth to bedrock, the slope, the hazard of erosion, and rock fragments on or near the surface.

The capability subclass is VIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 2R in areas of the Cowee soil and 2D in areas of the Saluda soil.

CsE—Cowee-Saluda complex, 25 to 60 percent slopes, stony. This map unit consists of well drained, steep Cowee and Saluda soils on side slopes in the mountains. The Cowee soil is moderately deep, and the Saluda soil is shallow. Rock fragments on the surface of these soils range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Individual areas are irregular in shape and range from 15 to more than 500 acres in size. The Cowee soil makes up about 70 percent of the map unit, and the Saluda soil makes up about 15 percent. These soils occur as areas so intricately mixed that separating them is not practical at the scale selected for mapping.

The Cowee soil is typically on the smooth and low parts of side slopes. The Saluda soil is typically on shoulder slopes and nose slopes. In many places both soils are in the same landscape position.

Typically, the Cowee soil has a surface layer of dark brown gravelly sandy loam about 3 inches thick. The subsurface layer is strong brown gravelly sandy loam about 4 inches thick. The subsoil is red clay loam about 13 inches thick. The next 10 inches is red sandy clay loam. Soft bedrock is at a depth of about 30 inches.

The Cowee soil is moderately permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid.

Typically, the Saluda soil has a surface layer of very dark grayish brown gravelly sandy loam about 2 inches thick. The next 4 inches is strong brown gravelly sandy loam. The subsoil is yellowish red sandy clay loam and clay loam about 12 inches thick. Soft bedrock is at a depth of about 18 inches.

The Saluda soil is moderately permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft bedrock is 10 to 20 inches. The depth to hard bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid or strongly acid.

Included with these soils in mapping are small, intermingled areas of Evard and Ashe soils. Evard soils have bedrock below a depth of 60 inches. They are on the low part of side slopes. Ashe soils have hard bedrock at a depth of 20 to 40 inches. They are on shoulder slopes and nose slopes. Also included are a few intermingled areas of soils that have a texture of clay in some part of the subsoil, a few scattered areas of soils that have a high content of mica in the lower part, and scattered areas of soils that have a very stony or very bouldery surface. Included soils make up about 15 percent of this map unit.

Most of the acreage in this map unit is used as woodland. The Cowee and Saluda soils are moderately suited to trees. Overstory trees include chestnut oak, scarlet oak, black oak, white oak, black locust, hickory, red maple, Virginia pine, blackgum, Table Mountain pine, and pitch pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, ladyfern, and greenbrier.

The slope and the depth to bedrock are the main limitations affecting timber production. The slope increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on these slopes. In most areas extensive grading is needed to establish roads and trails. Logging roads and skid trails should be designed on the contour. Water bars help to break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. Because of the depth to bedrock, the windthrow hazard is moderate on the Cowee soil and severe on the Saluda soil. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. The depth to bedrock reduces the effective rooting depth and increases the seedling mortality rate in areas of the Saluda soil. Reinforcement planting may be needed.

These soils are unsuited to cultivated crops. The slope, the hazard of erosion, and rock fragments on the surface are the main management concerns. The shallow root zone in the Saluda soil limits the amount of water available for plant growth.

These soils are unsuited to pasture and hay. The slope and rock fragments on the surface are the main limitations. The slope increases the equipment limitation. The rock fragments limit the establishment of sod and mowing. The shallow root zone in the Saluda soil limits the amount of water available for plant growth.

These soils are unsuited to most urban uses because of the depth to bedrock, the slope, the hazard of erosion, and rock fragments on or near the surface.

The capability subclass is VIIe. Based on chestnut oak as the indicator species, the woodland ordination symbol is 2R.

DaB2—Davidson clay loam, 2 to 8 percent slopes, eroded. This very deep, well drained, gently sloping soil is on high stream terraces, mainly along the Catawba River. This soil typically is at slightly higher elevations than the surrounding residual soils. Most areas are somewhat elongated or irregular in shape and range from 4 to about 30 acres in size.

Typically, the surface layer is dark reddish brown clay loam about 6 inches thick. The subsoil extends to a depth of 65 inches. It is dark red clay.

This soil is moderately permeable. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Masada, Cecil, and Pacolet soils. The included soils have a red subsoil. Masada soils have a moderate shrink-swell potential in the subsoil. They are in scattered areas throughout the unit. Cecil and Pacolet soils formed in residuum. They are along the edges of some mapped areas. Included soils make up about 15 percent of this map unit.

Most of the Davidson soil is used as cropland, pasture, or hayland. Some of the smaller, steeper areas are used as woodland.

This soil is suited to woodland. Overstory trees include scarlet oak, white oak, red maple, loblolly pine, shortleaf pine, southern red oak, eastern white pine, yellow-poplar, sweetgum, and Virginia pine. Understory plants include greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

Depth to the clayey subsoil and the texture of the surface layer are the main limitations affecting timber production. The clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods. The clay loam in the surface layer increases the seedling mortality rate. Reinforcement planting may be needed.

This soil is suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, the hazard of erosion, and the slope are management concerns. Clods form if the clay loam surface layer is tilled when the soil is too wet. Also, the germination of seeds may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This soil is well suited to pasture and hay. Depth to the clayey subsoil and the texture of the surface layer are management concerns in establishing sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to most urban uses. The high content of clay and low strength in the subsoil are the main limitations. The moderate permeability in the clayey subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is IIIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 7C.

DaC2—Davidson clay loam, 8 to 15 percent slopes, eroded. This very deep, well drained, strongly sloping soil is on high stream terraces, mainly along the Catawba River. This soil typically is at slightly higher elevations than the surrounding residual soils. Most areas are somewhat elongated or irregular in shape and range from 4 to about 40 acres in size.

Typically, the surface layer is dark reddish brown clay loam about 6 inches thick. The subsoil extends to a depth of 65 inches. It is dark red clay.

This soil is moderately permeable. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Masada and Pacolet soils. The included soils have a red subsoil. Masada soils have a moderate shrink-swell potential in the subsoil. They are in scattered areas throughout the unit. Pacolet soils formed in residuum. They are on knobs or along the edge of some mapped areas. Included soils make up about 15 percent of this map unit.

Most of the Davidson soil is used as pasture, hayland, or cropland. Some of the steeper areas are used as woodland.

This soil is suited to woodland. Overstory trees include scarlet oak, white oak, red maple, loblolly pine, shortleaf pine, southern red oak, eastern white pine, yellow-poplar, sweetgum, and Virginia pine. Understory plants include greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

Depth to the clayey subsoil and the texture of the topsoil are the main limitations affecting timber production. The clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods. The clay loam in the surface layer increases the seedling mortality rate. Reinforcement planting may be needed.

This soil is suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, the hazard of erosion, and the slope are management concerns. Clods form if the clay loam surface layer is tilled when the soil is too wet. Also, the germination of seeds may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This soil is well suited to pasture and hay. The slope, depth to the clayey subsoil, and the texture of the surface layer are management concerns in establishing sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to most urban uses. The slope, a high content of clay, and low strength in the subsoil are the main limitations. Strongly sloping areas require extensive cutting and filling and detailed site planning. The moderate permeability in the clayey subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is IVe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 7C.

DoB—Dogue sandy loam, 2 to 6 percent slopes, rarely flooded. This very deep, moderately well drained, gently sloping soil is on low stream terraces along many of the larger streams in the county. Most areas are somewhat elongated and range from 4 to about 15 acres in size.

Typically, the surface layer is brown sandy loam about 7 inches thick. The subsoil is about 43 inches thick. The upper part is yellowish brown clay that has strong brown and red mottles. The next part is mottled yellowish brown, red, strong brown, and light gray clay. The lower part is mottled yellowish brown, red, strong brown, and light gray clay loam. The underlying material to a depth of 60 inches is yellowish brown gravelly sandy clay loam that has strong brown and light gray mottles.

This soil is moderately slowly permeable in the subsoil and moderately permeable or moderately rapidly permeable in the underlying material. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of 1.5 to 3.0 feet. The soil is subject to rare flooding. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Masada and Chewacla soils. Masada soils are well drained. They are on knolls. Chewacla soils are somewhat poorly drained. They have a loamy subsoil and are on flood plains. Included soils make up about 5 percent of this map unit.

Most of the Dogue soil is used as cropland. Some areas are used as pasture or hayland.

This soil is well suited to woodland. Overstory trees include scarlet oak, white oak, red maple, yellow-poplar, shortleaf pine, southern red oak, American sycamore, eastern white pine, sweetgum, and Virginia pine. Understory plants include greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. No significant limitations affect woodland management.

This soil is well suited to most of the field and truck crops commonly grown in the county. The wetness, the slope, and the hazard of erosion are management concerns. Eliminating depressions and managing surface water improve productivity. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This soil is well suited to pasture and hay. The wetness is a limitation. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses. The flooding, the wetness, a high content of clay, the moderate shrink-swell potential, and low strength in the subsoil are the main limitations. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is IIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7A.

EcD—Evard-Cowee complex, 8 to 25 percent slopes, stony. This map unit consists of well drained, strongly sloping and moderately steep Evard and Cowee soils on ridgetops in the mountains. The Evard soil is very deep, and the Cowee soil is moderately deep. Rock fragments on the surface of these soils range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Individual areas are long and narrow or irregular in shape and range from 5 to more than 100 acres in size. The Evard soil makes up about 75 percent of the map unit, and the Cowee soil makes up about 20 percent. These soils occur as areas so intricately mixed that separating them is not practical at the scale selected for mapping.

The Evard soil is typically on the wide parts of ridgetops. The Cowee soil is typically on knobs and the narrow parts of ridgetops. In many places both soils are in the same landscape position.

Typically, the Evard soil has a surface layer of dark brown gravelly sandy loam about 3 inches thick. The subsurface layer is strong brown gravelly sandy loam about 4 inches thick. The next 3 inches is yellowish red sandy clay loam. The subsoil is red clay loam about 12 inches thick. The next 13 inches is yellowish red sandy clay loam. The underlying material extends to a depth of 60 inches. The upper part is strong brown saprolite that has a texture of fine sandy loam. The lower part is yellowish brown saprolite that has a texture of sandy loam.

The Evard soil is moderately permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Typically, the Cowee soil has a surface layer of dark brown gravelly sandy loam about 3 inches thick. The subsurface layer is strong brown gravelly sandy loam about 4 inches thick. The subsoil is red clay loam about 13 inches thick. The next 10 inches is red sandy clay loam. Soft bedrock is at a depth of about 30 inches.

The Cowee soil is moderately permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with these soils in mapping are small, intermingled areas of Hayesville and Saluda soils. Hayesville soils have a predominantly clayey subsoil. They are on the broad parts of ridgetops. Saluda soils have soft bedrock within a depth of 20 inches. They are on knobs and at the end of ridges. Also included are a few scattered areas of soils that have a high content of mica in the lower part and scattered areas of soils that have a very stony or very bouldery surface. Included soils make up about 5 percent of this map unit.

Most of the acreage in this map unit is used as woodland. A small acreage is used for orchards.

The Evard and Cowee soils are moderately suited to trees. Overstory trees include white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, blackgum, pitch pine, and eastern white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier.

The slope is the main limitation affecting timber production. It limits the use of equipment and increases the hazard of erosion. Logging roads and skid trails should be designed on the contour. Water bars help to break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. Because of the depth to bedrock, the windthrow hazard is moderate on the Cowee soil. Thinning should be held to a minimum, or the stand on the Cowee soil should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable.

These soils are poorly suited to most cultivated crops. The slope and rock fragments on the surface are the main limitations. Because of the slope, the hazard of erosion is severe. Rock fragments are a limitation during cultivation. If the soils are used for orchards, the trees should be planted on the contour and a cover of grasses is needed around the trees to control erosion. The rock fragments hinder mowing.

These soils are moderately suited to pasture and hay. The slope and rock fragments on the surface are the main limitations. The rock fragments limit the establishment of sod and mowing. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

These soils are poorly suited to most urban uses because of the slope, the hazard of erosion, and rock fragments on the surface. Also, the depth to bedrock is a limitation in areas of the Cowee soil. Onsite investigation is needed before building site development is planned. Areas that have slopes of more than 15 percent require substantial cutting and filling. Areas of the Evard soil that have slope of less than 15 percent can be used for septic tank absorption fields. Proper installation and design are needed.

The capability subclass is VIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6R in areas of the Evard soil. Based on chestnut oak as the indicator species, the woodland ordination symbol is 2R in areas of the Cowee soil.

EcE—Evard-Cowee complex, 25 to 60 percent slopes, stony. This map unit consists of well drained, steep Evard and Cowee soils on side slopes in the mountains. The Evard soil is very deep, and the Cowee soil is moderately deep. Rock fragments on the surface of these soils range from boulders to cobbles, average about 1 foot in diameter, and are about 25 to 80 feet apart. Individual areas are irregular in shape and range from 15 to more than 500 acres in size. The Evard soil makes up about 80 percent of the map unit, and the Cowee soil makes up about 15 percent. These soils occur as areas so intricately mixed that separating them is not practical at the scale selected for mapping.

The Evard soil is typically on the smooth and low parts of side slopes. The Cowee soil is typically on shoulder slopes and nose slopes. In many places both soils are in the same landscape position.

Typically, the Evard soil has a surface layer of dark brown gravelly sandy loam about 3 inches thick. The subsurface layer is strong brown gravelly sandy loam about 4 inches thick. The next 3 inches is yellowish red sandy clay loam. The subsoil is red clay loam about 12 inches thick. The next 13 inches is yellowish red sandy clay loam. The underlying material extends to a depth of 60 inches. The upper part is strong brown saprolite that has a texture of fine sandy loam. The lower part is yellowish brown saprolite that has a texture of sandy loam.

The Evard soil is moderately permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Typically, the Cowee soil has a surface layer of dark brown gravelly sandy loam about 3 inches thick. The subsurface layer is strong brown gravelly sandy loam about 4 inches thick. The subsoil is red clay loam about 13 inches thick. The next 10 inches is red sandy clay loam. Soft bedrock is at a depth of about 30 inches.

The Cowee soil is moderately permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with these soils in mapping are small areas of Tate and Saluda soils. Tate soils formed in colluvium. They are along drainageways and on benches. Saluda soils have soft bedrock within a depth of 20 inches. They are on shoulder slopes and nose slopes. Also included are a few scattered areas of soils that have a high content of mica in the lower part and scattered areas of soils that have a very stony or very bouldery surface. Included soils make up about 5 percent of this map unit.

Most of the acreage in this map unit is used as woodland. A small acreage is used for orchards.

The Evard and Cowee soils are moderately suited to trees. Overstory trees include white oak, scarlet oak, yellow-poplar, black locust, chestnut oak, northern red oak, hickory, red maple, Virginia pine, blackgum, pitch pine, and eastern white pine. Understory plants include mountain laurel, blueberry, sourwood, flowering dogwood, Fraser magnolia, Christmas fern, and greenbrier.

The slope is the main limitation affecting timber production. It increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on these slopes. In most areas extensive grading is needed to establish roads and trails. Logging roads and skid trails should be designed on the contour. Water bars help to break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. Because of the depth to bedrock, the windthrow hazard is moderate on the Cowee soil. Thinning should be held to a minimum, or the stand on the Cowee soil should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable.

These soils are unsuited to most cultivated crops. The slope and rock fragments on the surface are the main limitations. If the soils are used for orchards, the trees should be planted on the contour and a cover of grasses is needed around the trees to control erosion. The rock fragments and the slope hinder mowing.

These soils are unsuited to pasture and hay. The slope and rock fragments on the surface are the main limitations.

These soils are unsuited to most urban uses because of the slope, the hazard of erosion, and rock fragments on or near the surface. Also, the depth to bedrock is a limitation on the Cowee soil.

The capability subclass is VIIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6R in areas of the Evard soil. Based on chestnut oak as the indicator species, the woodland ordination symbol is 2R in areas of the Cowee soil.

HbC—Hibriten very cobbly sandy loam, 8 to 15 percent slopes. This moderately deep, well drained, strongly sloping soil is on Piedmont side slopes and ridgetops, mostly in the southwestern part of the county. Individual areas are irregular in shape and range from 4 to about 50 acres in size.

Typically, the surface layer is brown very cobbly sandy loam about 6 inches thick. The next 7 inches is brownish yellow very cobbly sandy loam. The subsoil extends to a depth of 28 inches. It is strong brown very cobbly sandy clay loam in the upper part and yellowish red very cobbly clay loam in the lower part. Soft bedrock is at a depth of about 28 inches.

This soil is moderately permeable. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

Included with this soil in mapping are small, intermingled areas of Bethlehem and Rion soils. These soils have less than 35 percent rock fragments in the subsoil. Bethlehem soils have a predominantly clayey subsoil. Rion soils are very deep. Included soils make up about 25 percent of this map unit.

Most of the acreage of the Hibriten soil is used as woodland. Some areas are used as pasture or hayland.

This soil is suited to woodland. Overstory trees include chestnut oak, Virginia pine, black oak, scarlet oak, white oak, hickory, shortleaf pine, eastern white pine, pitch pine, and red maple. Understory plants include sourwood, flowering dogwood, American holly, sassafras, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry.

The depth to bedrock and rock fragments in the surface layer are the main limitations affecting timber production. The depth to bedrock results in a moderate windthrow hazard, particularly for pine and other trees that have a taproot. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. Rock fragments in the surface layer limit the amount of water available for plant growth and increase the seedling mortality rate. Reinforcement planting may be needed.

This soil is poorly suited to cultivated crops. The slope, rock fragments in the soil, the depth to bedrock, the hazard of erosion, and the irregular topography are the main management concerns. The slope increases the hazard of erosion. Rock fragments in the surface layer limit the amount of water available for plant growth and make tillage difficult. The depth to bedrock also reduces the amount of water available for plant growth and creates droughty conditions. The irregular topography limits the size and shape of the field. Farming on the contour is difficult.

This soil is poorly suited to pasture and hay. The content and size of rock fragments and the depth to bedrock are the main limitations. The rock fragments and the depth to bedrock limit the amount of water available for plant growth and create droughty conditions.

This soil is poorly suited to most urban uses. The depth to bedrock, the content and size of rock fragments, and the slope are the main limitations. The depth to bedrock and the rock fragments affect the ease of digging, filling, and compacting. They should be carefully examined at the construction site. Strongly sloping areas require extensive cutting and filling and detailed site planning.

The capability subclass is VIs. Based on chestnut oak as the indicator species, the woodland ordination symbol is 3D.

HbE—Hibriten very cobbly sandy loam, 15 to 60 percent slopes. This moderately deep, well drained, moderately steep and steep soil is on Piedmont side slopes, mostly in the southwestern part of the county. Individual areas are irregular in shape and range from 4 to about 200 acres in size.

Typically, the surface layer is brown very cobbly sandy loam about 6 inches thick. The next layer is brownish yellow very cobbly sandy loam about 7 inches thick. The subsoil extends to a depth of 28 inches. It is strong brown very cobbly sandy clay loam in the upper part and yellowish red very cobbly clay loam in the lower part. Soft bedrock is at a depth of about 28 inches.

This soil is moderately permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to soft bedrock is 20 to 40 inches. The depth to hard bedrock is more than 40 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Rion and Chewacla soils. Rion soils have less than 35 percent rock fragments throughout. They are very deep and are on the smooth parts of side slopes. Chewacla soils are on flood plains. They are somewhat poorly drained. Also included are some small areas of soils that have ledges of bedrock within a depth of 40 inches and a few areas of Rock outcrop. Included areas make up about 20 percent of this map unit.

Most of the acreage of the Hibriten soil is used as woodland. A few areas are used as pasture.

This soil is suited to woodland. Overstory trees include chestnut oak, Virginia pine, black oak, scarlet oak, white oak, hickory, shortleaf pine, eastern white pine, pitch pine, and red maple. Understory plants include sourwood, flowering dogwood, American holly, sassafras, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry.

The slope, the depth to bedrock, and rock fragments in the surface layer are the main limitations affecting timber production. The slope increases the hazard of erosion and limits the use of equipment. Extreme caution is needed when vehicles are operated on slopes of more than 25 percent. On slopes of more than 25 percent, extensive grading is needed to establish roads and trails. Logging roads and skid trails should be designed on the contour. Water bars help to break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion. Because of the depth to bedrock, the windthrow hazard is moderate, particularly for pine and other trees that have a taproot. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. Rock fragments in the soil limit the amount of water available for plant growth and increase the seedling mortality rate. Reinforcement planting may be needed.

This soil is unsuited to cultivated crops. The slope, droughtiness, the content and size of the rock fragments, and the hazard of erosion are the main management concerns.

This soil is unsuited to pasture and hay. The slope, the content and size of the rock fragments, and droughtiness are the main limitations. The slope increases the hazard of erosion and limits the use of equipment. Rock fragments and the depth to bedrock limit the amount of water available for plant growth.

This soil is unsuited to most urban uses. The depth to bedrock, the content and size of rock fragments, and the slope are the main limitations. The depth to bedrock and rock fragments affect the ease of digging, filling, and compacting. They should be carefully examined at construction sites. Areas that have a steep slope require extensive cutting and filling and detailed site planning.

The capability subclass is VIIs. Based on chestnut oak as the indicator species, the woodland ordination symbol is 3R.

MaB2—Masada sandy clay loam, 2 to 8 percent slopes, eroded. This very deep, well drained, gently sloping soil is on high stream terraces along many of the larger streams in the Piedmont. Most areas are somewhat elongated and range from 4 to about 30 acres in size.

Typically, the surface layer is yellowish red sandy clay loam about 8 inches thick. The subsoil extends to a depth of 45 inches. The upper part is red clay, and the lower part is yellowish red clay loam. The next layer to a depth of 60 inches is strong brown loam. In some uneroded areas that have not been cultivated extensively, the surface layer is sandy loam.

This soil is moderately permeable. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Davidson, Dogue, and State soils. Davidson soils have a dark red subsoil. They are in scattered areas throughout the unit. The moderately well drained Dogue soils are along small drainageways and in depressions. State soils have a loamy subsoil. They are intermingled with areas of the Masada soil throughout the map unit. Also included are a few intermingled areas of soils that range to neutral in some part of the subsoil and a few areas along Lake Hickory that have been developed for urban uses. Included soils make up about 15 percent of this map unit.

Most of the Masada soil is used as pasture, hayland, or cropland. Some areas are used for urban development.

This soil is suited to woodland. Overstory trees include scarlet oak, white oak, red maple, loblolly pine, shortleaf pine, southern red oak, eastern white pine, yellow-poplar, and Virginia pine. Understory plants include greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

Depth to the clayey part of the subsoil and the texture of the surface layer are the main limitations affecting timber production. The clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods. The sandy clay loam in the surface layer increases the seedling mortality rate. Reinforcement planting may be needed.

This soil is suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, the hazard of erosion, and the slope are the main management concerns. Clods form if the sandy clay loam surface layer is tilled when the soil is too wet. Also, the germination of seeds may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This soil is well suited to pasture and hay. Depth to the clayey part of the subsoil and the texture of the surface layer are management concerns in establishing sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to most urban uses. A high content of clay, the moderate shrink-swell potential, and low strength in the subsoil are the main limitations. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. Structural damage can be prevented by designing roads, foundations, and footings so that they can withstand shrinking and swelling in the subsoil, by diverting runoff away from buildings, or by backfilling with material that has a low shrink-swell potential. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is IIIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 10C.

MaC2—Masada sandy clay loam, 8 to 15 percent slopes, eroded. This very deep, well drained, strongly sloping soil is on high stream terraces in the Piedmont. Most areas are somewhat elongated and range from 4 to about 40 acres in size.

Typically, the surface layer is yellowish red sandy clay loam about 8 inches thick. The subsoil extends to a depth of 45 inches. The upper part is red clay, and the lower part is yellowish red clay loam. The next layer to a depth of 60 inches is strong brown loam. In some uneroded areas that have not been cultivated extensively, the surface layer is sandy loam.

This soil is moderately permeable. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Pacolet and Davidson soils. Pacolet soils formed in residuum. They are on knobs or on slopes adjacent to flood plains. Davidson soils have a dark red subsoil. They are in scattered areas throughout the unit. Also included are a few intermingled soils that range to neutral in some part of the subsoil and a few areas of soils along Lake Hickory that have been developed for urban uses. Included soils make up about 15 percent of this map unit.

Most of the Masada soil is used as pasture, hayland, or cropland. Some of the steeper areas are used as woodland.

This soil is suited to woodland. Overstory trees include scarlet oak, white oak, red maple, loblolly pine, shortleaf pine, southern red oak, eastern white pine, yellow-poplar, and Virginia pine. Understory plants include greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape.

Depth to the clayey part of the subsoil and the texture of the surface layer are the main limitations affecting timber production. The clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods. The sandy clay loam in the surface layer increases the seedling mortality rate. Reinforcement planting may be needed.

This soil is suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, the hazard of erosion, and the slope are the main management concerns. Clods form if the sandy clay loam surface layer is tilled when the soil is too wet. Also, the germination of seeds may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This soil is well suited to pasture and hay. The slope, depth to the clayey part of the subsoil, and the texture of the surface layer are management concerns in establishing sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to most urban uses. The slope, a high content of clay, the moderate shrink-swell potential, and low strength in the subsoil are the main limitations. Strongly sloping areas require extensive cutting and filling and detailed site planning. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. Structural damage can be prevented by designing roads, foundations, and footings so that they can withstand shrinking and swelling in the subsoil, by diverting runoff away from buildings, or by backfilling with material that has a low shrink-swell potential. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is IVe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 10C.

PaD—Pacolet sandy loam, 15 to 25 percent slopes. This very deep, well drained, moderately steep soil is on Piedmont side slopes throughout the county. Individual areas are irregular in shape and range from 4 to about 200 acres in size.

Typically, the surface layer is dark yellowish brown sandy loam about 5 inches thick. The next 4 inches is yellowish brown sandy loam. The subsoil is red clay about 19 inches thick. The next 10 inches is yellowish red clay loam. The underlying material to a depth of 60 inches is strong brown and yellowish brown saprolite that has a texture of sandy loam. In some eroded areas that have been cleared of trees and cultivated, the surface layer is sandy clay loam.

This soil is moderately permeable. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Bethlehem, Rion, and Chewacla soils. Bethlehem soils have soft bedrock at a depth of 20 to 40 inches. They are on the most dissected parts of side slopes and ridgetops, mainly in the southwestern part of the county. Rion and Chewacla soils have a loamy subsoil. Rion soils are in scattered areas throughout the unit. Chewacla soils are somewhat poorly drained and are on flood plains. Also included are a few areas of soils that have a high content of mica in the lower part. Included soils make up about 10 to 20 percent of this map unit.

Most of the acreage of the Pacolet soil is used as woodland. A few small areas are used as pasture.

This soil is suited to woodland. Overstory trees include scarlet oak, white oak, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory plants include sourwood, flowering dogwood, American holly, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry.

The slope and depth to the clayey part of the subsoil are the main limitations affecting timber production. They increase the hazard of erosion and limit the use of equipment. Logging equipment should be operated only during dry periods. Logging roads and skid trails should be designed on the contour. Water bars help to break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

This soil is poorly suited to most of the field and truck crops commonly grown in the county. The slope and the hazard of erosion are the main management concerns.

This soil is suited to pasture and hay. The slope and the hazard of erosion are the main management concerns. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses. The slope, a high content of clay, and low strength in the subsoil are the main limitations. Areas of moderately steep slopes require extensive cutting and filling and detailed site planning. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is VIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 8R.

PcB2—Pacolet sandy clay loam, 2 to 8 percent slopes, eroded. This very deep, well drained, gently sloping soil is on ridgetops in the Piedmont. Individual areas are irregular in shape and range from 4 to about 40 acres in size.

Typically, the surface layer is yellowish red sandy clay loam about 5 inches thick. The subsoil is red clay about 19 inches thick. The next 10 inches is red clay loam. The underlying material to a depth of 60 inches is strong brown and yellowish brown saprolite that has a texture of sandy loam. In some uneroded areas that have not been cultivated, the surface layer is sandy loam.

This soil is moderately permeable. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Cecil, Bethlehem, and Rion soils. Cecil soils have a solum that is more than 40 inches thick. They are on the wide parts of ridgetops. Bethlehem soils have soft bedrock at a depth of 20 to 40 inches. They are on the narrow parts of ridgetops in the southwestern part of the county. Rion soils have a loamy subsoil. They are in scattered areas throughout the map unit. Also included are a few scattered areas of soils that have a high content of mica in the lower part. Included soils make up about 10 to 20 percent of this map unit.

Most of the acreage of the Pacolet soil is used as cropland, pasture, or hayland. Some of the steeper areas are used as woodland.

This soil is suited to woodland. Overstory trees include scarlet oak, white oak, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory plants include sourwood, flowering dogwood, American holly, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry.

Depth to the clayey part of the subsoil and the texture of the topsoil are the main limitations affecting timber production. The clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods. The sandy clay loam in the topsoil increases the seedling mortality rate. Reinforcement planting may be needed.

This soil is well suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, the hazard of erosion, and the slope are management concerns. Clods form if the sandy clay loam surface layer is tilled when the soil is too wet. Also, the germination of seeds may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This soil is well suited to pasture and hay. Depth to the clayey part of the subsoil and the texture of the surface layer are management concerns in establishing sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to most urban uses. The high content of clay and low strength in the subsoil are the main limitations. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is IIIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 6C.

PcC2—Pacolet sandy clay loam, 8 to 15 percent slopes, eroded. This very deep, well drained, strongly sloping soil is on side slopes and ridgetops in the Piedmont. Individual areas are irregular in shape and range from 4 to about 150 acres in size.

Typically, the surface layer is yellowish red sandy

Figure 4.—Hay in an area of Pacolet sandy clay loam, 8 to 15 percent slopes, eroded.

clay loam about 5 inches thick. The subsoil is red clay about 19 inches thick. The next 10 inches is red clay loam. The underlying material to a depth of 60 inches is strong brown and yellowish brown saprolite that has a texture of sandy loam. In uneroded areas that have not been cultivated, the surface layer is sandy loam.

This soil is moderately permeable. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Cecil, Bethlehem, Rion, and Chewacla soils. Cecil soils have a solum that is more than 40 inches thick. They are in scattered areas throughout the unit. Bethlehem soils have soft bedrock at a depth of 20 to 40 inches. They are on the dissected parts of side slopes and ridgetops in the southwestern part of the county. Rion and Chewacla soils have a loamy subsoil. Rion soils are in scattered areas throughout the unit. Chewacla soils are somewhat poorly drained and are on flood plains. Also included are a few scattered areas of soils that have a high content of mica in the lower part. Included soils make up about 10 to 20 percent of this map unit.

Most of the acreage of the Pacolet soil is used as cropland, pasture, or hayland (fig. 4). A few of the steeper areas are used as woodland.

This soil is suited to woodland. Overstory trees include scarlet oak, white oak, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory plants include sourwood, flowering dogwood, American holly, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry.

Depth to the clayey part of the subsoil and the texture of the topsoil are the main limitations affecting timber production. The clayey part of the subsoil limits the use of equipment. Logging equipment should be operated only during dry periods. The sandy clay loam in the topsoil increases the seedling mortality rate. Reinforcement planting may be needed.

This soil is suited to most of the field and truck crops commonly grown in the county. The texture of the topsoil, the hazard of erosion, and the slope are management concerns. Clods form if the sandy clay loam surface layer is tilled when the soil is too wet. Also, the germination of seeds may not be uniform across the field. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This soil is well suited to pasture and hay. Depth to the clayey part of the subsoil and the texture of the surface layer are management concerns in establishing sod. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to most urban uses. The slope, a high content of clay, and low strength in the subsoil are the main limitations. Strongly sloping areas require extensive cutting and filling and detailed site planning. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is IVe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 6C.

PuC—Pacolet-Urban land complex, 2 to 15 percent slopes. This map unit consists of a very deep, well drained, gently sloping and strongly sloping Pacolet soil intermingled with Urban land. The unit is on ridgetops and side slopes, primarily in and around small towns and housing developments in the Piedmont. Individual areas are generally rectangular or irregular in shape and range from 10 to about 50 acres in size. The Pacolet soil makes up about 50 percent of the map unit, and the Urban land makes up about 30 percent. The Pacolet soil and Urban land occur as areas so intricately mixed that separating them is not practical at the scale selected for mapping.

The Pacolet soil consists of undisturbed areas between buildings, roads, streets, and parking lots. Typically, the surface layer is yellowish red sandy clay loam about 5 inches thick. The subsoil is red clay about 19 inches thick. The next 10 inches is red clay loam. The underlying material to a depth of 60 inches is strong brown and yellowish brown saprolite that has a texture of sandy loam. In some uneroded areas that have not been cultivated extensively in the past, the surface layer is sandy loam.

The Pacolet soil is moderately permeable. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

The Urban land consists of areas where the soil is largely covered by concrete, asphalt, buildings, or other structures.

Included with this map unit are small areas of Udorthents and Cecil, Bethlehem, and Rion soils. Udorthents, which consist of areas of cut and fill material, are adjacent to the Urban land. Cecil soils have a solum that is more than 40 inches thick. They are in scattered areas throughout the unit. Bethlehem soils have soft bedrock at a depth of 20 to 40 inches. They are on dissected parts of side slopes and ridgetops in the southwestern part of the county. Rion soils have a loamy subsoil. They are in scattered areas throughout the unit. Also included are a few scattered areas of soils that have a high content of mica in the lower part. Included soils make up about 20 percent of this map unit.

Most of the acreage in this map unit is used for yards, gardens, recreational purposes, and landscaping in and around the Urban land. The open areas make up from 500 to about 7,000 square feet in size. They are too small for commercial wood production, cropland, pasture, or hayland.

The Pacolet soil is suited to most urban uses. The slope, a high content of clay, and low strength in the subsoil are the main limitations. Extensive cutting and filling and detailed site planning are needed where the slope exceeds 8 percent. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

In undisturbed areas the Pacolet soil is suited to lawn grasses, shade trees, ornamental trees, shrubs, vines, and vegetable gardens, but cut, filled, or compacted areas may be poorly suited. Because the open areas are small, onsite investigation to determine the limitations of this map unit is needed.

The capability subclass is IIIe in areas of the Pacolet soil and VIIIs in areas of Urban land. This map unit has not been assigned a woodland ordination symbol.

RnC—Rion sandy loam, 8 to 15 percent slopes. This very deep, well drained, strongly sloping soil is on Piedmont side slopes and ridgetops, primarily in the northeastern part of the county. Individual areas are irregular in shape and range from 4 to about 200 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 2 inches thick. The subsurface layer is brown sandy loam about 4 inches thick. The subsoil is strong brown sandy clay loam about 19 inches thick. The next 5 inches is brownish yellow sandy loam. The underlying material to a depth of 60 inches is brownish yellow, strong brown, and white saprolite that has a texture of sandy loam. In some eroded areas that have been extensively cultivated, the surface layer is sandy clay loam.

This soil is moderately permeable in the subsoil and moderately rapidly permeable in the underlying material. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Pacolet, Wedowee, and Chewacla soils. Pacolet and Wedowee soils have a predominantly clayey subsoil. They are in scattered areas throughout the unit. Chewacla soils are somewhat poorly drained and are on flood plains. Also included are scattered areas of soils that have bedrock within a depth of 40 inches. Included soils make up about 10 to 20 percent of this map unit.

Most of the acreage of the Rion soil is used as cropland, pasture, or hayland. Some of the steeper areas are used as woodland.

This soil is well suited to woodland. Overstory trees include scarlet oak, white oak, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory plants include sourwood, flowering dogwood, American holly, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry. No significant limitations affect woodland management.

This soil is suited to most of the field and truck crops commonly grown in the county. It also is preferred for tobacco. The slope and the hazard of erosion are management concerns. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This soil is well suited to pasture and hay. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to most urban uses. The slope is the main limitation. Strongly sloping areas require extensive cutting and filling and detailed site planning. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is IVe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 8A.

RnD—Rion sandy loam, 15 to 25 percent slopes. This very deep, well drained, moderately steep soil is on Piedmont side slopes, primarily in the northeastern part of the county. Individual areas are irregular in shape and range from 4 to about 200 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 2 inches thick. The subsurface layer is brown sandy loam about 4 inches thick. The subsoil is strong brown sandy clay loam about 19 inches thick. The next 5 inches is brownish yellow sandy loam. The underlying material to a depth of 60 inches is brownish yellow, strong brown, and white saprolite that has a texture of sandy loam. In some eroded areas that have been cleared of trees and cultivated, the surface layer is sandy clay loam.

This soil is moderately permeable in the subsoil and moderately rapidly permeable in the underlying material. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Pacolet, Wedowee, Bethlehem, and Chewacla soils. Pacolet, Wedowee, and Bethlehem soils have a predominantly clayey subsoil. Pacolet and Wedowee soils are in scattered areas throughout the unit. Bethlehem soils have soft bedrock at a depth of 20 to 40 inches. They are on the smooth parts of side slopes, mostly in the southwestern part of the county. Chewacla soils are somewhat poorly drained and are on flood plains. Also included are small, scattered areas of Rock outcrop, soils that have hard bedrock within a depth of 60 inches, and soils that have soft bedrock within a depth of 20 to 60 inches. Included areas make up about 10 to 20 percent of this map unit.

Most of the acreage of the Rion soil is used as woodland. Some of the less sloping areas are used as pasture.

This soil is suited to woodland. Overstory trees include scarlet oak, white oak, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory plants include sourwood, flowering dogwood, American holly, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry.

The slope is the main limitation affecting timber production. It limits the use of equipment and increases the hazard of erosion. Logging equipment should be operated only during dry periods. Logging roads and skid trails should be designed on the contour. Water bars help to break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

This soil is poorly suited to most of the field and truck crops commonly grown in the county. The slope and the hazard of erosion are the main management concerns.

This soil is suited to pasture and hay. The slope is the main limitation. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses. The slope is the main limitation. Moderately steep areas require extensive cutting and filling and detailed site planning. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is VIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 8R.

RnE—Rion sandy loam, 25 to 45 percent slopes. This very deep, well drained, steep soil is on Piedmont side slopes throughout the county. Individual areas are irregular in shape and range from 4 to about 200 acres in size.

Typically, the surface layer is very dark grayish brown sandy loam about 2 inches thick. The subsurface layer is brown sandy loam about 4 inches thick. The subsoil is strong brown sandy clay loam about 19 inches thick. The next 5 inches is brownish yellow sandy loam. The underlying material to a depth of 60 inches is brownish yellow, strong brown, and white saprolite that has a texture of sandy loam.

This soil is moderately permeable in the subsoil and moderately rapidly permeable in the underlying material. Surface runoff is rapid in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Pacolet and Chewacla soils. Pacolet soils have a predominantly clayey subsoil. They are in scattered areas throughout the unit. Chewacla soils are somewhat poorly drained and are on narrow flood plains. Also included are small areas of Rock outcrop, soils that have hard bedrock within a depth of 60 inches, and scattered areas of soils that have soft bedrock at a depth of 20 to 60 inches. Included areas make up about 10 to 20 percent of this map unit.

Most of the acreage of the Rion soil is used as woodland. A few of the less sloping areas are used as pasture.

This soil is suited to woodland. Overstory trees include scarlet oak, white oak, Virginia pine, southern red oak, hickory, shortleaf pine, American beech, eastern white pine, red maple, and yellow-poplar. Understory plants include sourwood, flowering dogwood, American holly, eastern redcedar, greenbrier, honeysuckle, wild grape, poison ivy, and blackberry.

The slope is the main limitation affecting timber production. It limits the use of equipment and increases the hazard of erosion. Extreme caution is needed when vehicles are operated on these slopes. In most areas, extensive grading is needed to establish roads and trails. Logging roads and skid trails should be designed on the contour. Water bars help to break the flow of water along roads. In exposed areas applying lime and fertilizer and seeding help to control erosion.

This soil is unsuited to cultivated crops. The slope and the hazard of erosion are the main management concerns.

This soil is unsuited to pasture and hay. The slope is the main limitation.

This soil is unsuited to most urban uses. The slope is the main limitation. Areas of steep slopes require excessive cutting and filling and detailed site planning. To improve trafficability of roads for year-round use, this soil requires a gravel base and an adequate wearing surface.

The capability subclass is VIIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 8R.

RwB—Rion-Wedowee complex, 2 to 8 percent slopes. This map unit consists of very deep, well drained, gently sloping Rion and Wedowee soils on ridgetops in the northeastern part of the county. Individual areas are irregular in shape and range from 5 to more than 200 acres in size. The Rion soil makes up about 45 percent of the map unit, and the Wedowee soil makes up about 35 percent. These soils occur as areas so intricately mixed that separating them is not practical at the scale selected for mapping.

Typically, the surface layer of the Rion soil is very dark grayish brown sandy loam about 2 inches thick. The subsurface layer is brown sandy loam about 4 inches thick. The subsoil is strong brown sandy clay loam about 19 inches thick. The next 5 inches is brownish yellow sandy loam. The underlying material to a depth of 60 inches is brownish yellow, strong brown, and white saprolite that has a texture of sandy loam. In some eroded areas the surface layer is sandy clay loam.

The Rion soil is moderately permeable in the subsoil and moderately rapidly permeable in the substratum. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Typically, the surface layer of the Wedowee soil is dark yellowish brown sandy loam about 6 inches thick. The subsoil is yellowish red clay about 15 inches thick. The next 19 inches is red sandy clay loam. The underlying material to a depth of 60 inches is yellowish red and light gray saprolite that has a texture of sandy loam. In some eroded areas the surface layer is sandy clay loam.

The Wedowee soil is moderately permeable. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is moderate. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

Included with these soils in mapping are small areas of Pacolet soils. These soils are intermingled with areas of the Rion and Wedowee soils. The included soils have a surface layer of sandy clay loam and a red subsoil. Also included are a few scattered areas of soils that have bedrock within a depth of 40 inches. Included soils make up about 20 percent of this map unit.

Most of the acreage in this map unit is used as cropland. Many areas are used as pasture or hayland. A few of the steeper areas are used as woodland.

The Rion and Wedowee soils are well suited to trees. Overstory trees include white oak, scarlet oak, black oak, southern red oak, red maple, yellow-poplar, shortleaf pine, hickory, and Virginia pine. Understory plants include sourwood, flowering dogwood, American holly, eastern redcedar, honeysuckle, wild grape, poison ivy, blackberry, and greenbrier.

No significant limitations affect timber production on the Rion soil. Depth to the clayey part of the subsoil is the main limitation affecting timber production on the Wedowee soil. It limits the use of equipment. Logging equipment should be operated only during dry periods.

These soils are well suited to most of the field and truck crops commonly grown in the county. They are preferred by tobacco farmers. The slope and the hazard of erosion are the main management concerns. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

These soils are well suited to pasture and hay. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

The Rion soil is well suited to most urban uses, and the Wedowee soil is suited. A high content of clay, the moderate shrink-swell potential, and low strength in the subsoil of the Wedowee soil are the main limitations. The moderate permeability in the clayey part of the subsoil can be overcome by increasing the size of the absorption area in septic tank absorption fields. Structural damage can be prevented by designing roads, foundations, and footings so that they can withstand shrinking and swelling in the subsoil, by diverting runoff away from buildings, or by backfilling with material that has a low shrink-swell potential. If the Wedowee soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads on these soils require a gravel base and an adequate wearing surface.

The capability subclass is IIe. Based on shortleaf pine as the indicator species, the woodland ordination symbol is 8A.

RxA—Riverview fine sandy loam, 0 to 2 percent slopes, frequently flooded. This very deep, well drained, nearly level soil is on flood plains in the Piedmont. Most areas are long and narrow and range from 4 to more than 170 acres in size.

Typically, the surface layer is brown fine sandy loam about 10 inches thick. The subsoil is about 33 inches thick. The upper part is yellowish red silty clay loam. The next part is strong brown loam. The lower part is dark brown loam that has brown and yellowish red mottles. The underlying material to a depth of 60 inches is reddish gray sandy loam that has strong brown mottles.

This soil is moderately permeable. Surface runoff is slow in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of 3 to 5 feet. The soil is frequently flooded for brief periods. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Chewacla, Buncombe, and Dogue soils. The somewhat poorly drained Chewacla soils are in depressions and at the base of uplands. The dominantly sandy Buncombe soils are adjacent to stream channels and on the inside of the curve at some turns of the larger streams. Dogue soils have a predominantly clayey subsoil. They are on low stream terraces. In a few intermingled areas of soils, reaction ranges to neutral throughout. Included soils make up about 20 percent of this map unit.

Most of the acreage of the Riverview soil is used as cropland. Many areas also are used as pasture, hayland, or woodland.

This soil is well suited to woodland. Overstory trees include American sycamore, green ash, red maple, yellow-poplar, black walnut, river birch, and black willow. Understory plants include alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, switchcane, poison ivy, and wild grape. No significant limitations affect woodland management.

This soil is well suited to most of the field and truck crops commonly grown in the county. The frequent flooding is the main hazard. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and improve fertility, the available water capacity, and tilth.

This soil is well suited to pasture and hay. The flooding is the main hazard. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to most urban uses. The flooding and the seasonal wetness are severe limitations.

The capability subclass is IVw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 9A.

StB—State sandy loam, 2 to 6 percent slopes. This very deep, well drained, gently sloping soil is on high stream terraces along many of the larger streams in the county. Most areas are somewhat elongated and range from 4 to about 30 acres in size.

Typically, the surface layer is olive brown sandy loam about 8 inches thick. The next 3 inches is light olive brown sandy loam. The subsoil is about 34 inches thick. The upper part is light olive brown sandy clay loam, and the lower part is yellowish brown sandy clay loam that has yellowish red and brown mottles. The underlying material to a depth of 60 inches is strong brown gravelly sandy loam.

This soil is moderately permeable. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of 4 to 6 feet. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

Included with this soil in mapping are small areas of Masada soils. These included soils have a predominantly clayey subsoil. They are in scattered areas throughout the unit. Also included are areas of State soils that are occasionally flooded and a few areas along Lake Hickory that have been developed for urban uses. Included soils make up about 10 percent of this map unit.

Most of the acreage of the State soil is used as woodland. Many areas are used as pasture, and a few areas are used as cropland.

This soil is well suited to woodland. Overstory trees include loblolly pine, scarlet oak, white oak, red maple, shortleaf pine, southern red oak, eastern white pine, yellow-poplar, and Virginia pine. Understory plants include greenbrier, honeysuckle, blackberry, poison ivy, sourwood, American holly, flowering dogwood, and wild grape. No significant limitations affect woodland management.

This soil is well suited to most of the field and truck crops commonly grown in the county. The slope and the hazard of erosion are management concerns. Conservation tillage, contour farming, stripcropping, cover crops, crop residue management, grassed waterways, and field borders improve tilth, conserve moisture, help to control erosion, and minimize the offsite damage caused by sedimentation.

This soil is well suited to pasture and hay. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is suited to most urban uses. The wetness and low strength in the subsoil are the main limitations. The wetness can be reduced by diverting runoff away from buildings and by installing perforated drainage tile around foundations. If the soil is used as a base for roads and streets, a mixture of sand and gravel and proper compaction are needed to increase strength and stability. To improve trafficability for year-round use, roads require a gravel base and an adequate wearing surface.

The capability subclass is IIe. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8A.

TfB—Tate-French complex, 2 to 10 percent slopes. This map unit consists of very deep, gently sloping and strongly sloping Tate and French soils in valleys at the head of streams flowing out of the mountains. The Tate soil is well drained, and the French soil is somewhat poorly drained. Most areas are long and narrow and range from 4 to about 30 acres in size. The Tate soil makes up about 45 percent of the map unit, and the French soil makes up about 30 percent. The mapped areas are so narrow that separating them is not practical at the scale selected for mapping.

The Tate soil is on stream terraces and foot slopes. The French soil is on flood plains. These landscape positions are narrow, typically less than 200 feet wide.

Typically, the surface layer of the Tate soil is dark yellowish brown sandy loam about 2 inches thick. The subsurface layer is yellowish brown sandy loam about 6 inches thick. The subsoil is strong brown clay loam about 30 inches thick. The next layer is about 17 inches thick. It is yellowish brown sandy clay loam that has strong brown and light brownish gray mottles. The underlying material to a depth of 60 inches is mottled yellowish brown, strong brown, and light brownish gray sandy loam.

The Tate soil is moderately permeable in the subsoil and moderately rapidly permeable in the underlying material. Surface runoff is medium in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Typically the surface layer of the French soil is dark yellowish brown sandy loam about 12 inches thick. The subsoil is about 12 inches thick. It is yellowish brown loam that has yellowish brown and grayish brown mottles. The underlying material extends to a depth of 60 inches. The upper part is dark grayish brown loam that has yellowish brown mottles. The lower part is dark gray very gravelly loamy sand.

The French soil is moderately permeable in the subsoil and rapidly permeable in the underlying material. Surface runoff is slow in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of 1.0 foot to 2.5 feet. This soil is frequently flooded for very brief periods. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

Included with these soils in mapping are small areas of somewhat excessively drained soils that have more than 35 percent rock fragments throughout. The included soils are adjacent to stream channels in areas where the water velocity is high. Also included are some areas of Tate soils that have stones on the surface or have a seasonal high water table at a depth of 40 to 60 inches and small areas of poorly drained soils on flood plains. Included soils make up about 25 percent of this map unit.

The acreage in this map unit is used mainly as woodland. Some areas are used as pasture.

The Tate soil is well suited to woodland, and the French soil is moderately suited to woodland. Overstory trees include American sycamore, red maple, yellow-poplar, Virginia pine, white oak, eastern white pine, black locust, scarlet oak, black oak, and black willow. Understory plants include alder, American hornbeam, black cherry, greenbrier, honeysuckle, blackberry, giant cane, poison ivy, sourwood, flowering dogwood, rhododendron, mountain laurel, and wild grape.

No significant limitations affect timber production on the Tate soil. The flooding and the wetness affect woodland management in areas of the French soil. They increase the seedling mortality rate and limit the use of equipment. Logging equipment should be operated only during dry periods. Reinforcement planting may be needed.

The Tate soil is well suited to most of the field and truck crops commonly grown in the county. The slope and the hazard of erosion are the main management concerns in areas of the Tate soil. Contour farming, conservation tillage, grassed waterways, and field borders help to control erosion in areas of the Tate soil. The French soil is poorly suited to most of the field and truck crops commonly grown in the county. The wetness and the flooding are management concerns in areas of the French soil. A surface and subsurface drainage system is needed if the French soil is to be used as cropland. Returning crop residue to the soil and planting winter cover crops increase the content of organic matter and improve fertility, the available water capacity, and tilth.

The Tate soil is well suited to pasture and hay, and the French soil is moderately suited. The Tate soil has no significant limitations. The wetness and the flooding are the main management concerns in areas of the French soil. A surface and subsurface drainage system may be needed to improve productivity in areas of the French soil. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

The Tate soil is well suited to most urban uses, and the French soil is poorly suited. The slopes of more than 8 percent are the only limitation in areas of the Tate soil. The flooding and the wetness are severe limitations in areas of the French soil.

The Tate soil is in capability subclass IIIe, and the French soil is in capability subclass IVw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6A in areas of the Tate soil and 9W in areas of the French soil.

UdC—Udorthents-Urban land complex, 0 to 15 percent slopes. This map unit consists of deep, nearly level to strongly sloping Udorthents intermingled with Urban land. The Udorthents and Urban land occur in such an intricate pattern that separating them is not practical at the scale selected for mapping. Areas range from 5 to about 80 acres in size. The Udorthents makes up about 40 percent of the map unit, and the Urban land makes up about 40 percent.

Udorthents are areas that have been cut or filled during grading for roads, railroads, houses, shopping centers, recreational purposes, and similar uses. The cuts are generally the steepest part of this map unit. The material exposed in these cuts varies in texture. The fill material removed from the cuts generally is variegated. Areas that have been filled are not as steep as the cuts. In some areas the fill material is highly compacted.

Permeability varies in this map unit. Surface runoff is medium or rapid in bare or unprotected areas. The shrink-swell potential of the underlying material is low to moderate. The depth to bedrock varies but is commonly more than 60 inches. The seasonal high water table is at a depth of 2.5 to more than 6 feet. Reaction is very strongly acid to slightly acid, except where the surface layer has been limed.

Urban land consists of areas where the soil is largely covered by concrete, asphalt, buildings, or other structures.

Included in this map unit are small areas of soil that has not been disturbed and areas that have been cut down to bedrock. In a few places, small areas of fill material consist of nonsoil materials, such as leftover building materials and miscellaneous solid garbage waste. Included areas make up about 20 percent of this map unit.

Areas of this map unit that have not been urbanized vary widely in their suitability and limitations for different land uses. If water and sewer services can be provided, the nearly level to strongly sloping areas generally are moderately suited to building sites and recreational purposes. These areas are somewhat droughty, and landscaping and vegetating these areas are difficult. The fill areas of this map unit generally are subject to subsidence and may be unsuited to building sites. The nearly level and gently sloping areas that are not highly compacted are moderately suited to landscaping and recreational purposes. Because this map unit is so variable, onsite investigation is needed to determine the suitability and limitations for any proposed use.

The capability subclass is VIIe for the Udorthents and VIIIs in areas of Urban land. This map unit has not been assigned a woodland ordination symbol.

WeA—Wehadkee loam, 0 to 2 percent slopes, frequently flooded. This very deep, poorly drained, nearly level soil is on flood plains. Most areas are long and narrow and range from 4 to about 50 acres in size.

Typically, the surface layer is about 14 inches thick. It is brown loam that has yellowish red and grayish brown mottles. The subsoil is about 8 inches thick. It is dark grayish brown loam that has yellowish red mottles. The underlying material extends to a depth of 60 inches. The upper part is dark grayish brown loam that has yellowish red mottles. The lower part is dark grayish brown sandy clay loam.

This soil is moderately permeable. Surface runoff is slow in bare or unprotected areas. The shrink-swell potential of the subsoil is low. The depth to bedrock is more than 60 inches. The seasonal high water table is at the surface or at a depth of 1 foot. The soil is frequently flooded for brief periods. Reaction is very strongly acid to neutral.

Included with this soil in mapping are small areas of Chewacla soils. These included soils are in slightly convex positions. Also included are some areas of Wehadkee soils that have a thin layer of sandy overwash and a few small areas of Wehadkee soils that are ponded during wet periods. Included soils make up about 20 percent of this map unit.

Most of the acreage of the Wehadkee soil is used as woodland. A few areas have been cleared of trees and are used as pasture.

This soil is suited to woodland. Overstory trees include American sycamore, green ash, red maple, yellow-poplar, river birch, and black willow. Understory plants include alder, American hornbeam, greenbrier, honeysuckle, blackberry, cattail, bulrush, giant cane, sedges, poison ivy, and wild grape.

The frequent flooding and the wetness are the main limitations affecting timber production. They increase the seedling mortality rate and the windthrow hazard and limit the use of equipment. Reinforcement planting may be needed. Bedding also is an alternative. Thinning should be held to a minimum, or the stand should not be thinned at all. A plan for the periodic removal of windthrown trees is advisable. Logging equipment should be operated only during dry periods.

This soil is poorly suited to most of the field and truck crops commonly grown in the county. The wetness and the flooding are management concerns on this soil. A surface and subsurface drainage system is needed. If the soil is used for cultivated crops, returning crop residue to the soil and planting winter cover crops increase the content of organic matter and improve fertility, the available water capacity, and tilth.

This soil is poorly suited to pasture and hay. The wetness and the flooding are the main management concerns. A surface and subsurface drainage system is needed. Proper stocking rates, pasture rotation, timely deferment of grazing, and restricted use during wet periods help to keep the pasture in good condition.

This soil is unsuited to most urban uses. The flooding and the wetness are severe limitations.

The capability subclass is VIw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8W.

Prime Farmland

In this section, prime farmland is defined and the soils in Alexander County that are considered prime farmland are listed.

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. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. The moisture supply must be adequate, and the growing season must be sufficiently long. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They are used for food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils usually receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 8 percent.

About 34,303 acres, or about 21 percent of the county, is prime farmland. Other small areas of prime farmland are scattered throughout the Piedmont. These areas are too small to show at the scale used in mapping and are included in other map units.

The loss of prime farmland to other uses puts pressure on marginal soils to be used as cropland. In Alexander County, these are the more sloping soils.

The following map units are considered prime farmland in Alexander County. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Some soils that have a high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. If applicable, the need for these measures is indicated in parentheses after the map unit name in the following list. Onsite evaluation is necessary to determine whether or not limitations have been overcome by the corrective measures.

The soils identified as prime farmland in Alexander County are:

CeB2 Cecil sandy clay loam, 2 to 8 percent slopes, eroded
ChA Chewacla loam, 0 to 2 percent slopes, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
DaB2 Davidson clay loam, 2 to 8 percent slopes, eroded
DoB Dogue sandy loam, 2 to 6 percent slopes, rarely flooded

MaB2 Masada sandy clay loam, 2 to 8 percent slopes, eroded

PcB2 Pacolet sandy clay loam, 2 to 8 percent slopes, eroded

RwB Rion-Wedowee complex, 2 to 8 percent slopes

RxA Riverview fine sandy loam, 0 to 2 percent slopes, frequently flooded (where protected from flooding or not frequently flooded during the growing season)

StB State sandy loam, 2 to 6 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help to prevent construction failures caused by unfavorable soil properties.

Generally, the soils in Alexander County that are well suited to crops also are 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 that is in harmony with nature.

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

Daniel J. McClure, district conservationist, and Bobby G. Brock, conservation agronomist, Soil Conservation Service; and Kenneth Patterson and Terry A. Garwood, agriculture extension agents, 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 Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units" and in the tables. Specific information can be obtained from the local office of the Soil Conservation Service or the North Carolina Cooperative Extension Service.

The acreage used as cropland has decreased slightly in Alexander County during the past ten years. Cropland has been converted to pasture and hayland because row cropping is not profitable. As a result, farmers have entered into poultry production (fig. 5) and are using the poultry waste to fertilize pastures.

In 1987 Alexander County had about 16,000 acres of cropland, 800 acres of orchards, and 43,000 acres of pasture and hayland. In 1987 flue-cured tobacco was estimated to have been grown on 530 acres, corn on 5,600 acres, soybeans on 1,600 acres, and small grain, including wheat, oats, barley, and rye, on 2,900 acres. Grain sorghum was grown on 375 acres. About 5,000 acres was idle land or rotational cropland. Most of the pasture and hayland is in tall fescue, with small acreages in alfalfa, orchardgrass, and red clover.

In 1987 the county ranked fifth in North Carolina in the production of apples (fig. 6). The acreage of apple orchards has increased somewhat in the past 20 years to more than 650 acres. This fruit is the county's seventh largest agricultural product. Apple production has been important in the county for more than 150 years. Peaches and nectarines also have developed into important crops in recent years.

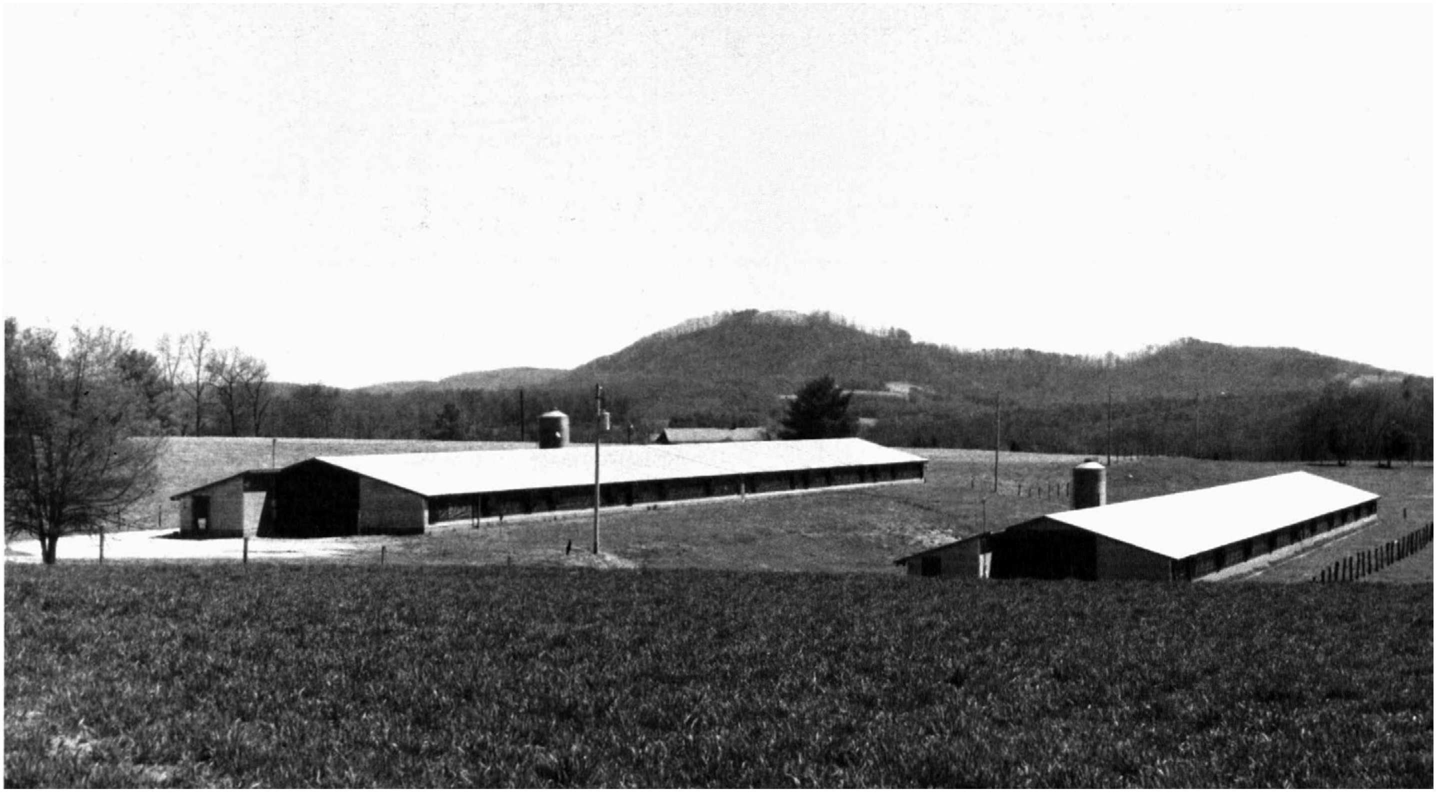

Figure 5.—Poultry production is a leading source of farm income in Alexander County.

To help maintain the county's status as a producer of high-quality apples, information about soils in relation to apple production is needed. Such factors as stoniness, wetness, depth to bedrock, flooding, and slope are management concerns affecting the production of apples. Climatic factors, such as frost damage and freezing temperatures, also affect apple production and are relative to the landscape position of the soil. The movement of air should be considered when selecting a site for apple production. The soils in the county most commonly used for apple production are the Braddock, Hayesville, Evard, Cowee, and Tate soils in the Brushy Mountains. Other soils in the county may be suited to apple production; however, particular attention should be paid to site conditions and the movement of air.

A small acreage is used for melons, strawberries, sweet corn, tomatoes, peppers, broccoli, and other vegetables and fruits. The latest information on growing specialty crops, such as selecting sites, applying fertilizer and lime, and selecting plant varieties, can be obtained at the local office of the Soil Conservation Service or the North Carolina Cooperative Extension Service.

Cropland Management

Erosion is a major management concern on about three-fourths of the cropland in Alexander County. The only soils in the county that are not subject to accelerated erosion are the Buncombe, Riverview, Chewacla, and Wehadkee soils on flood plains. Erosion is a hazard on all of the soils on uplands. Because the Cecil and Pacolet soils are used as most of the cropland on uplands, controlling erosion is particularly needed in eroded areas of these soils.

Loss of the topsoil layer because of erosion is damaging for two reasons. First, productivity is reduced as this layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as the Cecil, Pacolet, Wedowee, Bethlehem, Masada, and Davidson soils. Deep plowing tends to complete the mixing of the subsoil and the topsoil. Second, erosion on farmland results in the sedimentation of streams and reservoirs. Controlling erosion minimizes the pollution of streams by sedimentation and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

Resource management systems provide protective cover, help to control runoff, and increase infiltration. Improved cropping systems, conservation tillage, crop residue, terraces, stripcropping, grassed waterways, contour farming, and field borders are some of the practices that help to control erosion on cropland (fig. 7). Assistance in the design and layout of erosion-control measures on cropland is available from the local office of the Soil Conservation Service.

Tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils that have good tilth are granular and porous. Agronomic practices used to control erosion, such as conservation tillage, sod-based rotations, cover crops, crop residue management, and stripcropping, also improve tilth.

Most of the soils used for crops in the county have a surface layer that is low in content of organic matter (less than 1 percent). Intense rainfall causes crusting on the surface of some of these soils. Once the crust forms, the soil is almost impervious to water. The crust reduces infiltration and increases runoff. Regular additions of crop residue, manure, and other organic material improves soil structure and reduces crusting, thereby increasing the infiltration rate. A good content of organic matter is in the 1.5 to 2.0 percent range. Clods form on soils that have a higher content of clay, such as the Cecil, Pacolet, Masada, and Davidson soils, if they are cultivated when they are wet.

Drainage is a management concern on the Chewacla soils if they are used for the production of row crops or pasture. Drainage can be improved and yields increased by installing a surface or subsurface drainage system or both to lower the water table in these soils.

Figure 6.—An apple orchard in Alexander County.

Figure 7.—Stripcropping in an area of Pacolet sandy clay loam, 8 to 15 percent slopes, eroded.

Soil Fertility

None of the soils in Alexander County have enough natural fertility to economically produce crops. They are naturally acid and require lime to make them suitable for the production of most crops. Chewacla, Riverview, and Wehadkee soils are somewhat fertile, however, because they formed in recent alluvium.

Liming requirements are a major concern on cropland. The acidity level in the soil affects the availability of many nutrients to plants and the activity of beneficial bacteria. Lime also neutralizes exchangeable aluminum in the soil and thus counteracts the adverse effects of high levels of aluminum 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, however, for peanuts and clover, in some rotations of soybeans, or for alfalfa that is established. A reliable soil test is not available for predicting nitrogen requirements. Appropriate rates of nitrogen application are described in the section "Yields per Acre."

Soil tests can indicate the need for phosphorus and potassium fertilizer. They are needed because phosphorus and potassium tend to build up in the soil.

Chemical Weed Control

The use of herbicides for weed control is a common practice on the cropland in Alexander County. It decreases the need for tillage and is an integral part of modern farming. Selected soil properties, such as organic matter content and texture of the surface layer, affect the rate of herbicide application. Estimates of both of these properties were determined for the soils in the county. Table 14 shows a general range of organic matter content in the surface layer of the soils. The texture of the surface layer is shown in the USDA texture column in table 13.

In some areas the organic matter content projected for the different soils is outside the range shown in the table. The content can be higher in soils that have received high amounts of animal or manmade waste. Soils that have recently been brought into cultivation may have a higher organic matter content in the surface layer than similar soils that have been cultivated for a long time. Conservation tillage can increase the organic matter content in the surface layer. A lower organic matter content is common where the surface layer has been partly or completely removed by erosion or land smoothing. Current soil tests should be used for specific organic matter determinations.

Forage Production

Most of the soils in Alexander County are moderately suited to locally grown grasses and legumes, such as tall fescue, orchardgrass, alfalfa, ladino clover, and red clover. Yields and quality of forages vary from farm to farm and from soil type to soil type. The steeper slopes and stony areas have severe limitations because of the difficulty in establishing and maintaining forage plants. The relative suitability of each soil for forages is discussed in the section "Detailed Soil Map Units."

Because most of the soils in the county are low in fertility, applications of fertilizer and lime are needed to add calcium and phosphorus to the soils. Fertilizer and lime requirements should be based on the results of soil tests, on the kind of forage, and the desired yields. Lime and phosphorus should be incorporated into a well prepared seedbed before planting. Where these amendments are not required, seeding can be made by no-till methods. Fertility levels should be maintained by annual top-dress applications after the sod has been established. For maximum yields, fertilizer should be applied to cool-season plants, such as fescue, orchardgrass, and clover, in spring and fall just before the growing season.

In older pastures, eliminating the lower yielding species and establishing a desirable mixture of grass and clover can produce a better quality and quantity of forage. On the steeper slopes, renovation in contour strips or by no-till techniques helps to reduce soil loss. Also, introducing clover into a desirable grass sod greatly improves the quality of forage and reduces fescue toxicity problems while permitting the reduction of the required nitrogen fertilizer.

Rotational grazing by the use of cross fencing is a practice to avoid overgrazing or undergrazing on pastureland. Grazing closer than three inches on most species greatly reduces forage production. Undergrazing reduces feeding value, wastes forages, and encourages diseases and insects. Mowing helps to control uneven growth, control weeds, and keep plants at their most nutritious stage.

Access roads to and through the pasture should be installed on the contour to prevent excessive soil loss and to aid in fertilization and management.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations 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. The application rate of nitrogen for corn on soils that have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds per acre. If the yield potential for corn is 100 bushels per acre or less, a rate of 100 to 120 pounds of nitrogen per acre should be used. The application of nitrogen in excess of that required for potential yields generally is not recommended. The excess nitrogen fertilizer that is not utilized by a crop is an unnecessary expense and causes a hazard of water pollution. If corn is grown after the harvest of soybeans, nitrogen rates can be reduced by about 20 to 30 pounds per acre. Because nitrogen can be readily leached from sandy soils, applications may be needed on these soils more than once during the growing season.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the North Carolina 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 *(16)*. 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 Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII 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, IIe. 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.

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation. Class V 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.

Woodland Management and Productivity

Edwin J. Young, forester, Soil Conservation Service, helped prepare this section.

Forests are of economic, social, recreational, and environmental importance to Alexander County. Woodland managers in the county are 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 and the installation of a drainage system. 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 100,729 acres, or about 60 percent of the land area of Alexander County. The three

Figure 8.—A stand of loblolly pine in an area of Bethlehem gravelly sandy loam, 2 to 8 percent slopes.

predominant forest types identified in the county are *(19)*:

Loblolly-shortleaf pine. This forest type covers 37,077 acres. It is made up of more than 50 percent shortleaf pine, Virginia pine, or other southern yellow pines. Loblolly pine is not native to the county but has been planted in many places (fig. 8). The common associated species are red oak, white oak, gum, hickory, and yellow-poplar.

Oak-pine. This forest type covers 18,035 acres. It is more than 50 percent hardwoods, usually oaks, and more than 25 percent pines. The common associated species include yellow-poplar, gum, and hickory.

Oak-hickory. This forest type covers 45,617 acres. It is more than 50 percent upland oaks or hickory. The common associated species include red maple and yellow-poplar.

If left undisturbed, the oak-pine forest type develops into a forest of predominantly oak and other upland hardwoods. The understory in both the loblolly-shortleaf pine and oak-pine forest types generally consists of hardwood seedlings and saplings, which are more tolerant of shade than pine seedlings and saplings. In shaded understory, hardwoods compete so vigorously for light and moisture that few pine seedlings are able to survive.

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. Eastern white pine and loblolly pine are the most important timber species in the county because they grow fast, are adapted to the soil and climate, bring the highest average sale value per acre, and are easy to establish and manage.

One of the first steps in planning intensive woodland management is to determine the potential productivity of the soil for several alternative tree species. The most productive and valued trees are then selected for each soil type. Site and yield information enables a forest manager to estimate future wood supplies. These estimates are the basis of realistic decisions concerning expenses and profits associated with intensive woodland management, land acquisition, or industrial investments.

The potential productivity of woodland depends on physiography, soil properties, climate, and the effects of past management. Specific soil properties and site characteristics, including soil depth, texture, structure, and depth to the water table, affect forest productivity primarily by influencing available water capacity, aeration, and root development. The net effects of the interaction of these soil properties and site characteristics determine the potential site productivity.

Other site factors are also important. The gradient and length of slopes affect water movement and availability. In mountainous areas, elevation and aspect affect the amount of sunlight a site receives and the rate of evaporation. Sites on south-facing slopes are warmer and drier than those on north-facing slopes. The best sites are generally on north- and east-facing slopes in the lower areas, in sheltered coves, and in gently sloping concave areas. The amount of rainfall and length of the growing season influence site productivity.

Thinning is an important management tool. The best trees are given room to grow. Diseased, poorly formed, and slow growing trees can be harvested. Thinning is occasionally done on pine plantations. Very little thinning of hardwoods is now done in the county, but this may change as markets for firewood develop. Harvesting for firewood may actually reduce the costs of reforestation on cutover sites.

Controlling erosion is important during and after logging activities. Cutting trees does not cause erosion, but erosion occurs on access roads, skid trails, loading areas, and in other areas where the surface litter has been removed. Filter strips or vegetated areas between the logged areas and streams help to filter soil lost from the site. Crossing streams with roads and skid paths should be avoided, but where it is necessary, culverts or log bridges should be installed. Roads and trails should be laid out on the contour, and water bars, culverts, broad based dips, and outsloping of roads should be used. Road grades should be kept below 10 percent slope. All exposed soil areas should be fertilized and seeded to help control erosion.

Logging operations should be limited to dry periods to reduce the risk of compaction and damage to tree roots.

Controlling plant competition is important. Site preparation, prescribed burning, spraying, cutting, or girdling help to control competing vegetation.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to applications of fertilizer than others, and some soils are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section "Detailed Soil Map Units," the description of each map unit in the county that is suitable for timber includes information about productivity, limitations in harvesting timber, and management concerns in producing timber. The common forest understory plants also are listed. Table 6 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

Table 6 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of the slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *T* indicates a soil that has, within the root zone, excessive alkalinity or acidity, sodium salts, or other toxic substances that limit the development of desirable trees. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock, a hardpan, or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a large amount of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of moderate or severe indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of special equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, and susceptibility of the surface layer to compaction. As slope gradient and length increase, the use of wheeled equipment becomes more difficult. On the steeper slopes, tracked equipment is needed. On the steepest slopes, even tracked equipment cannot be operated and more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are so steep that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep that tracked equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize 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 seasonal 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 *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *volume* number. Common trees are listed in the order of their observed general occurrence. The table lists four to six trees for each applicable map unit. Additional species that commonly occur on the soils may be listed in the detailed soil map unit descriptions. 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. Site index values shown in table 6 are based on measurements at selected sites in Alexander County or other counties and the use of published site index curves *(5, 6, 8, 9, 10, 11, 13, 15)*. Common trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

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 productivity of the soils in this survey is based mainly on chestnut oak, yellow-poplar, and shortleaf pine *(5, 9, 15)*.

The *site index* is determined by taking height measurements and determining the age of selected 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 bedding, ditching, managing water, applying fertilizer, 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.

Trees to plant are those that are used for reforestation or, under suitable conditions, natural regeneration. They are moderately 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. If hardwoods are desired on a forest site, acceptable species should naturally reproduce from seeds and sprouts. Special site preparation techniques may be required.

Recreation

William R. Glad, recreation director, Alexander County Recreation Department, helped prepare this section.

Alexander County offers a variety of recreational opportunities. Town Park, in the town of Taylorsville, offers facilities that include a lighted ball field, an outdoor basketball court, and a playground. Privately owned swimming pools and a semi-private 18 hole golf course also are in the county.

The county also offers a variety of facilities for water-related recreational activities. Lake Hickory (fig. 9) and Lookout Shoals Lake on the southern border of the county offer opportunities for fishing, swimming, and boating. Many local landowners allow local citizens to hunt on their land and fish in their farm ponds. A power company and the North Carolina Wildlife Resources Commission also maintain public access areas for canoeing, boating, fishing, hunting, or scenic floating along the Catawba River.

Several privately owned campgrounds in the county have facilities that include camping, picnicking, hiking, fishing, swimming, and playgrounds. Rocky Face Mountain offers opportunities for rock climbing, hiking, rappelling, or studying nature.

As public and private recreational facilities continue to be developed, knowledge of the soils and soil properties is needed in planning and developing new facilities and in maintaining existing facilities.

In table 7, the soils of the survey area are rated 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 also are important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after

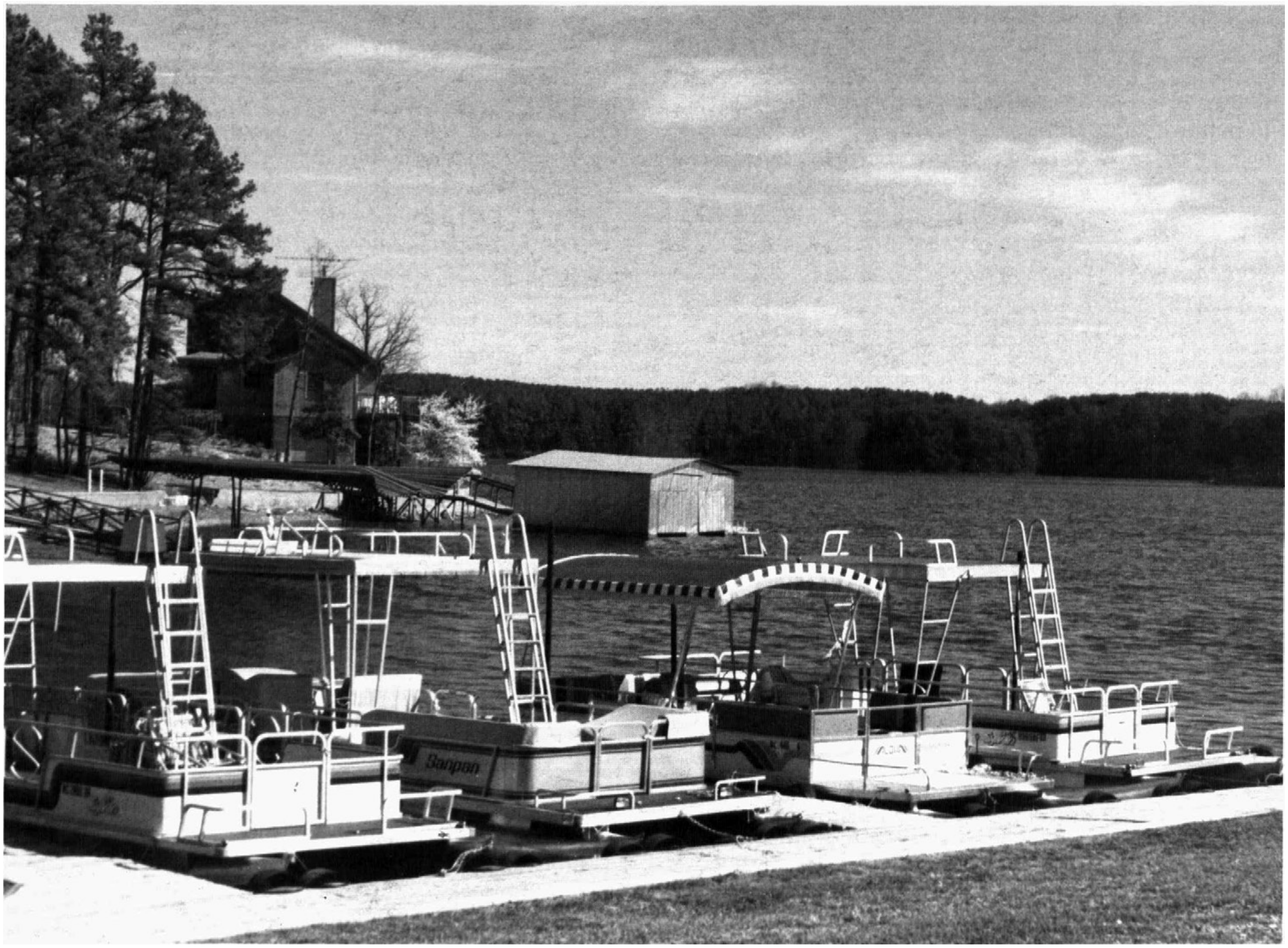

Figure 9.—Recreational facilities on Lake Hickory, along the southern boundary of Alexander County.

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

Donald A. Hayes, wildlife biologist, North Carolina Wildlife Resources Commission, helped prepare this section.

The habitat of Alexander County is capable of supporting many species of wildlife. The most common big game species throughout most of the county is the white-tailed deer. In recent years, a tremendous increase in the deer herd has been noted in the county. Black bear are occasionally observed, but no substantial populations exist. The continued loss of wilderness habitat prevents any noticeable increase in the number of this species.

Another big game species in the county is the wild turkey. In the past, such activities as market hunting, poaching, and timber cutting have eliminated the wild turkey from Alexander County and many other counties in northwestern North Carolina. Efforts to restore the wild turkey have been successful, however, in many areas in other counties. According to evaluations of the county, about 58 square miles of potential habitat for wild turkey remains, mostly in the Brushy Mountain area bordering Wilkes and Caldwell Counties. Restocking the wild turkey in this area is currently a top priority of the North Carolina Wildlife Resources Commission.

Small game and nongame species in the county include bobwhite quail, cottontail rabbit, mourning dove, gray squirrel, red squirrel, gray fox, red fox, raccoon, groundhog, ruffed grouse, bobcat, opossum, chipmunk, skunk, and numerous nongame birds and mammals. Furbearers, such as mink, muskrat, and beaver, are throughout the county. Trends in population levels vary by species. The populations of two of the most popular small game species, bobwhite quail and cottontail rabbit, fluctuate but have declined very noticeably for several years. The numbers of squirrels and dove have remained relatively stable. The population of beavers has expanded into new areas, creating valuable habitat for fish, waterfowl, and other species. The number of beavers must be limited, however, since this species is considered a nuisance by some landowners.

Woodland management is important to many cavity nesting species, including raccoons, squirrels, owls, and woodpeckers. Also, most wildlife species depend on mast (hickory nuts, acorns, grapes, berries, fruits, etc.) as part of their diet. Some management practices that can be applied include leaving a buffer zone of unharvested timber along a stream, keeping clearcuts small, leaving one or two den trees per acre uncut, and maintaining some old growth timber for mast production. Prescribed burning under the guidance of the North Carolina Forest Service can also improve habitat conditions for small game. This practice is limited primarily to loblolly pine plantations.

The potential for waterfowl management is very limited. Some migratory birds use the lakes, streams, and ponds. Proper construction, placement, and maintenance of nest boxes greatly enhance conditions for wood ducks, the only duck that normally nests in this area. Protection of wetlands is critical for waterfowl, furbearers, reptiles and amphibians, and many other species.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat. The ratings in table 8 are intended to be used as a guide and are not site specific. Onsite investigation is needed for individual management plans.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are 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 also are considerations. Examples of grasses and legumes are fescue, lovegrass, orchardgrass, 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 also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, 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 hardwoods and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are autumn-olive 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, eastern white pine, assorted yellow pines, eastern redcedar, and hemlock.

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, cattail, rushes, and sedges.

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 marshes, 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, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, white-tailed deer, and black bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, 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 seasonal 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, the shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal 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, and shrinking and swelling can cause the movement of footings. The 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), the shrink-swell 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 the need for lime and fertilizer. Help in making soil tests or in deciding what soil additive, if any, should be used can be obtained from the office of the Alexander Soil and Water Conservation District or the local office of the North Carolina Cooperative Extension Service.

Sanitary Facilities

Table 10 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 10 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness. The Alexander County Health Department should be contacted for detailed information and guidance.

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. Aerobic lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. The animal waste lagoons commonly used in farming operations are not considered in the ratings. They are generally deeper than the lagoons referred to in the table and rely on anaerobic bacteria to decompose waste materials.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The ratings in this table may not necessarily reflect the soil suitability for lagoons deeper than 5 feet (anaerobic type). The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope or bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, depth to a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, and soil reaction 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 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to 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 the shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, 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. These soils have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 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 gneiss and schist, 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, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, and depth to bedrock.

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 seasonal 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 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and 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 in 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 soil 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 or mica. The depth to a high water table affects the amount of usable material. It also affects trafficability.

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, and susceptibility to flooding. 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 acidity. Availability of drainage outlets is not considered in the ratings.

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 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. The 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 *(18)*. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages, by weight, of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, by volume, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the Unified soil classification system *(4)* and the system adopted by the American Association of State Highway and Transportation Officials *(3)*.

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, MH, and CH. 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. 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.

Rock fragments larger than 3 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 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated content of clay in each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time. It is the difference between the amount of soil water at field moisture capacity and the amount at wilting point.

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.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

The shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low,* a change of less than 3 percent; *moderate,* 3 to 6 percent; and *high,* more than 6 percent. *Very high,* more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep or very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to very deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the surface by flowing water, is caused by overflowing streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 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). Duration 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). The time of year that floods are most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table, the kind of water table, and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 15. An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. "More than 6.0" indicates that the water table is below a depth of 6 feet.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(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 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Entisol.

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 Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

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 Fluvaquents (*Fluv*, meaning flood plain, plus *aquent*, the suborder of the Entisols that has an aquic moisture regime).

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 Fluvaquents.

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, mixed, nonacid, thermic Typic Fluvaquents.

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 substratum 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 the exact location for each series is shown on the detailed soil maps with a special symbol. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(20)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(17)*. 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."

Ashe Series

The Ashe series consists of moderately deep, somewhat excessively drained soils that formed in material weathered from gneiss or schist. These soils are on mountain ridgetops and side slopes. Slopes range from 8 to 60 percent.

Ashe soils are commonly adjacent to Cleveland, Saluda, Cowee, and Evard soils. Cleveland soils have hard bedrock at a depth of 10 to 20 inches. They are intermingled with areas of the Ashe soils. Saluda soils have soft bedrock at a depth of 10 to 20 inches. Cowee and Evard soils have more clay in the subsoil than the Ashe soil. Cowee soils have soft bedrock at a depth of 20 to 40 inches. Saluda, Cowee, and Evard soils are on ridgetops and side slopes.

Typical pedon of Ashe gravelly sandy loam, in a forested area of Ashe-Cleveland complex, 8 to 25 percent slopes, stony; 5.1 miles northeast of Hiddenite on Secondary Road 1001, about 0.6 mile southwest on Secondary Road 1419, about 2.2 miles west on Secondary Road 1426, about 500 feet east of the road, and 600 feet north of a rock quarry:

Oi—1.5 inches to 0.5 inch; partly decomposed pine and hardwood litter.

Oe—0.5 inch to 0; humus.

A1—0 to 2 inches; dark brown (10YR 3/3) gravelly sandy loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; about 15 percent, by volume, gravel; few fine flakes of mica; strongly acid; clear smooth boundary.

A2—2 to 5 inches; brown (10YR 4/3) gravelly sandy loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; about 15 percent, by volume, gravel; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bw—5 to 26 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; very friable; common fine and medium roots; about 10 percent, by volume, gravel; few fine flakes of mica; strongly acid; abrupt wavy boundary.

R—26 inches; hard, granitic gneiss.

The solum is 20 to 40 inches deep over hard bedrock. Rock fragments make up, by volume, 15 to 35 percent of the A horizon and 5 to 35 percent of the B and C horizons. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed. The number of mica flakes is few or common throughout the solum.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 to 6. Where value is 3, the horizon is less than 7 inches thick.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, fine sandy loam, sandy loam, or the gravelly analogs of those textures.

The C horizon, if it occurs, is saprolite that is similar in color and texture to the Bw horizon. The texture includes cobbly analogs.

The Cr horizon, if it occurs, is soft bedrock that is partly consolidated but can be dug with difficulty by hand tools.

Bethlehem Series

The Bethlehem series consists of moderately deep, well drained soils on ridgetops and side slopes in the Piedmont. These soils formed in material weathered from sillimanite schist. Slopes range from 2 to 15 percent.

Bethlehem soils are commonly adjacent to Hibriten, Pacolet, Rion, and Chewacla soils. Hibriten and Rion soils have less clay in the subsoil than the Bethlehem soils. Hibriten soils have more than 35 percent rock fragments throughout. Pacolet and Rion soils are very deep. Hibriten, Pacolet, and Rion soils are on ridgetops and side slopes. Chewacla soils have a loamy subsoil. They are somewhat poorly drained and are on flood plains.

Typical pedon of Bethlehem gravelly sandy loam, 2 to 8 percent slopes; in a forested area 2.0 miles north of Bethlehem on North Carolina Highway 127, about 3.0 miles east on Secondary Road 1150, about 0.6 mile south on Secondary Road 1283 to a dead end, 500 feet southeast on a private road, and 20 feet south of the road:

Oi—0.5 inch to 0; partly decomposed pine and hardwood litter.

Ap—0 to 8 inches; strong brown (7.5YR 5/6) gravelly sandy loam; common medium distinct yellowish red (5YR 5/6) mottles; weak medium and coarse granular structure; friable; common fine, medium, and coarse roots; about 25 percent, by volume, gravel and cobbles; few fine flakes of mica; very strongly acid; abrupt wavy boundary.

BA—8 to 12 inches; yellowish red (5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; common fine, medium, and coarse roots; about 10 percent, by volume, gravel; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bt—12 to 25 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm, sticky and plastic; thin patchy clay films on faces of peds; common fine, medium, and coarse roots; about 5 percent, by volume, gravel; few fine flakes of mica; very strongly acid; clear wavy boundary.

BC—25 to 31 inches; red (2.5YR 4/8) very gravelly sandy clay loam; rock-controlled structure; friable; common medium and coarse roots; about 40 percent, by volume, weak red (10R 4/3), dusky red (10R 3/3), and yellowish red (5YR 5/8) soft gravel and cobbles; common fine flakes of mica; very strongly acid; gradual wavy boundary.

Cr—31 to 60 inches; soft sillimanite schist that is partly consolidated but can be dug with difficulty by hand tools.

The solum is 20 to 40 inches deep over a Cr horizon of weathered bedrock. Hard bedrock is at a depth of more than 60 inches. Rock fragments make up, by volume, 15 to 35 percent of the A and E horizons, 5 to 35 percent of the BA, BE, and Bt horizons, and 15 to 50 percent of the BC and C horizons. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed. The number of mica flakes is few or common throughout the solum.

The Ap horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6. Where value is 3, the horizon is less than 6 inches thick.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 5, and chroma of 4 to 6. It is gravelly sandy loam.

The BA or BE horizon, if it occurs, has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 6 to 8. It is sandy clay loam or gravelly sandy clay loam.

The Bt horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 to 8. It is clay, clay loam, gravelly clay, or gravelly clay loam.

The BC horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 to 8. It is gravelly or very gravelly sandy clay loam.

The C horizon, if it occurs, is multicolored saprolite that has a texture of gravelly sandy loam or very gravelly sandy loam.

The Cr horizon is soft bedrock that is partly consolidated but can be dug with difficulty by hand tools.

Braddock Series

The Braddock series consists of very deep, well drained soils that formed in colluvium and old alluvium on foot slopes and high stream terraces in the mountains. Slopes range from 6 to 25 percent.

Braddock soils are commonly adjacent to Hayesville, Evard, Cowee, Saluda, Tate, and French soils. Hayesville soils are on side slopes and ridgetops. They formed in residuum. Evard, Cowee, and Saluda soils have a loamy subsoil. They formed in residuum on side slopes. Tate soils are on stream terraces and benches. They have a loamy subsoil. French soils are on flood plains. They have loamy horizons over a sandy or gravelly substratum.

Typical pedon of Braddock clay loam, in an area of Braddock and Hayesville clay loams, 6 to 15 percent slopes, eroded; in a pasture in the northwestern part of the county; 4.2 miles west of Taylorsville on North Carolina Highway 90, about 6.4 miles north on Secondary Road 1307, about 750 feet north on Secondary Road 1307 from its intersection with Secondary Road 1308, and 375 feet west of the road:

Ap—0 to 6 inches; yellowish red (5YR 4/6) clay loam; weak medium granular structure; friable; common fine roots; few fine flakes of mica; neutral; clear smooth boundary.

Bt1—6 to 36 inches; red (2.5YR 5/8) clay; moderate medium subangular blocky structure; firm; few fine roots; thin patchy clay films on faces of peds; common fine flakes of mica; strongly acid; gradual wavy boundary.

Bt2—36 to 46 inches; mottled yellowish red (5YR 5/8) and strong brown (7.5YR 5/8) clay; moderate medium subangular blocky structure; firm; thin patchy clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt3—46 to 54 inches; yellowish red (5YR 5/8) clay; moderate medium subangular blocky structure; firm; thin patchy clay films on faces of peds; common fine flakes of mica; very strongly acid; clear wavy boundary.

Bt4—54 to 60 inches; yellowish red (5YR 5/8) gravelly clay loam; common medium prominent light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; firm; about 20 percent, by volume, gravel; common fine flakes of mica; very strongly acid.

The solum is 40 to more than 60 inches thick. The depth to bedrock is more than 80 inches. The content of coarse fragments ranges, by volume, from 0 to 15 percent in the A horizon and the upper part of the B horizon and 0 to 35 percent in the lower part of the B horizon and in the C horizon. The coarse fragments consist mainly of waterworn gravel and cobbles. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

The A or Ap horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6. Where value is 3 or less, the horizon is less than 6 inches thick.

The BA horizon, if it occurs, has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam.

The Bt horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay, clay loam, or the gravelly or cobbly analogs of those textures. The control section has a weighted average of more than 35 percent clay.

The BC horizon, if it occurs, has the same colors as the Bt horizon. In some pedons it is mottled or streaked in shades of red, yellow, or brown. It is clay loam, loam, sandy clay loam, or the gravelly or cobbly analogs of those textures.

The C or 2C horizon, if it occurs, varies considerably in color and is generally mottled or variegated. It has textures similar to those of the BC horizon.

Buncombe Series

The Buncombe series consists of very deep, excessively drained soils that formed in recent alluvium on flood plains in the Piedmont. Slopes range from 0 to 3 percent.

Buncombe soils are commonly adjacent to Riverview, Chewacla, Wehadkee, Pacolet, Masada, and Rion soils. Riverview, Chewacla, Wehadkee, and Rion soils have a loamy substratum or subsoil. Riverview soils are well drained. Chewacla soils are somewhat poorly drained. Wehadkee soils are poorly drained. Pacolet and Masada soils have a predominantly clayey subsoil. Rion, Pacolet, and Masada soils are well drained. Rion and Pacolet soils are underlain by saprolite, and Masada soils are underlain by old alluvium.

Typical pedon of Buncombe loamy sand, 0 to 3 percent slopes, occasionally flooded; in a forested area 6.7 miles east of Taylorsville on North Carolina Highway 90, about 1.3 miles northeast on Secondary Road 1456, about 600 feet east of the road, and 100 feet south of the South Yadkin River, on a flood plain:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) loamy sand; weak medium granular structure; very friable; common fine and medium roots; few fine flakes of mica; slightly acid; clear wavy boundary.

C1—7 to 15 inches; dark yellowish brown (10YR 4/6) loamy sand; massive; very friable; few fine roots; few fine flakes of mica; moderately acid; clear wavy boundary.

C2—15 to 60 inches; brownish yellow (10YR 6/6) loamy sand; massive; very friable; few fine roots; few fine flakes of mica; moderately acid.

The sandy horizon extends to a depth of more than 40 inches. In some pedons layers of pebbles and cobbles are in the substratum below a depth of 40 inches. The depth to bedrock is more than 120 inches. Reaction ranges from very strongly acid to slightly acid, except where the surface layer has been limed. The number of mica flakes is few or common throughout the profile.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 6. Where value is 3, the horizon is less than 7 inches thick.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 3 to 8. It is sand, loamy sand, or loamy fine sand to a depth of 40 inches. The substratum is loamy or stratified with loam below a depth of 40 inches.

Cecil Series

The Cecil series consists of very deep, well drained soils that formed in material weathered from gneiss. These soils are on ridgetops in the Piedmont. Slopes range from 2 to 8 percent.

Cecil soils are adjacent to Pacolet, Masada, and Davidson soils. Pacolet soils have a solum that is 20 to 40 inches thick. They are on ridgetops and side slopes. Masada and Davidson soils formed in old alluvium. They are on high stream terraces. Davidson soils have a dark red subsoil.

Typical pedon of Cecil sandy clay loam, 2 to 8 percent slopes, eroded; in a field 1.6 miles southwest of Stony Point on Secondary Road 1637, about 0.4 mile south on Secondary Road 1005, about 0.1 mile west on Secondary Road 1626, and 50 feet north of the road:

Ap—0 to 8 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium granular structure; friable; common fine and medium roots; about 2 percent gravel; few fine flakes of mica; strongly acid; abrupt wavy boundary.

Bt1—8 to 14 inches; yellowish red (5YR 5/8) clay; moderate medium subangular blocky structure; firm, sticky; few fine roots; thin patchy clay films on faces of peds; few fine flakes of mica; strongly acid; abrupt wavy boundary.

Bt2—14 to 48 inches; red (2.5YR 4/8) clay; few medium prominent strong brown (7.5YR 5/8) mottles that increase to many in the lower part; moderate medium subangular blocky structure; firm, sticky; few fine roots; thin patchy clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt3—48 to 60 inches; red (2.5YR 4/8) clay loam; many medium prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm, sticky; thin patchy clay films on faces of peds; common fine flakes of mica; very strongly acid.

The solum is 40 to more than 60 inches thick. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges, by volume, from 0 to 15 percent in the A horizon and 0 to 10 percent in the Bt horizon. The number of mica flakes is few or common in the Bt horizon and ranges from few to many in the

BC and C horizons. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed.

The A or Ap horizon has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 2 to 8. Where value is 3, the horizon is less than 6 inches thick.

The BA horizon, if it occurs, has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 3 to 8. It is sandy clay loam, loam, or clay loam.

The Bt horizon has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 to 8. It has hue of 5YR if patterns of mottling are not evident. The texture is clay loam or clay. The control section has a weighted average of more than 35 percent clay.

The BC horizon, if it occurs, has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. It is sandy clay loam or clay loam.

The C horizon, if it occurs, is multicolored saprolite that has a texture of loam, sandy loam, or fine sandy loam.

Chewacla Series

The Chewacla series consists of very deep, somewhat poorly drained soils that formed in recent alluvium on flood plains in the Piedmont. Slopes range from 0 to 2 percent.

Chewacla soils are commonly adjacent to Buncombe, Riverview, Wehadkee, Dogue, State, Masada, Hibriten, Pacolet, and Rion soils. Buncombe soils have a sandy substratum. They are excessively drained. Riverview soils are well drained, and Wehadkee soils are poorly drained. Dogue soils are moderately well drained. They have a predominantly clayey subsoil and are on terraces. State and Masada soils are well drained and are on terraces. Masada soils have a predominantly clayey subsoil. Hibriten, Pacolet, and Rion soils are well drained and are on uplands. Hibriten soils have more than 35 percent rock fragments throughout. Pacolet soils have a predominantly clayey subsoil.

Typical pedon of Chewacla loam, 0 to 2 percent slopes, frequently flooded; in a forested area 6.8 miles southeast of Taylorsville on Secondary Road 1605, about 0.4 mile east on Secondary Road 1664, about 200 feet southeast of the road, and 100 feet northeast of Big Branch Creek, on a flood plain:

A—0 to 8 inches; brown (7.5YR 4/4) loam; weak medium granular structure; friable; common fine and medium roots; few fine flakes of mica; strongly acid; clear wavy boundary.

Bw—8 to 18 inches; brown (7.5YR 4/4) loam; common fine distinct strong brown (7.5YR 5/8) and grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; strongly acid; clear wavy boundary.

Bg1—18 to 26 inches; dark gray (5YR 4/1) loam; common fine prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; common fine roots; few fine flakes of mica; strongly acid; clear wavy boundary.

Bg2—26 to 41 inches; dark gray (5YR 4/1) sandy clay loam; few fine prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; strongly acid; abrupt wavy boundary.

2C—41 to 60 inches; gray (10YR 5/1) and yellowish brown (10YR 5/4) very gravelly loamy sand; massive; very friable; few fine roots; few fine flakes of mica; moderately acid.

The solum is more than 35 inches thick. The depth to bedrock is more than 60 inches. The content of coarse fragments is 0 to 5 percent, by volume, in the solum. The number of mica flakes is few or common throughout the profile. Reaction ranges from very strongly acid to slightly acid to a depth of 40 inches unless the soils are limed and from very strongly acid to mildly alkaline below a depth of 40 inches.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 1 to 4. Where value is 3, the horizon is less than 7 inches thick.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 3 to 8. It has mottles with chroma of 2 or less within 24 inches of the surface. The texture is sandy clay loam, loam, sandy loam, fine sandy loam, or clay loam.

The Bg horizon has hue of 5YR to 10YR, value of 4 to 7, and chroma of 1 or 2. It is dominantly sandy clay loam, loam, sandy loam, fine sandy loam, or clay loam. Individual subhorizons, however, are silt loam or silty clay loam.

The C or 2C horizon is similar in color to the Bw or Bg horizon. It is alluvium that varies in texture and includes the gravelly or very gravelly analogs. In some pedons it is stratified.

Cleveland Series

The Cleveland series consists of shallow, somewhat excessively drained soils that formed in material weathered from gneiss or schist. These soils are on mountain ridgetops and side slopes. Slopes range from 8 to 90 percent.

Cleveland soils are commonly adjacent to Ashe, Saluda, Cowee, and Evard soils. Ashe soils have hard bedrock at a depth of 20 to 40 inches. They are intermingled with areas of the Cleveland soils. Saluda soils have soft bedrock at a depth of 10 to 20 inches, and Cowee soils have soft bedrock at a depth of 20 to 40 inches. Cowee and Evard soils have more clay in the subsoil than the Cleveland soils. Evard soils are very deep. Saluda, Cowee, and Evard soils are on ridgetops and side slopes.

Typical pedon of Cleveland gravelly sandy loam, in an area of Cleveland-Rock outcrop complex, 8 to 90 percent slopes; in a forested area 5.1 miles northeast of Hiddenite on Secondary Road 1001, about 0.6 mile southwest on Secondary Road 1419, about 2.2 miles west on Secondary Road 1426, about 400 feet east of the road, and 200 feet north of a rock quarry:

Oi—1 inch to 0.5 inch; partly decomposed pine and hardwood litter.

Oe—0.5 inch to 0; humus.

A—0 to 7 inches; brown (10YR 4/3) gravelly sandy loam; weak fine granular structure; very friable; common fine and medium roots; about 15 percent, by volume, gravel; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bw—7 to 12 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak fine subangular blocky structure; very friable; few fine roots; about 15 percent, by volume, gravel; few fine flakes of mica; very strongly acid; abrupt wavy boundary.

R—12 inches; hard, granitic gneiss bedrock.

The solum is 10 to 20 inches deep over hard bedrock. The content of rock fragments ranges, by volume, from 15 to 35 percent in the A horizon and 5 to 35 percent in the Bw and C horizons. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed. The number of mica flakes is few or common throughout the solum.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 4. Where value is 3 or less, the horizon is less than 7 inches thick.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is loam, sandy loam, fine sandy loam, or the gravelly analogs of those textures.

The C horizon, if it occurs, has colors and textures similar to those of the Bw horizon.

The R horizon is hard, granitic gneiss bedrock.

Cowee Series

The Cowee series consists of moderately deep, well drained soils that formed in material weathered from gneiss or schist. These soils are on mountain ridgetops and side slopes. Slopes range from 8 to 60 percent.

Cowee soils are commonly adjacent to Evard, Saluda, Ashe, Cleveland, Hayesville, Braddock, Tate, and French soils. Evard, Saluda, Ashe, Cleveland, and Hayesville soils are on ridgetops and side slopes. Evard soils are very deep. Saluda soils have soft bedrock at a depth of 10 to 20 inches. Ashe and Cleveland soils have less clay in the subsoil than the Cowee soils. Ashe soils have hard bedrock at a depth of 20 to 40 inches, and Cleveland soils have hard bedrock at a depth of 10 to 20 inches. Hayesville soils are very deep. They have a predominantly clayey subsoil. Braddock soils are on foot slopes and high stream terraces, and Tate soils are on stream terraces. Braddock and Tate soils formed in colluvium and old alluvium and have a predominantly clayey subsoil. They are very deep. French soils are on flood plains and are somewhat poorly drained. They formed in alluvium and are very deep.

Typical pedon of Cowee gravelly sandy loam, in an area of Cowee-Saluda complex, 25 to 60 percent slopes, stony; in a forested area 4.6 miles west of Taylorsville on North Carolina Highway 90, about 2.7 miles southeast on Secondary Road 1124, about 1.2 miles southwest on Secondary Road 1128, and 50 feet north of the road:

Oi—1 inch to 0; partly decomposed hardwood litter.

A—0 to 3 inches; dark brown (10YR 3/3) gravelly sandy loam; weak fine granular structure; very friable; common fine and medium roots; about 20 percent, by volume, gravel; few fine flakes of mica; strongly acid; abrupt wavy boundary.

E—3 to 7 inches; strong brown (7.5YR 5/6) gravelly sandy loam; weak fine granular structure; very friable; common fine and medium roots; about 20 percent, by volume, gravel; few fine flakes of mica; strongly acid; abrupt wavy boundary.

Bt—7 to 20 inches; red (2.5YR 4/8) clay loam; moderate medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; about 10 percent, by volume, cobbles and gravel; common fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—20 to 30 inches; red (2.5YR 4/8) sandy clay loam; common medium prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; about 10 percent, by volume, cobbles and gravel; common fine flakes of mica; very strongly acid; abrupt wavy boundary.

Cr—30 to 60 inches; soft mica gneiss bedrock that is partly consolidated but can be dug with difficulty by hand tools.

The solum is 20 to 40 inches deep over soft bedrock. The depth to hard bedrock is more than 40 inches. Rock fragments make up, by volume, 15 to 35 percent of the A and E horizons and 5 to 35 percent of the B and C horizons. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed. The number of mica flakes is few or common throughout the solum.

The A horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 3 to 8. Where value is 3, the horizon is less than 6 inches thick.

The E horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is the gravelly or cobbly analogs of loam, sandy loam, or fine sandy loam.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is sandy clay loam, clay loam, loam, or the gravelly or cobbly analogs of those textures.

The BC horizon has colors and textures similar to those of the Bt horizon. The texture is also fine sandy loam, sandy loam, or the gravelly or cobbly analogs of those textures.

The C horizon, if it occurs, is multicolored saprolite that has a texture of sandy loam, fine sandy loam, loam, or the gravelly or cobbly analogs of those textures.

The Cr horizon is soft bedrock that is partly consolidated but can be dug with difficulty by hand tools.

Davidson Series

The Davidson series consists of very deep, well drained soils that formed in old alluvium on ridgetops and side slopes that are remnants of high stream terraces in the Piedmont. Slopes range from 2 to 15 percent.

Davidson soils are commonly adjacent to Masada, Cecil, Pacolet, and Rion soils. Masada soils are on high stream terraces. They have a red or yellowish red subsoil. Cecil and Pacolet soils are on ridgetops and side slopes. They formed in residuum and have a red subsoil. Rion soils are on side slopes. They formed in residuum and have a loamy subsoil.

Typical pedon of Davidson clay loam, 2 to 8 percent slopes, eroded; in a field in the southeastern part of the county; 1.6 miles southwest of Stony Point on Secondary Road 1626, about 0.9 mile south on Secondary Road 1005, about 3.4 miles southwest on Secondary Road 1638, about 0.6 mile southwest on Secondary Road 1625, about 1.0 mile west to the end of Secondary Road 1654, and 50 feet north of the road:

Ap—0 to 6 inches; dark reddish brown (2.5YR 3/4) clay loam; weak medium subangular blocky and weak medium granular structure; friable; common fine and medium roots; few rounded and angular quartz gravel; few fine flakes of mica; very strongly acid; abrupt wavy boundary.

Bt—6 to 65 inches; dark red (10R 3/6) clay; moderate medium subangular blocky structure; firm, very sticky; few fine roots; thin patchy clay films on faces of peds; few manganese concretions; few rounded quartz gravel; few fine flakes of mica; moderately acid.

The solum is more than 60 inches thick. The depth to bedrock is more than 60 inches. The content of coarse fragments, by volume, ranges from 0 to 10 percent throughout the profile. The content of clay does not decrease from its maximum amount by more than 20 percent within a depth of 60 inches. Reaction ranges from very strongly acid to moderately acid, except where the surface layer has been limed.

The A or Ap horizon has hue of 2.5YR or 5YR, value of 2 or 3, and chroma of 2 to 4.

The Bt horizon has hue of 10R or 2.5YR, value of 3, and chroma of 3 to 6.

Dogue Series

The Dogue series consists of very deep, moderately well drained soils that formed in old alluvium on low stream terraces in the Piedmont. Slopes range from 2 to 6 percent.

Dogue soils are commonly adjacent to Chewacla, Riverview, Masada, Davidson, Rion, and Pacolet soils. Chewacla and Riverview soils are on flood plains. They have less clay in the subsoil than the Dogue soils. Chewacla soils are somewhat poorly drained, and Riverview soils are well drained. Masada and Davidson soils are on high stream terraces and are well drained. Masada soils have a red subsoil, and Davidson soils have a dark red subsoil. Rion and Pacolet soils are on upland side slopes and are well drained. Rion soils have less clay in the subsoil than the Dogue soils. Pacolet soils have a red subsoil.

Typical pedon of Dogue sandy loam, 2 to 6 percent slopes, rarely flooded; in a field 1.0 mile south of Stony Point on Secondary Road 1637, about 1,350 feet north of the road, and 400 feet west of Third Creek:

Ap—0 to 7 inches; brown (10YR 4/3) sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 5 percent, by volume, gravel; few fine flakes of mica; neutral; abrupt wavy boundary.

Bt1—7 to 21 inches; yellowish brown (10YR 5/8) clay; common medium distinct strong brown (7.5YR 5/8) and common medium prominent red (2.5YR 5/8) mottles in the lower part; moderate medium subangular blocky structure; firm; few fine roots; thin patchy clay films on faces of peds; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bt2—21 to 37 inches; mottled yellowish brown (10YR 5/8), red (2.5YR 5/8), strong brown (7.5YR 5/8), and light gray (10YR 7/2) clay; moderate medium subangular blocky structure; firm; few fine roots; thin patchy clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt3—37 to 50 inches; mottled yellowish brown (10YR 5/8), red (2.5YR 5/8), strong brown (7.5YR 5/8), and light gray (10YR 7/2) clay loam; moderate medium subangular blocky structure; firm; few fine roots; thin patchy clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual wavy boundary.

2C—50 to 60 inches; yellowish brown (10YR 5/8) gravelly sandy clay loam; common medium distinct strong brown (7.5YR 5/8) and few medium prominent light gray (N 6/0) mottles; massive; friable; about 20 percent, by volume, gravel; common fine flakes of mica; very strongly acid.

The solum is 40 to more than 60 inches thick. The depth to bedrock is more than 60 inches. The content of coarse fragments, by volume, ranges from 0 to 15 percent of the A and B horizons and 0 to 25 percent of the C horizon. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed. The number of mica flakes is few or common throughout the solum.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4.

The E horizon, if it occurs, has hue of 10YR or 2.5Y and value and chroma of 4 to 6. It is loam, fine sandy loam, or sandy loam.

The BA horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4 to 8. It is loam, clay loam, or sandy clay loam.

The upper part of the Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It has mottles with chroma of 2 or less in the upper 24 inches. The lower part has hue of 7.5YR or 10YR, value of 4 to 6, and chroma 1 to 8. The texture is dominantly clay loam, clay, or sandy clay. Some subhorizons, however, are sandy clay loam.

The BC horizon, if it occurs, has colors similar to those of the lower part of the Bt horizon. It is sandy loam, sandy clay loam, or clay loam.

The C or 2C horizon, if it occurs, has colors similar to those of the lower part of the Bt horizon. It ranges in texture from sand to sandy clay loam or is the gravelly analogs of those textures. In some pedons it is stratified.

Evard Series

The Evard series consists of very deep, well drained soils that formed in material weathered from gneiss or schist. These soils are on ridgetops and side slopes in the mountains. Slopes range from 8 to 60 percent.

Evard soils are commonly adjacent to Cowee, Saluda, Ashe, Cleveland, Hayesville, Braddock, Tate, and French soils. Cowee, Saluda, Ashe, Cleveland, and Hayesville soils are on ridgetops and side slopes. Cowee soils have soft bedrock at a depth of 20 to 40 inches, and Saluda soils have soft bedrock at a depth of 10 to 20 inches. Ashe soils have hard bedrock at a depth of 20 to 40 inches, and Cleveland soils have hard bedrock at a depth of 10 to 20 inches. Ashe and Cleveland soils have less clay in the subsoil than the Evard soils. Hayesville soils have a predominantly clayey subsoil. Braddock soils are on foot slopes and high stream terraces. They formed in colluvium and old alluvium and have a predominantly clayey subsoil. Tate soils are on stream terraces. They formed in colluvium and old alluvium and have a browner subsoil than the Evard soils. French soils are on flood plains and are somewhat poorly drained. They formed in alluvium.

Typical pedon of Evard gravelly sandy loam, in an area of Evard-Cowee complex, 25 to 60 percent slopes, stony; in a forested area in the northeastern part of the county; 1.6 miles north of Vashti on Secondary Road 1403, about 1.6 miles northeast on Secondary Road 1436, and 50 feet south of the road:

Oi—2 inches to 0; partly decomposed hardwood litter.

A—0 to 3 inches; dark brown (10YR 3/3) gravelly sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 15 percent, by volume, gravel; common fine flakes of mica; strongly acid; abrupt wavy boundary.

E—3 to 7 inches; strong brown (7.5YR 5/6) gravelly sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 15 percent, by volume, gravel; common fine flakes of mica; strongly acid; clear wavy boundary.

BE—7 to 10 inches; yellowish red (5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; common fine flakes of mica; very strongly acid; abrupt wavy boundary.

Bt—10 to 22 inches; red (2.5YR 4/8) clay loam; moderate medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—22 to 35 inches; yellowish red (5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; many fine flakes of mica; about 30 percent saprolite; very strongly acid; gradual wavy boundary.

C1—35 to 48 inches; strong brown (7.5YR 5/8) saprolite that has a texture of fine sandy loam; massive; very friable; few fine roots; many fine flakes of mica; very strongly acid; abrupt wavy boundary.

C2—48 to 60 inches; yellowish brown (10YR 5/8) saprolite that has a texture of sandy loam; massive; very friable; few fine roots; many fine flakes of mica; very strongly acid.

The solum is 20 to more than 40 inches thick. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges, by volume, from 15 to 35 percent in the A and E horizons and 0 to 8 percent in the B horizon. Reaction ranges from very strongly acid to moderately acid, except where the surface layer has been limed. The number of mica flakes is few or common in the A and E horizons and the upper part of the B horizon and common or many in the lower part of the B horizon and in the C horizon.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6. Where value is 3, the horizon is less than 6 inches thick.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is sandy loam, fine sandy loam, loam, or the gravelly or cobbly analogs of those textures.

The BE or BA horizon, if it occurs, has hue of 5YR or 2.5YR, value of 4 to 6, and chroma of 4 to 8. It is sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8. It is sandy clay loam or clay loam.

The BC horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 6 to 8. It is sandy loam, fine sandy loam, loam, or sandy clay loam.

The C horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 6 to 8. It is sandy loam, fine sandy loam, loam, loamy fine sand, or loamy sand.

French Series

The French series consists of very deep, somewhat poorly drained soils that formed in recent alluvium on flood plains along small streams in the mountains. Slopes range from 2 to 5 percent.

French soils are commonly adjacent to Tate, Braddock, Hayesville, Evard, Cowee, and Saluda soils. Tate soils are well drained and are on stream terraces. Braddock and Hayesville soils have a predominantly clayey subsoil and are on foot slopes. Evard, Cowee, and Saluda soils are on upland side slopes. They formed in residuum.

Typical pedon of French sandy loam, in an area of Tate-French complex, 2 to 10 percent slopes; in a forested area in the northwestern part of the county; 4.2 miles west of Taylorsville on North Carolina Highway 90, about 6.4 miles north on Secondary Road 1307 to its intersection with Secondary Road 1308, about 0.3 mile north on Secondary Road 1307, about 300 feet west on a logging road, and 40 feet north of the road:

Oi—1 inch to 0; hardwood and pine litter.

A—0 to 12 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium granular structure; friable; common fine and medium roots; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bw—12 to 24 inches; yellowish brown (10YR 5/4) loam; common medium distinct yellowish brown (10YR 5/8) and grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Cg—24 to 31 inches; dark grayish brown (10YR 4/2) loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; common fine flakes of mica; strongly acid; abrupt smooth boundary.

2Cg—31 to 60 inches; dark gray (10YR 4/1) very gravelly loamy sand; common medium distinct yellowish brown (10YR 5/4) mottles; massive; very friable; about 50 percent, by volume, gravel and cobbles; common fine flakes of mica; moderately acid.

The solum is 20 to 40 inches deep over a gravelly or very gravelly sandy substratum. The depth to bedrock is more than 60 inches. The content of rock fragments ranges from 0 to 10 percent, by volume, in the A, B, and C horizons. The 2C horizon has more than 35 percent, by volume, rock fragments within a depth of 40 inches. Reaction ranges from very strongly acid to moderately acid, except where the surface layer has been limed.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 or 4. Where value is 3, the horizon is less than 7 inches thick.

The BA horizon, if it occurs, has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 4 to 8. It is fine sandy loam, loam, or sandy clay loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 8. It has few to many mottles in shades of brown, gray, or red. It is loam, sandy loam, fine sandy loam, sandy clay loam, or clay loam with 18 to 35 percent clay.

The Cg horizon, if it occurs, has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 1 or 2. It has few to many mottles in shades of red or brown. It is loam, sandy loam, fine sandy loam, sandy clay loam, or clay loam.

The 2Cg horizon has hue of 10YR, value of 4 or 5, and chroma of 1 or 2. It has few to many mottles in shades of red or brown. It is the very gravelly or very cobbly analogs of loamy sand or sand.

Hayesville Series

The Hayesville series consists of very deep, well drained soils that formed in material weathered from gneiss or schist on ridgetops and side slopes in low mountain valleys. Slopes range from 6 to 25 percent.

Hayesville soils are commonly adjacent to Braddock, Evard, Cowee, Saluda, Tate, and French soils. Braddock soils formed in colluvium and old alluvium on foot slopes and high stream terraces. Evard, Cowee, and Saluda soils have a loamy subsoil. They formed in residuum on side slopes. Tate soils have a loamy subsoil. They are on foot slopes and stream terraces. French soils have a loamy surface layer and subsoil that is 20 to 40 inches thick over gravelly or very gravelly underlying material. They are on flood plains.

Typical pedon of Hayesville clay loam, in an area of Braddock and Hayesville clay loams, 6 to 15 percent slopes, eroded; in a pasture in the northwestern part of the county; 1.6 miles south on North Carolina Highway 16 from the Wilkes County line, 2.8 miles west on Secondary Road 1334, about 0.7 mile northwest on Secondary Road 1307, about 300 feet north on a private road, and 40 feet southeast of the road:

Ap—0 to 7 inches; reddish brown (5YR 4/4) clay loam; moderate medium granular structure; friable; common fine roots; few fine flakes of mica; slightly acid; clear smooth boundary.

Bt—7 to 31 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm; few fine roots; thin patchy clay films on faces of peds; few fine flakes of mica; moderately acid; gradual wavy boundary.

BC—31 to 41 inches; red (2.5YR 5/8) clay loam; weak medium subangular blocky structure; friable; common fine flakes of mica; strongly acid; clear wavy boundary.

C—41 to 60 inches; mottled strong brown (7.5YR 5/8) and yellowish brown (10YR 5/6) saprolite that has a texture of sandy loam; massive; friable; few fine flakes of mica; very strongly acid.

The solum is 30 to 60 inches thick. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 15 percent, by volume, throughout the profile. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

The A or Ap horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 4. Where value is 3, the horizon is less than 6 inches thick.

The BA horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, clay loam, or sandy clay loam.

The Bt horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay or clay loam.

The BC horizon has hue of 10R to 5YR, value of 5, and chroma of 6 to 8. It is clay loam, sandy clay loam, or loam.

The C horizon is multicolored saprolite that has a texture of loam, sandy clay loam, sandy loam, or fine sandy loam.

Hibriten Series

The Hibriten series consists of well drained, moderately deep soils that formed in material weathered from sillimanite schist on ridgetops and side slopes in the Piedmont. Slopes range from 8 to 60 percent.

Hibriten soils are commonly adjacent to Bethlehem, Pacolet, Rion, and Chewacla soils. The adjacent soils have fewer rock fragments throughout than the Hibriten soils. Bethlehem, Pacolet, and Rion soils are on ridgetops and side slopes. Bethlehem and Pacolet soils have a predominantly clayey subsoil. Pacolet, Rion, and Chewacla soils are very deep. Chewacla soils are on flood plains and are somewhat poorly drained.

Typical pedon of Hibriten very cobbly sandy loam, 8 to 15 percent slopes; in a forested area in the southwestern part of the county; 1.7 miles east of Bethlehem on Secondary Road 1137 from its intersection with North Carolina Highway 90, about 75 feet east on a private road, and in a road cut south of the road:

A—0 to 6 inches; brown (10YR 5/3) very cobbly sandy loam; weak medium granular structure; very friable; many fine and medium roots; about 40 percent, by volume, cobbles and gravel; few fine flakes of mica; strongly acid; clear wavy boundary.

BA—6 to 13 inches; brownish yellow (10YR 6/6) very cobbly sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; about 40 percent, by volume, cobbles and gravel; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt1—13 to 18 inches; strong brown (7.5YR 5/6) very cobbly sandy clay loam; weak medium subangular blocky structure; friable; few fine and common medium roots; about 40 percent, by volume, cobbles and gravel; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt2—18 to 28 inches; yellowish red (5YR 5/6) very cobbly clay loam; moderate medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; few fine and medium roots; about 45 percent, by volume, cobbles and gravel; common fine flakes of mica; very strongly acid; gradual wavy boundary.

Cr—28 to 60 inches; soft sillimanite schist bedrock that is partly consolidated but can be dug with difficulty by hand tools.

The solum is 20 to 40 inches deep over soft bedrock. The depth to hard bedrock is more than 40 inches. Rock fragments average more than 35 percent, by volume, throughout the solum. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed. The number of mica flakes is few or common throughout the solum.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 6. Where value is 3, the horizon is less than 6 inches thick.

The E horizon, if it occurs, has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is the very gravelly or very cobbly analogs of sandy loam.

The BA or BE horizon, if it occurs, has hue of 5YR to 10YR and value and chroma of 4 to 6. The texture is similar to that of the E horizon.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is the very gravelly or very cobbly analogs of sandy clay loam, clay loam, or loam.

The Cr horizon is soft bedrock that is partly consolidated but can be dug with difficulty by hand tools.

Masada Series

The Masada series consists of very deep, well drained soils that formed in old alluvium on high stream terraces in the Piedmont. Slopes range from 2 to 15 percent.

Masada soils are commonly adjacent to Cecil, Pacolet, Rion, Chewacla, Riverview, and Davidson soils. Cecil, Pacolet, and Rion soils formed in residuum. Cecil soils are on ridgetops. Pacolet and Rion soils are on ridgetops and side slopes. Pacolet soils have a solum that is 20 to 40 inches thick. Rion soils have a loamy subsoil. Chewacla and Riverview soils are on flood plains. They have a loamy subsoil. Chewacla soils are somewhat poorly drained. Davidson soils are on ridgetops and side slopes and have a dark red subsoil.

Typical pedon of Masada sandy clay loam, 2 to 8 percent slopes, eroded; in a field in the southeastern part of the county; 8.2 miles southeast of Taylorsville on Secondary Road 1605, about 0.7 mile southwest on Secondary Road 1622, about 1.7 miles west to the end of a farm road, 600 feet northwest of the road, and 600 feet east of Lookout Shoals Lake:

Ap—0 to 8 inches; yellowish red (5YR 5/6) sandy clay loam; weak medium granular structure; friable; common fine and medium roots; few fine flakes of mica; very strongly acid; abrupt wavy boundary.

Bt1—8 to 30 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm; few fine roots; thin patchy clay films on faces of peds; few fine flakes of mica; moderately acid; gradual wavy boundary.

Bt2—30 to 45 inches; yellowish red (5YR 5/8) clay loam; weak medium subangular blocky structure; friable; thin patchy clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—45 to 60 inches; strong brown (7.5YR 5/8) loam; weak medium subangular blocky structure; friable; few fine flakes of mica; very strongly acid.

The solum is 40 to more than 60 inches thick. The depth to bedrock is more than 60 inches. Rock fragments make up, by volume, 0 to 15 percent in the A, BA, Bt, and BC horizons and 0 to 35 percent in the C horizon. Stone or cobble lines are present in some pedons. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed. The number of mica flakes is few or common throughout the solum.

The A or Ap horizon has hue of 5YR to 10YR, value of 3 to 8, and chroma of 3 to 6. Where value is 3, the horizon is less than 6 inches thick.

The BA horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is loam, sandy clay loam, or clay loam.

The Bt horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is clay loam or clay. The control section has a weighted average of more than 35 percent clay.

The BC horizon has colors similar to those of the Bt horizon. It is loam, sandy clay loam, or clay loam.

The C horizon, if it occurs, is multicolored strata, commonly in shades of brown, gray, yellow, or red. It is sandy loam, loam, sandy clay loam, or the gravelly or cobbly analogs of those textures.

Pacolet Series

The Pacolet series consists of very deep, well drained soils that formed in material weathered from gneiss or schist on ridgetops and side slopes in the Piedmont. Slopes range from 2 to 25 percent.

Pacolet soils are commonly adjacent to Cecil, Rion, Bethlehem, Masada, Chewacla, and Riverview soils. Cecil, Rion, and Bethlehem soils are on ridgetops and side slopes. Cecil soils have a solum that is 40 to more than 60 inches thick. Rion soils have a loamy subsoil. Bethlehem soils have a clayey subsoil and have soft bedrock at a depth of 20 to 40 inches. Masada soils are on high stream terraces and have a solum that is 40 to 60 inches thick. Chewacla and Riverview soils are on flood plains and have a loamy subsoil. Chewacla soils are somewhat poorly drained.

Typical pedon of Pacolet sandy loam, 15 to 25 percent slopes; in a forested area in the southeastern part of the county; 9.4 miles southeast of Taylorsville on Secondary Road 1605, about 1.5 miles west on Secondary Road 1622, and 50 feet south of the road:

Oi—2 inches to 0.5 inch; hardwood and pine litter.

Oe—0.5 inch to 0; humus.

A—0 to 5 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium granular structure; friable; many fine, medium, and coarse roots; few fine flakes of mica; strongly acid; abrupt wavy boundary.

BA—5 to 9 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; many fine, medium, and coarse roots; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt—9 to 28 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm; few fine roots; thin patchy clay films on faces of peds; common fine flakes of mica; strongly acid; clear wavy boundary.

BC—28 to 38 inches; yellowish red (5YR 5/8) clay loam; weak medium subangular blocky structure; friable; common fine flakes of mica; very strongly acid; clear wavy boundary.

C—38 to 60 inches; strong brown (7.5YR 5/6) and yellowish brown (10YR 5/8) saprolite that has a texture of sandy loam; massive; very friable; common fine flakes of mica; very strongly acid.

The solum is 20 to 40 inches thick. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 15 percent, by volume, throughout the profile. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed. The number of mica flakes is few or common throughout the profile.

The A or Ap horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6. Where value is 3, the horizon is less than 6 inches thick. It is sandy clay loam or sandy loam.

The E horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is sandy loam, fine sandy loam, or loam.

The BA or BE horizon, if it occurs, has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. It is sandy clay loam, sandy loam, or loam.

The Bt horizon has hue of 2.5YR, value of 4 or 5, and chroma of 6 to 8. It is clay or clay loam. The control section has a weighted average of more than 35 percent clay.

The BC horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay loam, sandy clay loam, loam, or sandy loam.

The C horizon is multicolored saprolite that has a texture of sandy loam, fine sandy loam, or loam.

Rion Series

The Rion series consists of very deep, well drained soils that formed in material weathered from gneiss or schist on ridgetops and side slopes in the Piedmont. Slopes range from 2 to 45 percent.

Rion soils are commonly adjacent to Pacolet, Cecil, Wedowee, Masada, Bethlehem, Chewacla, and Riverview soils. Pacolet soils are on ridgetops and side slopes. Cecil and Wedowee soils are on ridgetops. Masada soils are on high stream terraces. Pacolet, Cecil, Wedowee, and Masada soils have a predominantly clayey subsoil. Bethlehem soils are on ridgetops and side slopes. They have a predominantly clayey subsoil and have soft bedrock at a depth of 20 to 40 inches. Chewacla and Riverview soils are on flood plains. Chewacla soils are somewhat poorly drained.

Typical pedon of Rion sandy loam, 8 to 15 percent slopes; in a forested area in the northeastern part of the county; 5.0 miles north of Hiddenite on Secondary Road 1001, about 0.6 mile southwest on Secondary Road 1419, about 0.3 mile northwest on Secondary Road 1426, about 0.5 mile northwest on Secondary Road 1556, and 250 feet southwest of the road:

Oi—1 inch to 0; partly decomposed hardwood litter.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) sandy loam; weak fine granular structure; very friable; common fine and medium roots; few pebbles; few fine flakes of mica; very strongly acid; abrupt wavy boundary.

E—2 to 6 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; common fine and medium roots; few pebbles; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bt—6 to 25 inches; strong brown (7.5YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—25 to 30 inches; brownish yellow (10YR 6/8) sandy loam; weak medium subangular blocky structure; very friable; few fine roots; about 30 percent saprolite; few fine flakes of mica; strongly acid; gradual wavy boundary.

C—30 to 60 inches; brownish yellow (10YR 6/8), strong brown (7.5YR 5/8), and white (10YR 8/1) saprolite that has a texture of sandy loam; massive; very friable; few fine roots; few fine flakes of mica; strongly acid.

The solum is 20 to 40 inches thick. The depth to bedrock is more than 60 inches. The content of coarse fragments, by volume, ranges from 0 to 10 percent throughout the profile. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed. The number of mica flakes is few or common throughout the solum.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 6. Where value is 3, the horizon is less than 6 inches thick.

The E horizon has colors similar to those of the A horizon. It is sandy loam or fine sandy loam.

The BA or BE horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is sandy loam or sandy clay loam.

The Bt horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is sandy clay loam or clay loam.

The BC horizon has colors similar to those of the Bt horizon. It is sandy loam or sandy clay loam.

The C horizon is multicolored saprolite that has colors in shades of red, yellow, brown, gray, or white. It is sandy loam or loamy sand.

Riverview Series

The Riverview series consists of very deep, well drained soils that formed in recent alluvium on flood plains in the Piedmont. Slopes range from 0 to 2 percent.

Riverview soils are commonly adjacent to Chewacla, Buncombe, Wehadkee, Rion, Pacolet, State, and Masada soils. Chewacla, Buncombe, and Wehadkee soils are on flood plains. Chewacla soils are somewhat poorly drained. Buncombe soils are excessively drained and have a sandy substratum. Wehadkee soils are poorly drained. Rion and Pacolet soils are on ridgetops and side slopes. They formed in residuum. Pacolet soils have a predominantly clayey subsoil. State and Masada soils are on high stream terraces. They formed in old alluvium. Masada soils have a predominantly clayey subsoil.

Typical pedon of Riverview fine sandy loam, 0 to 2 percent slopes, frequently flooded; in a field in the southeastern part of the county; 9.8 miles southeast of Taylorsville on Secondary Road 1605, about 500 feet west of the road, and 100 feet north of Elk Shoals Creek:

Ap—0 to 10 inches; brown (7.5YR 4/4) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; few fine flakes of mica; moderately acid; abrupt wavy boundary.

Bw1—10 to 30 inches; yellowish red (5YR 4/6) silty clay loam; weak medium subangular blocky structure; friable; few fine roots; common fine flakes of mica; moderately acid; clear wavy boundary.

Bw2—30 to 35 inches; strong brown (7.5YR 4/6) loam; weak medium subangular blocky structure; friable; few fine roots; common fine flakes of mica; few thin lenses of loamy sand; moderately acid; abrupt wavy boundary.

Bw3—35 to 43 inches; brown (7.5YR 4/4) loam; common fine distinct brown (7.5YR 5/2) and common medium prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; common fine flakes of mica; very strongly acid; abrupt wavy boundary.

2Cg—43 to 60 inches; reddish gray (5YR 5/2) sandy loam; common medium prominent strong brown (7.5YR 5/8) mottles; massive; friable; common fine flakes of mica; strongly acid.

The solum is 24 to 60 inches thick. The depth to bedrock is commonly more than 60 inches. The content of coarse fragments is generally less than 2 percent, by volume. The number of mica flakes ranges from few to many throughout the profile. Reaction ranges from very strongly acid to moderately acid throughout, except where the surface layer has been limed.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Where value is 3, the horizon is less than 7 inches thick.

The upper part of the Bw horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6. The lower part has hue of 5YR to 10YR, value of 4 or 5, and chroma of 1 or 2. The Bw horizon has mottles with chroma of 2 or less below a depth of 24 inches. The texture is silty clay loam, loam, sandy clay loam, or clay loam.

The 2C or C horizon is similar in color to those of the

Bw horizon. It is loamy sand, sandy loam, or fine sandy loam.

Saluda Series

The Saluda series consists of shallow, well drained soils that formed in material weathered from gneiss or schist on ridgetops and side slopes in the mountains. Slopes range from 8 to 60 percent.

Saluda soils are commonly adjacent to Cowee, Evard, Ashe, Cleveland, Hayesville, Braddock, Tate, and French soils. Cowee, Evard, Ashe, Cleveland, and Hayesville soils are on ridgetops and side slopes. Cowee soils have soft bedrock at a depth of 20 to 40 inches. Evard soils are very deep. Ashe soils have hard bedrock at a depth of 20 to 40 inches, and Cleveland soils have hard bedrock at a depth of 10 to 20 inches. Ashe and Cleveland soils have less clay in the subsoil than the Saluda soils. Hayesville and Braddock soils are very deep and have a predominantly clayey subsoil. Braddock soils are on foot slopes and high stream terraces and formed in colluvium and old alluvium. Tate soils are on foot slopes and stream terraces and formed in colluvium and old alluvium. French soils are on flood plains and are somewhat poorly drained. Tate and French soils are very deep.

Typical pedon of Saluda gravelly sandy loam, in an area of Cowee-Saluda complex, 25 to 60 percent slopes, stony; in a forested area in the southwestern part of the county; 4.6 miles west of Taylorsville on North Carolina Highway 90, about 2.7 miles southeast on Secondary Road 1124, about 1.3 miles southwest on Secondary Road 1128, and 50 feet north of the road:

Oi—1 inch to 0; partly decomposed hardwood litter.

A—0 to 2 inches; very dark grayish brown (10YR 3/2) gravelly sandy loam; weak fine granular structure; very friable; common fine and medium roots; about 20 percent, by volume, gravel; few fine flakes of mica; strongly acid; abrupt wavy boundary.

BA—2 to 6 inches; strong brown (7.5YR 5/8) gravelly sandy loam; weak fine granular structure; very friable; common fine and medium roots; about 20 percent, by volume, gravel; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt1—6 to 9 inches; yellowish red (5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; about 10 percent, by volume, cobbles and gravel; common fine flakes of mica; very strongly acid; clear wavy boundary.

Bt2—9 to 18 inches; yellowish red (5YR 5/6) clay loam; weak medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; about 10 percent, by volume, cobbles and gravel; common fine flakes of mica; very strongly acid; abrupt wavy boundary.

Cr—18 to 60 inches; soft sillimanite schist bedrock that is partly consolidated but can be dug with difficulty by hand tools.

The solum is 10 to 20 inches deep over soft bedrock. The depth to hard bedrock is more than 40 inches. The content of rock fragments ranges, by volume, from 15 to 35 percent in the A horizon and 5 to 20 percent in the B horizon. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed. The number of mica flakes is few or common throughout the solum.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 6. Where value is 3, the horizon is less than 6 inches thick.

The BA horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is sandy loam, sandy clay loam, or the gravelly analogs of those textures.

The Bt horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is sandy clay loam, clay loam, or the gravelly analogs of those textures. The control section has a weighted average of 18 to 35 percent clay.

The Cr horizon is soft bedrock that is partly consolidated but can be dug with difficulty by hand tools.

State Series

The State series consists of very deep, well drained soils that formed in old alluvium on high stream terraces in the Piedmont. Slopes range from 2 to 6 percent.

State soils are commonly adjacent to Pacolet, Rion, Hibriten, Bethlehem, Chewacla, Riverview, and Masada soils. Pacolet, Rion, Hibriten, and Bethlehem soils are on ridgetops and side slopes. They formed in residuum. Pacolet and Bethlehem soils have a predominantly clayey subsoil. Hibriten soils have more than 35 percent rock fragments throughout. Hibriten and Bethlehem soils have soft bedrock at a depth of 20 to 40 inches. Chewacla and Riverview soils are on flood plains. Chewacla soils are somewhat poorly drained. Masada soils are on high stream terraces. They have a predominantly clayey subsoil.

Typical pedon of State sandy loam, 2 to 6 percent slopes; in a forested area in the southwestern part of the county; 2.1 miles east of Bethlehem on Secondary Road 1137, about 0.3 mile south on Secondary Road 1239, and 100 yards northwest of the road:

Oi—2 inches to 1 inch; pine needles.

Oe—1 inch to 0; humus.

A—0 to 8 inches; olive brown (2.5Y 4/4) sandy loam;

weak medium granular structure; very friable; common fine and medium roots; few pebbles; few fine flakes of mica; strongly acid; abrupt wavy boundary.

BA—8 to 11 inches; light olive brown (2.5Y 5/4) sandy loam; weak medium subangular blocky structure; very friable; common fine roots; few pebbles; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt1—11 to 18 inches; light olive brown (2.5Y 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; few pebbles; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt2—18 to 45 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium prominent yellowish red (5YR 5/8) and common medium distinct brown (10YR 5/3) mottles; moderate medium subangular blocky structure; friable; few fine roots; about 2 percent, by volume, gravel; few fine flakes of mica; strongly acid; abrupt wavy boundary.

2C—45 to 60 inches; strong brown (7.5YR 5/8) gravelly sandy loam; common medium distinct yellowish red (5YR 5/8) mottles; massive; friable; about 20 percent, by volume, gravel; common fine flakes of mica; strongly acid.

The solum is 30 to more than 60 inches thick. The depth to bedrock is more than 60 inches. Coarse fragments make up, by volume, 0 to 2 percent of the A and B horizons and 0 to 25 percent of the 2C horizon. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed. The number of mica flakes is few or common throughout the profile.

The A or Ap horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 2 to 6. Where value is 3, the horizon is less than 6 inches thick.

The BA horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. It is sandy loam, fine sandy loam, loam, or sandy clay loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. It is loam, clay loam, or sandy clay loam. In some pedons it has mottles in shades of red, brown, or yellow in the lower part of the horizon.

The BC horizon, if it occurs, has colors similar to those of the Bt horizon. It is sandy loam, fine sandy loam, loam, or sandy clay loam.

The C or 2C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 8. It is sand, loamy sand, sandy loam, or the gravelly analogs of those textures. It is stratified in some pedons.

Tate Series

The Tate series consists of very deep, well drained soils that formed in colluvium and old alluvium on stream terraces and foot slopes in the mountains. Slopes range from 4 to 10 percent.

Tate soils are commonly adjacent to French, Braddock, Hayesville, Evard, Cowee, and Saluda soils. French soils are on flood plains and are somewhat poorly drained. They have a loamy surface layer and subsoil that is 20 to 40 inches thick over sandy or gravelly underlying material. Braddock and Hayesville soils have a predominantly clayey subsoil. They are on foot slopes, side slopes, and high stream terraces. Evard, Cowee, and Saluda soils are on upland side slopes and formed in residuum. Cowee soils have soft bedrock at a depth of 20 to 40 inches, and Saluda soils have soft bedrock at a depth of 10 to 20 inches.

Typical pedon of Tate sandy loam, in an area of Tate-French complex, 2 to 10 percent slopes; in a forested area in the northwestern part of the county; 4.2 miles west of Taylorsville on North Carolina Highway 90, about 6.4 miles north on Secondary Road 1307, about 0.3 mile north on Secondary Road 1307 from its intersection with Secondary Road 1308, about 500 feet west on a logging road, and 20 feet west of the road:

Oi—3 to 1.5 inches; hardwood and pine litter.

Oe—1.5 inches to 0; humus.

A—0 to 2 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium granular structure; friable; common fine and medium roots; few fine flakes of mica; very strongly acid; clear smooth boundary.

E—2 to 8 inches; yellowish brown (10YR 5/6) sandy loam; weak medium granular structure; friable; common fine and medium roots; few fine flakes of mica; very strongly acid; clear smooth boundary.

Bt1—8 to 18 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt2—18 to 38 inches; strong brown (7.5YR 5/8) clay loam; moderate medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—38 to 55 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine distinct strong brown (7.5YR 5/8) and few fine prominent light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C—55 to 60 inches; mottled yellowish brown

(10YR 5/6), strong brown (7.5YR 5/8), and light brownish gray (10YR 6/2) sandy loam; massive; friable; about 5 percent, by volume, gravel; few fine flakes of mica; very strongly acid.

The solum is 30 to more than 60 inches thick. The depth to bedrock is more than 60 inches. The content of rock fragments ranges, by volume, from 0 to 15 percent in the A, E, and B horizons and 5 to 35 percent in the C horizon. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed.

The A horizon has hue of 10YR, value of 3 to 6, and chroma of 2 to 4. Where value is 3, the horizon is less than 6 inches thick.

The E horizon has slightly higher value and chroma than the A horizon. It is sandy loam, fine sandy loam, or loam.

The BA horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam, sandy clay loam, or clay loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 8. In some pedons it has mottles with chroma of 2 or less below the upper 24 inches. It is clay loam, sandy clay loam, or loam.

The BC horizon is similar in color and texture to the Bt horizon.

The C horizon is sandy, loamy, or gravelly colluvium. It is multicolored.

Udorthents

Udorthents consists of areas where the natural soil has been altered by excavation or covered by earthy fill material. The areas are well drained or moderately well drained. The excavated areas are mainly borrow areas from which the soil has been removed and used as foundation material for roads or buildings. In some areas the exposed substratum of the excavated soil is sandy loam to clay loam. In a few places it may be bedrock. The fill areas are sites where at least 20 inches of earthy fill material covers the natural soil or where borrow pits, dumps, natural drainageways, or low areas have been filled. Slope ranges from nearly level to steep.

A typical pedon is not given for these soils because they vary. The fill areas are mainly more than 20 inches deep and are as much as 20 to 30 feet in places. Some areas have inclusions of nonsoil material, such as concrete, wood, glass, and asphalt. The soils are stratified and vary in color and texture.

Udorthents have colors in shades of red, yellow, brown, or white. It varies in texture and ranges from sandy loam to clay. Reaction of the material ranges from very strongly acid to slightly acid.

These soils were not classified below the great group level. Most areas would be classified as Typic Udorthents, but some areas that have been cut close to bedrock are Lithic Udorthents, and other areas where the seasonal high water table is within a depth of 40 inches in low areas that are cut or filled are Aquic Udorthents. The particle-size class is coarse-loamy, fine-loamy, or clayey.

Wedowee Series

The Wedowee series consists of very deep, well drained soils that formed in material weathered from gneiss. These soils are on ridgetops in the Piedmont. Slopes range from 2 to 8 percent.

Wedowee soils are commonly adjacent to Rion, Pacolet, and Cecil soils, which are on upland ridgetops and side slopes. Rion soils have a loamy subsoil. Pacolet and Cecil soils have a red subsoil. Cecil soils have a solum that is more than 40 inches thick.

Typical pedon of Wedowee sandy loam, in an area of Rion-Wedowee complex, 2 to 8 percent slopes; in a field in the northeastern part of the county; 5.0 miles north of Hiddenite on Secondary Road 1001, about 0.6 mile southwest on Secondary Road 1419, about 0.3 mile northwest on Secondary Road 1426, about 0.5 mile northwest on Secondary Road 1556, and 300 feet northeast of the road:

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) sandy loam; weak medium granular structure; very friable; common fine and medium roots; about 5 percent, by volume, gravel; few fine flakes of mica; moderately acid; abrupt wavy boundary.

Bt—6 to 21 inches; yellowish red (5YR 5/6) clay; moderate medium subangular blocky structure; firm; few fine roots; thin patchy clay films on faces of peds; few fine flakes of mica; strongly acid; clear wavy boundary.

BC—21 to 40 inches; red (2.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few fine flakes of mica; strongly acid; clear wavy boundary.

C—40 to 60 inches; yellowish red (5YR 5/6) and light gray (10YR 7/2) saprolite that has a texture of sandy loam; massive; friable; few fine flakes of mica; strongly acid.

The solum is 20 to 40 inches thick. The depth to bedrock is more than 60 inches. Rock fragments, by volume, make up 0 to 15 percent throughout the profile. Reaction is very strongly acid or strongly acid, except where the surface layer has been limed. The number of mica flakes is few in the A and Bt horizons and few or common in the BC and C horizons.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 4. Where value is 3, the horizon is less than 6 inches thick.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is sandy loam.

The BA or BE horizon, if it occurs, has hue of 5YR to 10YR and value and chroma of 4 to 6. It is loam or sandy clay loam.

The Bt horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 6 to 8. In some pedons it has mottles in shades of red or brown. It is sandy clay, clay, or clay loam. The control section has a weighted average of more than 35 percent clay.

The BC horizon has colors similar to those of the Bt horizon. It may include hue of 2.5YR. It is sandy clay loam, clay loam, or loam.

The C horizon is multicolored saprolite that has a texture of sandy loam.

Wehadkee Series

The Wehadkee series consists of very deep, poorly drained soils that formed in recent alluvium on flood plains in the Piedmont. Slopes range from 0 to 2 percent.

Wehadkee soils are commonly adjacent to Chewacla, Buncombe, Riverview, Rion, Pacolet, and Masada soils. Chewacla, Buncombe, and Riverview soils are on flood plains. Chewacla soils are somewhat poorly drained. Buncombe soils are excessively drained and have a sandy substratum. Riverview soils are well drained. Rion and Pacolet soils are on ridgetops and side slopes. They are well drained and formed in residuum. Pacolet soils have a predominantly clayey subsoil. Masada soils are on high stream terraces. They have a predominantly clayey subsoil and formed in old alluvium.

Typical pedon of Wehadkee loam, 0 to 2 percent slopes, frequently flooded; in a forested area in the southeastern part of the county; 8.2 miles southeast of Taylorsville on Secondary Road 1605, about 0.7 mile west on Secondary Road 1622, about 1.3 miles west on a farm road, and 50 feet south of the road:

Oi—1 inch to 0; hardwood litter and grass.

A—0 to 14 inches; brown (10YR 4/3) loam; common fine prominent yellowish red (5YR 5/6) and few fine faint grayish brown (10YR 5/2) mottles; weak medium granular structure; friable; common fine and medium roots; common fine flakes of mica; moderately acid; clear wavy boundary.

Bg—14 to 22 inches; dark grayish brown (10YR 4/2) loam; common fine prominent yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; common fine flakes of mica; moderately acid; gradual wavy boundary.

Cg1—22 to 50 inches; dark grayish brown (10YR 4/2) loam; common fine prominent yellowish red (5YR 5/6) mottles; massive; friable; common fine and medium roots; common fine flakes of mica; slightly acid; gradual wavy boundary.

Cg2—50 to 60 inches; dark grayish brown (2.5Y 4/2) sandy clay loam; common lenses of sandy loam; massive; friable; common fine and medium roots; common fine flakes of mica; neutral.

The solum is 20 to 60 inches thick over strata that are sandy, loamy, or both. The depth to bedrock is more than 60 inches. The content of coarse fragments ranges from 0 to 2 percent, by volume, throughout the profile. Reaction ranges from very strongly acid to neutral. At least some part of the particle-size control section has a pH of 5.5 or more. The number of mica flakes ranges from few to many throughout the profile.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 0 to 4 or is neutral in hue and has value of 4 to 6.

The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 0 to 2 or is neutral in hue and has value of 4 to 6. Mottles are in shades of red, brown, or yellow. The texture is loam, sandy clay loam, silt loam, silty clay loam, or clay loam.

The Cg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 0 to 2 or is neutral in hue and has value of 4 to 7. Mottles, if they occur, are in shades of red, brown, or yellow. The texture is dominantly sandy loam, sandy clay loam, or loam, but in some pedons stratified layers of sand and gravel are below a depth of 40 inches.

The Wehadkee soils in Alexander County are taxadjuncts because in most pedons they do not have gray colors or mottles as high in the soil profile as the Wehadkee series. This difference does not significantly affect use or management of the soils.

Formation of the Soils

This section describes the factors of soil formation and relates them to the soils in Alexander County.

Factors of Soil Formation

Soils are formed through the interaction of five major factors: parent material, climate, plant and animal life, relief, and time *(7)*. The relative influence of each factor varies from place to place, and in some places one factor dominates in the formation of a soil and determines most of its properties.

Parent Material

Parent material is the mass from which soils form. It influences the mineral and chemical composition of the soil and to a large extent the rate at which soil formation takes place. Residual material and alluvial sediments are the two major types of parent material in the soils in Alexander County.

Residual material is the earthy material derived from the weathering of rocks. It is often referred to as saprolite or residuum. Saprolite underlies the soils on the uplands, which account for most of the land area in the county. Soils that formed in residuum also are influenced by soil creep, the movement of soil downslope by gravity. Soil creep is more pronounced on the steeper slopes. In some places the saprolite may be several feet thick, and in other places it may be only a few inches thick. Gneiss and schist are the two major types of rock in the county.

Alluvial sediments consist of material that has been eroded from the soils on the uplands and deposited on flood plains along streams. Recent deposits are made up of sand, silt, clay, and in some places, gravel and cobbles. These deposits generally are more than 5 feet thick. In some places the alluvial sediments are much older and are now on high stream terraces that were once flood plains.

Climate

The generally warm, humid climate of Alexander County has caused strong weathering and leaching of the soils. In most places the soil materials have weathered to a considerable depth because they have been exposed to climatic forces for a long time. The only soil materials that are not deeply or strongly weathered are either highly resistant to weathering or have been exposed to weathering for only a short time, such as the soil materials on some of the steep slopes.

Most of the bases have been leached from the soils and they are naturally acid. Weathering and leaching have left the natural supply of plant nutrients low in most of the soils. Because of the downward movement of clay from the surface horizon, the subsoil of most of the soils on uplands is enriched in clay. Alternate wetting and drying and freezing and thawing are responsible for the blocky structure in a clay-enriched subsoil. More detailed information on the climate is in the section "General Nature of the County."

Plant and Animal Life

Plant and animal life influences the formation and differentiation of soil horizons. The type and number of organisms in and on a soil are determined in part by climate and in part by the nature of the soil material, relief, and the age of the soil. Bacteria, fungi, and other micro-organisms aid in the weathering of rocks and in the decomposition of organic matter. The plants and animals that live on a soil are the primary source of organic material.

Plants generally supply most of the organic material that decomposes and gives a dark color to the soil surface horizons. It also supplies nutrients to these horizons. Plants also are important in changing the base status and in the leaching process. In areas of native forest in Alexander County, not enough bases are brought to the surface by plants to counteract the effects of leaching.

The soils of the county generally formed under hardwood forest. The trees took up elements from the subsoil and added organic matter to the surface by depositing leaves, roots, twigs, and eventually the whole tree. The organic material on the surface was acted on by organisms and underwent chemical reaction.

Organic material decomposes rapidly in the county because of the moderate temperature, the abundant moisture supply, and the character of the organic material. Because it decays so rapidly, little organic material accumulates in the soil.

Animals convert complex compounds into simpler forms, add organic matter to the soil, and modify certain chemical and physical properties. In the county most of the organic material accumulates on the surface. It is acted on by micro-organisms, fungi, earthworms, and other forms of life and by direct chemical reaction. It is mixed with the uppermost mineral part of the soil by the activities of earthworms and other small invertebrates. This mixing generally affects the structure of the soil, making the soil more open and porous.

Human activities also affect the structure of the soils. They make the soils more porous in places by tillage and management practices. In some places, however, humans compact the soils and make them more dense by foot and vehicular traffic and by tillage equipment. The intensive use and disturbance of some of the soils have caused accelerated losses by erosion, often accompanied by increased deposition on flood plains and in depressions. In other places, human activities have slowed the rate of erosion. Many of the soils have also been chemically altered through the use of lime and fertilizer, which make the soils more favorable for desired plants.

Relief

In soil formation, relief affects surface runoff and the percolation of water through the soil. Increased surface runoff reduces the amount of water available for plant growth. The movement of water is important in soil development because it aids chemical reactions and is necessary for leaching. In Alexander County, relief is determined mainly by the kind of underlying bedrock, the geology of the area, and the amount of dissection of the landscape by streams.

Relief affects the depth of soils. The slopes in the county range from 0 to 90 percent. The upland soils that have slopes of less than 15 percent generally have deeper, better defined profiles than those of the steeper soils. Examples are the well developed Cecil and Davidson soils. On soils that have slopes of 25 percent or more, geologic erosion removes soil material almost as quickly as it forms. As a result, most of the steep and very steep soils have a thinner solum than that of the less sloping soils. Examples are Ashe, Cleveland, and Saluda soils, which are neither as deep nor as well developed as the less sloping soils.

Relief also affects drainage. Runoff from the uplands accumulates on the nearly level flood plains, resulting in a high water table. Examples are the poorly drained Wehadkee and somewhat poorly drained Chewacla soils.

Time

The length of time that parent material has been in place and exposed to the active forces of climate and plant and animal life strongly influences the nature of the soil. The length of time a soil has been forming is reflected in the profile.

The soils on the more level positions in the uplands are older and have profile features that reflect their age. These soils have a B horizon that has been enriched with clay that has moved down from the surface layer. Examples are Cecil and Pacolet soils, which are classified as Ultisols (from ultimate).

The young soils, such as those that formed in recent stream sediments, have not been in place long enough to have developed distinct horizons. The C horizon in these soils extends essentially to the surface and is subdivided only by the depositional stratification in the materials. An example is the Buncombe soils. Most of these soils are classified as Entisols (from recent).

The upland soils on the steeper slopes, such as Ashe and Cleveland soils, are less developed. They have only the structure and color of a B horizon but little clay enrichment. Such soils are classified as Inceptisols (from inception).

Morphology of the Soils

The results of the factors of soil formation are the different layers, or horizons, in a profile. The soil profile extends from the surface down to materials that are little altered by the soil-forming processes.

Most soils contain three major horizons, the A, B, and C horizons. Some soils, particularly those in forested areas, also have an organic horizon, the O horizon, on the surface. This horizon is an accumulation of organic material, such as twigs and leaves, or of humified organic material that has little admixture of mineral material. The major horizons can be subdivided by the use of letters to indicate differences within the horizon. For example, the Bt horizon represents the best developed part of the B horizon that has an accumulation of clay from overlying horizons. The Cecil soils have a Bt horizon.

The A horizon is a mineral surface layer. The A1 horizon is darkened by humified organic matter. The Ap horizon is a plow layer commonly darkened with organic matter. The A horizon is the layer of maximum leaching or eluviation of clay and iron. An E horizon forms if considerable leaching has taken place and organic matter has not darkened the material. The E horizon is normally the lightest colored horizon in the profile.

The B horizon normally underlies the A horizon. It is commonly called the subsoil. It is the horizon of maximum accumulation or illuviation of clay, iron, aluminum, or other compounds leached from the surface layer. The B horizon commonly has blocky structure. It generally is firmer and is lighter in color than the A horizon, but it is darker than the E or C horizons.

The C horizon is below the A or B horizon. It consists of materials that are little altered by the soil-forming processes, but it may be modified by weathering. In young soils, such as those that formed in recent alluvium or in fill material deposited by humans, the C horizon may extend almost to the surface and the B horizon may be absent.

Processes of Horizon Differentiation

Several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble constituents, the chemical reduction and movement of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes often take place simultaneously. Such processes have been going on for thousands of years in the old soils.

The accumulation and incorporation of organic matter takes place as plant residue and organic material deposited by humans decompose and are mixed into the soil. These additions darken the color of the mineral soil materials and are responsible for forming the A horizon.

In order for soils to have a distinct subsoil, lime and more soluble materials must be leached before the translocation of clay minerals. Once leaching has taken place, the clay can disperse more easily and be moved as part of the percolate. Clay has accumulated in the Bt horizon of the soils classified as Ultisols by being leached from overlying horizons and settling in the B horizon as a result of flocculation and the drying up of the percolating water. Clay from dissolved silica and aluminum also has accumulated in these horizons. More inert materials, such as silt and sand-sized quartz, are concentrated in the A horizon as the more soluble materials and clay are leached out.

The natural, well drained and moderately well drained soils in Alexander County generally have a yellowish brown to red subsoil. These colors come from finely divided iron oxide minerals that coat the sand, silt, and clay particles. These iron oxides have formed from iron released during the weathering of silicate minerals in the present soil or in soils that were the source of sediments in which the present soil developed. In the more poorly drained soils, the gray color in the subsoil horizons indicates the absence of free iron oxide coatings. In the gray zones iron has been chemically reduced to a more soluble form during wet periods when oxygen was excluded and the iron was either leached from the soils or was concentrated in iron oxide mottles and concretions.

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Glossary

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.

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.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

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, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

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.

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.

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.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

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. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

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. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

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.

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.

Crop residue management. Use of that portion of the plant or crop left in the field after harvest for protection or improvement of the soil.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

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.

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:

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 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 periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

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.

Eroded (soil phase). Because of erosion, soils that 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 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 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 tons per acre (values determined by the Universal Soil Loss Equation assuming bare soil conditions and using rainfall and climate factors for North Carolina):

0 tons per acre	none
Less than 1 ton per acre	slight
1 to 5 tons per acre	moderate
5 to 10 tons per acre	severe
More than 10 tons per acre	very severe

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.

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.

Flooding. The temporary covering of the 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 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.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant that is not a grass or a sedge.

Forest type. A classification of forest land based on the species forming the majority of live-tree stocking.

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.

Gneiss. A coarse grained metamorphic rock in which bands rich in granular minerals alternate with bands in which schistose minerals predominate. It is commonly formed by the metamorphism of granite.

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 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

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 at the surface of a mineral soil.

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 O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

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 A or B horizon. 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 rock (unweathered bedrock) beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

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-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

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.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

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.

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.

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 strength. The soil is not strong enough to support loads.

Mean annual increment. The average yearly volume of a stand of trees from the year of origin to the age under consideration.

Micas. A group of silicate minerals characterized by sheet or scale cleavage. Biotite is the ferromagnesian black mica. Muscovite is the potassic white mica.

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.

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. Mottling generally indicates poor aeration and impeded drainage. 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).

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.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

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 placed 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.

Open space. A relatively undeveloped green or wooded area provided mainly within an urban area to minimize feelings of congested living.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Overstory. The portion of the trees in a forest stand forming the upper crown cover.

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 to move downward through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 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

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

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). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

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.

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	below 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
Mildly 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

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

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.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Road cut. A sloping surface made by mechanical means during road construction. It is generally on the uphill section of a road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

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.

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 or 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 open and 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 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.

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.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Schist. A metamorphic rock dominated by fibrous or platy minerals. Has schistose cleavage and is a product of regional metamorphism.

Seasonal 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.

Seepage (in tables). The movement of water through the soil 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 or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

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.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

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.

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 feet.

Skid trails. The paths left from skidding logs and the bulldozer or tractor used to pull them.

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.

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 area slope classes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 8 percent
Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 60 percent
Very steep	60 to 90 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

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.

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. Soil compaction decreases the extent of voids and increases bulk density.

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 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 underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stand density. The degree to which an area is covered with living trees. It is usually expressed in units of basal area per acre, number of trees per acre, or the percentage of ground covered by the tree canopy as viewed from above.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, thickness of the line can be one fragment or more. It generally overlies material that weathered in place, and it is overlain by recent sediments of variable thickness.

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.

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).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Suitability ratings. Ratings for the degree of suitability of soils for pasture, crops, woodland, and engineering uses. The ratings and the general criteria used for their selection are as follows:

Well suited.—The intended use may be initiated and maintained by using only the standard materials and methods typically required for that use. Good results can be expected.

Moderately suited.—The limitations affecting the intended use may 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 high 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.

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.

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 1.5 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 1.5 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 or more percent 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 or more percent 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 or more percent 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 or more percent clay and 45 or more percent sand.

Silty clay.—Soil material that contains 40 or more percent clay and 40 or more percent silt.

Clay.—Soil material that contains 40 or more percent 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.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

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.

Toxicity (in tables). An excessive amount of toxic substances in the soil, such as sodium or sulfur, severely hinders the establishment of vegetation or severely restricts plant growth.

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.

Universal Soil Loss Equation. An equation used to design water erosion control systems. The equation is A=RKLSPC wherein A is the average annual soil loss in tons per acre per year, R is the rainfall factor, K is the soil erodibility factor, L is the length of slope, S is the steepness of slope, P is the conservation practice factor, and C is the cropping and management factor.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

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 (seasonal high). The highest level of a saturated zone in the soil (the apparent 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 by atmospheric agents in rocks or other deposits at or near the earth's surface. 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.

Windthrow. Trees that are uprooted and tipped over by the wind.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-84 at Hickory, North Carolina)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	48.1	28.2	38.2	72	6	17	3.63	1.95	5.08	6	3.5
February----	51.6	30.2	40.9	73	11	19	4.33	2.01	6.17	7	3.3
March-------	59.6	37.5	48.6	82	18	101	5.06	2.96	6.79	9	1.9
April-------	70.1	46.7	58.4	89	29	261	3.98	1.63	5.78	7	.1
May---------	77.7	55.3	66.5	92	36	512	4.20	2.44	5.83	8	.0
June--------	83.9	62.9	73.4	97	48	702	4.74	2.80	6.26	8	.0
July--------	86.9	66.8	76.9	98	56	834	4.23	1.73	5.98	8	.0
August------	86.1	65.9	76.0	96	54	806	3.95	1.75	5.74	7	.0
September---	79.9	59.4	69.7	93	42	591	4.26	1.49	6.48	5	.0
October-----	70.3	47.7	59.0	87	29	287	3.43	1.19	5.26	5	.0
November----	60.2	38.0	49.1	79	19	68	3.03	1.46	4.30	5	.1
December----	51.1	31.1	41.1	72	11	29	3.99	1.50	5.79	6	.9
Yearly:											
Average---	68.8	47.5	58.2	---	---	---	---	---	---	---	---
Extreme---	---	---	---	99	4	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,227	48.83	42.20	55.78	81	9.8

* 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 1951-84 at Hickory, 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. 28	Apr. 7	Apr. 24
2 years in 10 later than--	Mar. 21	Apr. 1	Apr. 19
5 years in 10 later than--	Mar. 7	Mar. 20	Apr. 8
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 8	Oct. 24	Oct. 16
2 years in 10 earlier than--	Nov. 14	Oct. 30	Oct. 21
5 years in 10 earlier than--	Nov. 26	Nov. 9	Oct. 30

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-84 at Hickory, 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	236	208	182
8 years in 10	204	179	149
5 years in 10	218	192	167
2 years in 10	231	205	185
1 year in 10	238	212	194

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AcD	Ashe-Cleveland complex, 8 to 25 percent slopes, stony	388	0.2
AcE	Ashe-Cleveland complex, 25 to 60 percent slopes, stony	1,553	0.9
BeB	Bethlehem gravelly sandy loam, 2 to 8 percent slopes	780	0.5
BeC	Bethlehem gravelly sandy loam, 8 to 15 percent slopes	3,106	1.8
BrC	Bethlehem-Urban land complex, 2 to 15 percent slopes	278	0.2
BsC2	Braddock and Hayesville clay loams, 6 to 15 percent slopes, eroded	1,444	0.9
BsD2	Braddock and Hayesville clay loams, 15 to 25 percent slopes, eroded	2,427	1.4
BuA	Buncombe loamy sand, 0 to 3 percent slopes, occasionally flooded	462	0.3
CeB2	Cecil sandy clay loam, 2 to 8 percent slopes, eroded	15,113	9.0
CfB	Cecil-Urban land complex, 2 to 8 percent slopes	1,402	0.8
ChA	Chewacla loam, 0 to 2 percent slopes, frequently flooded	6,392	3.8
CnF	Cleveland-Rock outcrop complex, 8 to 90 percent slopes	900	0.5
CsD	Cowee-Saluda complex, 8 to 25 percent slopes, stony	2,811	1.7
CsE	Cowee-Saluda complex, 25 to 60 percent slopes, stony	10,843	6.4
DaB2	Davidson clay loam, 2 to 8 percent slopes, eroded	461	0.3
DaC2	Davidson clay loam, 8 to 15 percent slopes, eroded	404	0.2
DoB	Dogue sandy loam, 2 to 6 percent slopes, rarely flooded	133	0.1
EcD	Evard-Cowee complex, 8 to 25 percent slopes, stony	3,443	2.0
EcE	Evard-Cowee complex, 25 to 60 percent slopes, stony	15,922	9.4
HbC	Hibriten very cobbly sandy loam, 8 to 15 percent slopes	170	0.1
HbE	Hibriten very cobbly sandy loam, 15 to 60 percent slopes	6,784	4.0
MaB2	Masada sandy clay loam, 2 to 8 percent slopes, eroded	771	0.5
MaC2	Masada sandy clay loam, 8 to 15 percent slopes, eroded	721	0.4
PaD	Pacolet sandy loam, 15 to 25 percent slopes	18,943	11.2
PcB2	Pacolet sandy clay loam, 2 to 8 percent slopes, eroded	8,937	5.3
PcC2	Pacolet sandy clay loam, 8 to 15 percent slopes, eroded	45,982	27.4
PuC	Pacolet-Urban land complex, 2 to 15 percent slopes	1,129	0.7
RnC	Rion sandy loam, 8 to 15 percent slopes	1,560	0.9
RnD	Rion sandy loam, 15 to 25 percent slopes	3,233	1.9
RnE	Rion sandy loam, 25 to 45 percent slopes	4,628	2.8
RwB	Rion-Wedowee complex, 2 to 8 percent slopes	860	0.5
RxA	Riverview fine sandy loam, 0 to 2 percent slopes, frequently flooded	1,352	0.8
StB	State sandy loam, 2 to 6 percent slopes	284	0.2
TfB	Tate-French complex, 2 to 10 percent slopes	648	0.4
UdC	Udorthents-Urban land complex, 0 to 15 percent slopes	780	0.5
WeA	Wehadkee loam, 0 to 2 percent slopes, frequently flooded	226	0.1
	Water	3,268	1.9
	Total	168,538	100.0

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. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Wheat	Grain sorghum	Tobacco	Grass hay	Pasture
		Bu	Bu	Bu	Bu	Lbs	Tons	AUM*
AcD:								
Ashe-----------	VIe	---	---	---	---	---	---	---
Cleveland------	VIIe	---	---	---	---	---	---	---
AcE------------- Ashe-Cleveland	VIIe	---	---	---	---	---	---	---
BeB------------- Bethlehem	IIIe	65	25	35	35	---	3.6	6.0
BeC------------- Bethlehem	IVe	60	20	30	30	---	3.3	5.5
BrC**:								
Bethlehem------	IVe	---	---	---	---	---	---	---
Urban land-----	VIIIs	---	---	---	---	---	---	---
BsC2------------ Braddock and Hayesville	IVe	75	25	45	40	2,800	3.3	5.5
BsD2------------ Braddock and Hayesville	VIe	---	---	---	---	---	3.0	5.0
BuA------------- Buncombe	IVw	60	---	---	---	---	1.8	3.0
CeB2------------ Cecil	IIIe	80	35	50	45	3,000	3.3	5.5
CfB**:								
Cecil----------	IIIe	---	---	---	---	---	---	---
Urban land-----	VIIIs	---	---	---	---	---	---	---
ChA***---------- Chewacla	IVw	110	30	50	---	---	5.4	9.0
CnF**:								
Cleveland------	VIIe	---	---	---	---	---	---	---
Rock outcrop---	VIIIs	---	---	---	---	---	---	---
CsD------------- Cowee-Saluda	VIe	---	---	---	---	---	3.3	5.5
CsE------------- Cowee-Saluda	VIIe	---	---	---	---	---	---	---
DaB2------------ Davidson	IIIe	90	40	50	60	3,200	4.8	8.0

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Wheat	Grain sorghum	Tobacco	Grass hay	Pasture
		Bu	Bu	Bu	Bu	Lbs	Tons	AUM*
DaC2------------ Davidson	IVe	80	35	45	55	3,000	4.2	7.0
DoB------------- Dogue	IIe	115	40	55	---	---	5.7	9.5
EcD:								
Evard----------	VIe	---	---	---	---	---	3.6	6.0
Cowee----------	VIe	---	---	---	---	---	3.3	5.5
EcE------------- Evard-Cowee	VIIe	---	---	---	---	---	---	---
HbC------------- Hibriten	VIs	---	---	---	---	---	2.4	4.0
HbE------------- Hibriten	VIIs	---	---	---	---	---	1.8	3.0
MaB2------------ Masada	IIIe	85	30	50	45	3,000	3.9	6.5
MaC2------------ Masada	IVe	70	25	50	40	2,800	3.6	6.0
PaD------------- Pacolet	VIe	---	---	---	---	---	2.7	4.5
PcB2------------ Pacolet	IIIe	75	30	50	45	3,000	3.3	5.5
PcC2------------ Pacolet	IVe	65	25	45	40	2,800	2.7	4.5
PuC**:								
Pacolet--------	IIIe	---	---	---	---	---	---	---
Urban land-----	VIIIs	---	---	---	---	---	---	---
RnC------------- Rion	IVe	65	25	45	35	3,200	3.0	5.0
RnD------------- Rion	VIe	---	---	---	---	---	2.7	4.5
RnE------------- Rion	VIIe	---	---	---	---	---	---	---
RwB:								
Rion-----------	IIe	85	35	45	40	3,500	3.3	5.5
Wedowee--------	IIe	80	30	45	40	3,200	5.5	5.5
RxA------------- Riverview	IVw	140	45	55	---	---	5.1	8.5
StB------------- State	IIe	130	40	60	---	2,700	5.1	8.5

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Wheat	Grain sorghum	Tobacco	Grass hay	Pasture
		Bu	Bu	Bu	Bu	Lbs	Tons	AUM*
TfB:								
Tate-----------	IIIe	95	---	60	---	---	4.8	8.0
French---------	IVw	120	---	65	---	---	5.0	8.5
UdC**:								
Udorthents-----	VIIe	---	---	---	---	---	---	---
Urban land-----	VIIIs	---	---	---	---	---	---	---
WeA------------- Wehadkee	VIw	---	---	---	---	---	---	---

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

*** Yields are for drained conditions.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant**
AcD:									
Ashe	2R	Moderate	Moderate	Moderate	Moderate	Chestnut oak	50	34	Eastern white pine, shortleaf pine.
						Scarlet oak	---	---	
						Northern red oak	---	---	
						Pitch pine	---	---	
						Virginia pine	62	95	
						Hickory	---	---	
Cleveland	2D	Moderate	Moderate	Moderate	Severe	Chestnut oak	45	98	Eastern white pine, shortleaf pine.
						Northern red oak	60	43	
						Hickory	---	---	
						Virginia pine	57	84	
AcE:									
Ashe	2R	Moderate	Moderate	Moderate	Moderate	Chestnut oak	50	34	Eastern white pine, shortleaf pine.
						Scarlet oak	---	---	
						Northern red oak	---	---	
						Pitch pine	---	---	
						Virginia pine	62	95	
Cleveland	2R	Severe	Severe	Moderate	Severe	Chestnut oak	45	30	Eastern white pine, shortleaf pine.
						Northern red oak	60	43	
						Hickory	---	---	
						Virginia pine	57	84	
BeB, BeC: Bethlehem	7D	Slight	Slight	Slight	Moderate	Shortleaf pine	66	101	Shortleaf pine, loblolly pine, eastern white pine.
						Virginia pine	75	115	
						Scarlet oak	73	55	
						Chestnut oak	64	47	
						White oak	---	---	
						Black oak	---	---	
BsC2:									
Braddock	6C	Slight	Moderate	Moderate	Slight	Yellow-poplar	90	90	Eastern white pine, shortleaf pine, loblolly pine.
						Eastern white pine	95	176	
						Virginia pine	76	117	
						Shortleaf pine	76	122	
						White oak	---	---	
						Pitch pine	---	---	
Hayesville	6C	Slight	Slight	Moderate	Slight	Yellow-poplar	90	90	Eastern white pine, shortleaf pine, loblolly pine.
						Eastern white pine	77	137	
						Pitch pine	---	---	
						Virginia pine	70	109	
BsD2:									
Braddock	6C	Slight	Moderate	Moderate	Slight	Yellow-poplar	90	90	Eastern white pine, shortleaf pine, loblolly pine.
						Eastern white pine	95	176	
						Virginia pine	76	117	
						Shortleaf pine	76	122	
						White oak	---	---	
						Pitch pine	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	Trees to plant**
		Management concerns				Potential productivity			
BsD2:									
Hayesville	6R	Moderate	Moderate	Moderate	Slight	Yellow-poplar	90	90	Eastern white pine, shortleaf pine, loblolly pine.
						Eastern white pine	77	137	
						Pitch pine	---	---	
						Virginia pine	70	109	
BuA: Buncombe	8S	Slight	Moderate	Moderate	Slight	Yellow-poplar	100	107	Loblolly pine, eastern white pine.
						American sycamore	---	---	
						Sweetgum	---	---	
						River birch	---	---	
CeB2: Cecil	7C	Slight	Moderate	Moderate	Slight	Shortleaf pine	66	101	Loblolly pine, shortleaf pine, eastern white pine.
						Virginia pine	65	100	
						Black oak	---	---	
						Scarlet oak	---	---	
						White oak	---	---	
ChA: Chewacla	8W	Slight	Moderate	Slight	Moderate	Yellow-poplar	100	107	Loblolly pine, eastern white pine.
						Sweetgum	97	128	
						American sycamore	---	---	
						Green ash	---	---	
						Blackgum	---	---	
						Red maple	---	---	
CnF***:									
Cleveland	2R	Severe	Severe	Moderate	Severe	Chestnut oak	45	30	Eastern white pine, shortleaf pine.
						Northern red oak	60	43	
						Hickory	---	---	
						Virginia pine	57	84	
Rock outcrop.									
CsD:									
Cowee	2R	Moderate	Moderate	Slight	Moderate	Chestnut oak	51	35	Eastern white pine, shortleaf pine, loblolly pine.
						Scarlet oak	65	48	
						Virginia pine	65	100	
						Pitch pine	---	---	
						Black oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Red maple	---	---	
						Blackgum	---	---	
Saluda	2D	Moderate	Moderate	Moderate	Severe	Chestnut oak	45	30	Shortleaf pine, loblolly pine, eastern white pine.
						Pitch pine	---	---	
						Virginia pine	70	109	
						Yellow-poplar	85	81	
						Scarlet oak	---	---	
CsE:									
Cowee	2R	Severe	Severe	Slight	Moderate	Chestnut oak	51	35	Eastern white pine, shortleaf pine, loblolly pine.
						Scarlet oak	65	48	
						Virginia pine	65	100	
						Pitch pine	---	---	
						Black oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Red maple	---	---	
						Blackgum	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant**
CsE:									
Saluda	2R	Severe	Severe	Moderate	Severe	Chestnut oak	45	30	Shortleaf pine, loblolly pine, eastern white pine.
						Pitch pine	---	---	
						Virginia pine	70	109	
						Scarlet oak	---	---	
DaB2, DaC2 Davidson	7C	Moderate	Moderate	Moderate	Slight	Shortleaf pine	68	106	Loblolly pine, shortleaf pine, eastern white pine.
						Loblolly pine	86	123	
						Southern red oak	72	54	
						Sweetgum	80	79	
						White oak	71	53	
						Yellow-poplar	80	71	
DoB Dogue	7A	Slight	Moderate	Slight	Slight	Yellow-poplar	93	95	Loblolly pine.
						Southern red oak	80	62	
						Sweetgum	90	106	
						White oak	80	62	
EcD:									
Evard	6R	Moderate	Moderate	Slight	Slight	Yellow-poplar	90	90	Shortleaf pine, eastern white pine, loblolly pine.
						Pitch pine	---	---	
						Virginia pine	70	109	
						Eastern white pine	80	144	
						White oak	75	57	
						Northern red oak	---	---	
						Hickory	---	---	
Cowee	2R	Moderate	Moderate	Slight	Moderate	Chestnut oak	51	35	Eastern white pine, shortleaf pine, loblolly pine.
						Scarlet oak	65	48	
						Virginia pine	65	100	
						Pitch pine	---	---	
						Black oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Red maple	---	---	
						Blackgum	---	---	
EcE:									
Evard	6R	Severe	Severe	Slight	Slight	Yellow-poplar	90	90	Shortleaf pine, eastern white pine, loblolly pine.
						Pitch pine	---	---	
						Virginia pine	70	109	
						Eastern white pine	80	144	
						White oak	75	57	
						Northern red oak	---	---	
						Hickory	---	---	
Cowee	2R	Severe	Severe	Slight	Moderate	Chestnut oak	51	35	Eastern white pine, shortleaf pine, loblolly pine.
						Scarlet oak	65	48	
						Virginia pine	65	100	
						Eastern white pine	78	139	
						Pitch pine	---	---	
						Black oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Red maple	---	---	
						Blackgum	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant**
HbC: Hibriten	3D	Slight	Slight	Moderate	Moderate	Chestnut oak	56	39	Eastern white pine, shortleaf pine, loblolly pine.
						Virginia pine	61	93	
						Eastern white pine	---	---	
						Scarlet oak	---	---	
						White oak	---	---	
						Pitch pine	---	---	
HbE: Hibriten	3R	Severe	Severe	Moderate	Moderate	Chestnut oak	56	39	Eastern white pine, shortleaf pine, loblolly pine.
						Virginia pine	61	93	
						Eastern white pine	---	---	
						Scarlet oak	---	---	
						White oak	---	---	
						Pitch pine	---	---	
MaB2, MaC2: Masada	10C	Slight	Moderate	Moderate	Slight	Shortleaf pine	85	140	Loblolly pine, yellow-poplar, eastern white pine, shortleaf pine.
						Loblolly pine	80	110	
						Southern red oak	70	52	
						Virginia pine	70	109	
						Yellow-poplar	80	71	
						Eastern white pine	82	148	
PaD: Pacolet	8R	Moderate	Moderate	Slight	Slight	Shortleaf pine	70	110	Loblolly pine, shortleaf pine, eastern white pine.
						Yellow-poplar	90	90	
						Virginia pine	---	---	
						Hickory	---	---	
						White oak	---	---	
PcB2, PcC2: Pacolet	6C	Slight	Moderate	Moderate	Slight	Shortleaf pine	60	88	Loblolly pine, shortleaf pine, eastern white pine.
						Yellow-poplar	80	71	
						Virginia pine	---	---	
						Hickory	---	---	
						White oak	---	---	
RnC: Rion	8A	Slight	Slight	Slight	Slight	Shortleaf pine	70	110	Loblolly pine, shortleaf pine, eastern white pine.
						Southern red oak	80	62	
						White oak	70	52	
						Yellow-poplar	90	90	
						Scarlet oak	---	---	
RnD: Rion	8R	Moderate	Moderate	Slight	Slight	Shortleaf pine	70	110	Loblolly pine, shortleaf pine, eastern white pine.
						Southern red oak	80	62	
						White oak	70	52	
						Yellow-poplar	90	90	
						Scarlet oak	---	---	
RnE: Rion	8R	Severe	Severe	Slight	Slight	Shortleaf pine	70	110	Loblolly pine, shortleaf pine, eastern white pine.
						Southern red oak	80	62	
						White oak	70	52	
						Yellow-poplar	90	90	
						Scarlet oak	---	---	
RwB: Rion	8A	Slight	Slight	Slight	Slight	Shortleaf pine	70	110	Loblolly pine, shortleaf pine, eastern white pine.
						Southern red oak	80	62	
						White oak	70	52	
						Yellow-poplar	90	90	
						Scarlet oak	---	---	

See footnotes at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Management concerns: Erosion hazard	Equip- ment limita- tion	Seedling mortal- ity	Wind- throw hazard	Potential productivity: Common trees	Site index	Volume*	Trees to plant**
RwB:									
Wedowee	8A	Slight	Slight	Slight	Slight	Shortleaf pine	69	108	Loblolly pine, Virginia pine, shortleaf pine, eastern white pine.
						Virginia pine	70	109	
						Southern red oak	70	52	
						White oak	65	48	
						Scarlet oak	---	---	
RxA: Riverview	9A	Slight	Slight	Slight	Slight	Yellow-poplar	110	124	Loblolly pine, eastern white pine.
						River birch	---	---	
						American sycamore	---	---	
StB: State	8A	Slight	Slight	Slight	Slight	Yellow-poplar	100	107	Shortleaf pine, eastern white pine.
						Loblolly pine	95	142	
						Southern red oak	85	67	
						Virginia pine	---	---	
						Shortleaf pine	---	---	
TfB:									
Tate	6A	Slight	Slight	Slight	Slight	Yellow-poplar	92	93	Eastern white pine, loblolly pine, shortleaf pine.
						Eastern white pine	89	164	
						Virginia pine	---	---	
French	9W	Slight	Moderate	Slight	Slight	Yellow-poplar	110	124	Yellow-poplar, eastern white pine.
						American sycamore	---	---	
						Red maple	---	---	
						Virginia pine	---	---	
WeA: Wehadkee	8W	Slight	Severe	Moderate	Moderate	Yellow-poplar	100	107	Hardwoods.**
						Green ash	---	---	
						American sycamore	86	90	
						River birch	---	---	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** Management for natural regeneration of desirable hardwoods may be necessary.

*** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AcD:					
Ashe	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Cleveland	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.	Severe: slope, depth to rock.
AcE:					
Ashe	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cleveland	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
BeB Bethlehem	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
BeC Bethlehem	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
BrC*:					
Bethlehem	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
Urban land.					
BsC2:					
Braddock	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Hayesville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
BsD2:					
Braddock	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
BuA Buncombe	Severe: flooding.	Moderate: too sandy.	Moderate: too sandy, flooding.	Severe: too sandy.	Severe: droughty.
CeB2 Cecil	Slight	Slight	Moderate: slope.	Slight	Slight.
CfB*:					
Cecil	Slight	Slight	Moderate: slope.	Slight	Slight.
Urban land.					

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ChA------------------- Chewacla	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
CnF*:					
Cleveland------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Rock outcrop.					
CsD:					
Cowee----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Saluda---------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: slope.	Severe: slope, depth to rock.
CsE:					
Cowee----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Saluda---------------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
DaB2------------------ Davidson	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
DaC2------------------ Davidson	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
DoB------------------- Dogue	Severe: flooding.	Moderate: wetness, percs slowly.	Moderate: slope, small stones, wetness.	Moderate: wetness.	Moderate: wetness.
EcD:					
Evard----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Cowee----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
EcE:					
Evard----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Cowee----------------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
HbC: Hibriten	Severe: small stones.	Severe: small stones.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: small stones.
HbE: Hibriten	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: small stones, slope.
MaB2: Masada	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
MaC2: Masada	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
PaD: Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
PcB2: Pacolet	Slight	Slight	Moderate: slope.	Slight	Slight.
PcC2: Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
PuC*:					
Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Urban land.					
RnC: Rion	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
RnD: Rion	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
RnE: Rion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RwB:					
Rion	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
Wedowee	Slight	Slight	Moderate: slope.	Slight	Slight.
RxA: Riverview	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
StB: State	Slight	Slight	Moderate: slope.	Slight	Slight.
TfB:					
Tate	Slight	Slight	Severe: slope.	Slight	Slight.
French	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
UdC*:					
Udorthents.					
Urban land.					
WeA------------------- Wehadkee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
AcD:										
Ashe	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
Cleveland	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.
AcE:										
Ashe	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Cleveland	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.
BeB, BeC Bethlehem	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
BrC*:										
Bethlehem.										
Urban land.										
BsC2:										
Braddock	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Hayesville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BsD2:										
Braddock	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Hayesville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BuA Buncombe	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
CeB2 Cecil	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CfB2*:										
Cecil.										
Urban land.										
ChA Chewacla	Very poor.	Poor	Poor	Good	Good	Fair	Fair	Poor	Good	Fair.
CnF*:										
Cleveland	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Rock outcrop.										

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
CsD:										
Cowee	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Saluda	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.
CsE:										
Cowee	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Saluda	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.
DaB2 Davidson	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Good	Poor.
DaC2 Davidson	Fair	Good	Good	Good	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
DoB Dogue	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EcD:										
Evard	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Cowee	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
EcE:										
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.
HbC Hibriten	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
HbE Hibriten	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.
MaB2 Masada	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MaC2 Masada	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
PaD Pacolet	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
PcB2 Pacolet	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
PcC2 Pacolet	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
PuC*:										
Pacolet.										
Urban land.										
RnC Rion	Poor	Fair	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
RnD Rion	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
RnE Rion	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
RwB:										
Rion	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wedowee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
RxA Riverview	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
StB State	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TfB:										
Tate	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
French	Poor	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
UdC*:										
Udorthents.										
Urban land.										
WeA Wehadkee	Very poor.	Poor	Poor	Fair	Fair	Good	Fair	Poor	Fair	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AcD, AcE:						
Ashe	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
Cleveland	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
BeB: Bethlehem	Moderate: depth to rock, too clayey.	Slight	Moderate: depth to rock.	Moderate: slope.	Moderate: low strength.	Severe: small stones.
BeC: Bethlehem	Moderate: depth to rock, too clayey, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: low strength, slope.	Severe: small stones.
BrC*:						
Bethlehem	Moderate: depth to rock, too clayey, slope.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: low strength, slope.	Severe: small stones.
Urban land.						
BsC2:						
Braddock	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
Hayesville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
BsD2:						
Braddock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Hayesville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BuA: Buncombe	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: droughty.
CeB2: Cecil	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
CfB*:						
Cecil	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
Urban land.						

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ChA--------------- Chewacla	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
CnF*:						
Cleveland---------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Rock outcrop.						
CsD, CsE:						
Cowee-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Saluda------------	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
DaB2-------------- Davidson	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Severe: low strength.	Slight.
DaC2-------------- Davidson	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
DoB--------------- Dogue	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength.	Moderate: wetness.
EcD, EcE:						
Evard-------------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Cowee-------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HbC--------------- Hibriten	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: small stones.
HbE--------------- Hibriten	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.	Severe: small stones, slope.
MaB2-------------- Masada	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
MaC2-------------- Masada	Moderate: too clayey, slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
PaD--------------- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PcB2-------------- Pacolet	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
PcC2: Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
PuC*:						
Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
Urban land.						
RnC: Rion	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
RnD, RnE: Rion	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
RwB:						
Rion	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
Wedowee	Moderate: too clayey.	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Moderate: low strength, shrink-swell.	Slight.
RxA: Riverview	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
StB: State	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Moderate: low strength.	Slight.
TfB:						
Tate	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
French	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
UdC*:						
Udorthents.						
Urban land.						
WeA: Wehadkee	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, low strength.	Severe: wetness, flooding.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AcD, AcE:					
Ashe	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, slope, thin layer.
Cleveland	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope, thin layer.
BeB Bethlehem	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, thin layer.
BeC Bethlehem	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, thin layer.
BrC*:					
Bethlehem	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, thin layer.
Urban land.					
BsC2:					
Braddock	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Hayesville	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
BsD2:					
Braddock	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Hayesville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
BuA Buncombe	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
CeB2 Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CfB*:					
Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
Urban land.					
ChA Chewacla	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
CnF*:					
Cleveland	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope, thin layer.
Rock outcrop.					
CsD, CsE:					
Cowee	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: depth to rock, slope.
Saluda	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, slope.
DaB2 Davidson	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
DaC2 Davidson	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
DoB Dogue	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
EcD, EcE:					
Evard	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Cowee	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Poor: depth to rock, slope, thin layer.
HbC Hibriten	Severe: depth to rock, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock.	Poor: depth to rock, large stones.
HbE Hibriten	Severe: depth to rock, slope.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope, large stones.	Severe: depth to rock, slope.	Poor: depth to rock, large stones, slope.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MaB2----------------- Masada	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
MaC2----------------- Masada	Moderate: slope, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
PaD------------------ Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
PcB2----------------- Pacolet	Moderate: percs slowly.	Moderate: seepage, slope.	Slight-----------	Slight-----------	Fair: too clayey.
PcC2----------------- Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey, slope.
PuC*:					
Pacolet------------	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey, slope.
Urban land.					
RnC------------------ Rion	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
RnD, RnE------------ Rion	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
RwB:					
Rion---------------	Slight-----------	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Wedowee------------	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
RxA------------------ Riverview	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
StB------------------ State	Moderate: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Moderate: wetness.	Good.
TfB:					
Tate---------------	Moderate: percs slowly.	Severe: seepage, slope.	Severe: seepage.	Slight-----------	Fair: too clayey, large stones.
French-------------	Severe: flooding, wetness, poor filter.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, too sandy, small stones.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
UdC*:					
Udorthents.					
Urban land.					
WeA----------------- Wehadkee	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AcD:				
Ashe	Poor: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Cleveland	Poor: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
AcE:				
Ashe	Poor: depth to rock, thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
Cleveland	Poor: depth to rock, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
BeB, BeC Bethlehem	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
BrC*:				
Bethlehem	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, small stones.
Urban land.				
BsC2:				
Braddock	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Hayesville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
BsD2:				
Braddock	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Hayesville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
BuA Buncombe	Good	Probable	Improbable: too sandy.	Fair: too sandy.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CeB2------------------ Cecil	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CfB*:				
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.
CnF*:				
Cleveland------------	Poor: depth to rock, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Rock outcrop.				
CsD:				
Cowee----------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Saluda---------------	Poor: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
CsE:				
Cowee----------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Saluda---------------	Poor: depth to rock, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
DaB2, DaC2------------ Davidson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
DoB------------------- Dogue	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
EcD:				
Evard----------------	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Cowee----------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
EcE:				
Evard----------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Cowee----------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
HbC: Hibriten	Poor: depth to rock, large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones.
HbE: Hibriten	Poor: depth to rock, large stones, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, slope.
MaB2, MaC2: Masada	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
PaD: Pacolet	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
PcB2, PcC2: Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
PuC*:				
Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
RnC: Rion	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
RnD: Rion	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
RnE: Rion	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
RwB:				
Rion	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Wedowee	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
RxA: Riverview	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
StB: State	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
TfB:				
Tate	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
French	Fair: wetness.	Improbable: excess fines.	Probable	Poor: small stones, area reclaim.
UdC*: Udorthents.				

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
UdC*:				
Urban land.				
WeA------------------ Wehadkee	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
AcD, AcE:					
Ashe	Severe: seepage, slope.	Severe: piping, thin layer.	Deep to water	Depth to rock, slope.	Depth to rock, slope.
Cleveland	Severe: depth to rock, slope.	Severe: piping, thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
BeB: Bethlehem	Moderate: seepage, depth to rock, slope.	Severe: hard to pack.	Deep to water	Large stones, depth to rock.	Large stones, depth to rock.
BeC: Bethlehem	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
BrC*:					
Bethlehem	Severe: slope.	Severe: hard to pack.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
Urban land.					
BsC2:					
Braddock	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Slope.
Hayesville	Severe: seepage.	Severe: hard to pack.	Deep to water	Slope	Slope.
BsD2:					
Braddock	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Slope.
Hayesville	Severe: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Slope.
BuA: Buncombe	Severe: seepage.	Severe: seepage, piping.	Deep to water	Too sandy	Droughty, rooting depth.
CeB2: Cecil	Moderate: seepage, slope.	Severe: piping, hard to pack.	Deep to water	Favorable	Favorable.
CfB*:					
Cecil	Moderate: seepage, slope.	Severe: piping, hard to pack.	Deep to water	Favorable	Favorable.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
CfB*: Urban land.					
ChA Chewacla	Moderate: seepage.	Severe: piping, hard to pack, wetness.	Flooding	Wetness	Wetness.
CnF*: Cleveland	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.					
CsD, CsE: Cowee	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
Saluda	Severe: depth to rock, slope.	Severe: piping.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
DaB2 Davidson	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Favorable	Favorable.
DaC2 Davidson	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope.
DoB Dogue	Moderate: seepage, slope.	Severe: wetness.	Slope	Wetness	Favorable.
EcD, EcE: Evard	Severe: slope.	Severe: seepage, piping.	Deep to water	Slope, too sandy.	Slope.
Cowee	Severe: slope.	Severe: thin layer.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
HbC, HbE Hibriten	Severe: slope.	Severe: large stones.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
MaB2 Masada	Moderate: seepage, slope.	Moderate: thin layer, hard to pack.	Deep to water	Favorable	Favorable.
MaC2 Masada	Severe: slope.	Moderate: thin layer, hard to pack.	Deep to water	Slope	Slope.
PaD Pacolet	Severe: slope.	Severe: piping.	Deep to water	Soil blowing, slope.	Slope.
PcB2 Pacolet	Moderate: seepage, slope.	Severe: piping.	Deep to water	Favorable	Favorable.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
PcC2 Pacolet	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope.
PuC*:					
Pacolet	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope.
Urban land.					
RnC, RnD, RnE Rion	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope	Slope.
RwB:					
Rion	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
Wedowee	Moderate: slope, seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
RxA Riverview	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
StB State	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Favorable	Favorable.
TfB:					
Tate	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable.
French	Severe: seepage.	Severe: seepage, piping, wetness.	Flooding, slope, large stones.	Wetness	Wetness, too sandy.
UdC*:					
Udorthents.					
Urban land.					
WeA Wehadkee	Moderate: seepage.	Severe: wetness, piping.	Flooding	Wetness	Wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
AcD, AcE:											
Ashe------------	0-5	Gravelly sandy loam.	SM, SM-SC	A-2, A-4	5-15	80-90	65-80	60-90	30-49	<25	NP-7
	5-26	Gravelly sandy loam, sandy loam, fine sandy loam.	SM, SM-SC	A-4	0-15	85-100	65-90	60-95	35-49	<25	NP-7
	26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Cleveland-------	0-12	Gravelly sandy loam.	SM, GM	A-2, A-4, A-1	2-15	65-90	55-90	45-75	20-40	<25	NP-3
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
BeB, BeC---------- Bethlehem	0-8	Gravelly sandy loam.	SM, GP-GM, GM, SP-SM	A-2-4, A-4, A-1	0-15	60-83	60-80	20-60	10-45	<35	NP-10
	8-12	Sandy clay loam, gravelly sandy clay loam.	SC, CL, GC, CL-ML	A-2, A-6, A-4, A-1	0-15	65-100	60-90	35-70	20-55	18-36	5-15
	12-25	Clay, clay loam, gravelly clay.	MH, CL, CH, ML	A-6, A-7	0-15	65-100	60-100	55-90	50-85	38-65	16-30
	25-31	Gravelly sandy clay loam, very gravelly sandy clay loam.	SC, GC, SM-SC, GM-GC	A-2, A-6, A-4, A-1	5-15	50-85	50-80	25-82	20-50	25-50	5-16
	31-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
BrC*:											
Bethlehem-------	0-8	Gravelly sandy loam.	SM, GP-GM, GM, SP-SM	A-2-4, A-4, A-1	0-15	60-80	60-80	20-60	10-45	<35	NP-10
	8-12	Sandy clay loam, gravelly sandy clay loam.	SC, CL, GC, CL-ML	A-2, A-6, A-4, A-1	0-15	65-100	60-90	35-70	20-55	18-36	5-15
	12-25	Clay, clay loam, gravelly clay.	MH, CL, CH, ML	A-6, A-7	0-15	65-100	60-90	55-90	50-85	38-65	16-30
	25-31	Gravelly sandy clay loam, very gravelly sandy clay loam.	SC, GC, SM-SC, GM-GC	A-2, A-6, A-4, A-1	5-15	50-85	50-80	25-82	20-50	25-50	5-16
	31-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Urban land.											
BsC2, BsD2:											
Braddock--------	0-6	Clay loam--------	CL	A-6, A-7	0-5	80-95	75-100	65-90	50-85	35-50	15-25
	6-60	Clay loam, clay, gravelly clay.	CH, CL, SC, GC	A-7, A-2	0-15	80-95	65-100	45-90	20-80	42-60	15-33

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
BsC2, BsD2:											
Hayesville------	0-7	Clay loam--------	CL, SC, CL-ML, SM-SC	A-4, A-6	0-5	90-100	75-100	80-95	45-75	25-40	7-20
	7-31	Clay loam, clay	ML, MH, CL, CH	A-6, A-7	0-5	90-100	75-100	70-100	55-80	36-66	11-35
	31-41	Sandy clay loam, clay loam.	SM, ML, MH, CL	A-6, A-7	0-5	90-100	75-100	85-95	45-65	36-55	11-25
	41-60	Sandy loam, loam, sandy clay loam.	SM, ML, CL, SC	A-4, A-6	5-15	90-100	75-100	65-90	40-55	<28	NP-12
BuA-------------- Buncombe	0-7	Loamy sand-------	SM, SP-SM	A-2, A-3	0	98-100	98-100	90-97	7-32	---	NP
	7-60	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-2, A-3	0	98-100	98-100	98-100	7-32	---	NP
CeB2------------- Cecil	0-8	Sandy clay loam	SM, SC, CL, ML	A-4, A-6	0-5	75-100	75-100	68-95	38-81	21-35	3-15
	8-60	Clay, clay loam	MH, ML	A-7, A-5	0-5	97-100	85-100	72-99	55-95	41-80	9-37
CfB*:											
Cecil-----------	0-8	Sandy clay loam	SM, SC, CL, ML	A-4, A-6	0-5	75-100	75-100	68-95	38-81	21-35	3-15
	8-60	Clay, clay loam	MH, ML	A-7, A-5	0-5	97-100	85-100	72-99	55-95	41-80	9-37
Urban land.											
ChA-------------- Chewacla	0-8	Loam-------------	ML, CL, CL-ML	A-4, A-6, A-7	0	98-100	95-100	70-100	55-90	25-49	4-20
	8-41	Sandy clay loam, loam, sandy loam.	SM, SM-SC, ML, CL	A-4, A-7-6, A-6	0	96-100	95-100	60-100	36-70	20-45	2-15
	41-60	Variable---------	---	---	---	---	---	---	---	---	---
CnF*:											
Cleveland-------	0-12	Gravelly sandy loam.	SM, GM	A-2, A-4, A-1	2-15	65-90	55-90	45-75	20-40	<25	NP-3
	12	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
CsD, CsE:											
Cowee-----------	0-7	Gravelly sandy loam.	SM, SM-SC	A-2-4, A-4	5-15	75-95	65-80	55-75	20-50	<30	NP-5
	7-30	Sandy clay loam, clay loam, gravelly sandy clay loam.	SC, CL, ML, SM-SC	A-4, A-6, A-7	0-15	90-100	65-95	60-85	35-70	25-50	5-14
	30-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
Saluda----------	0-6	Gravelly sandy loam.	SM	A-2	5-15	65-85	60-80	55-75	15-35	<30	NP-4
	6-18	Sandy loam, sandy clay loam, clay loam.	SM, SM-SC, SC	A-2, A-4, A-6	0-5	90-100	75-98	60-85	30-50	20-38	3-15
	18-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
DaB2, DaC2-------Davidson	0-6	Clay loam--------	CL, SC, CL-ML, SM-SC	A-6, A-4	0	94-100	84-100	75-95	40-70	25-40	5-18
	6-65	Clay-------------	CL, CH, ML, MH	A-7, A-6	0-5	96-100	85-100	85-100	65-85	35-65	12-33
DoB-------------Dogue	0-7	Sandy loam-------	SM, SC, SM-SC	A-2, A-4	0-5	95-100	75-100	50-100	20-50	<25	NP-10
	7-50	Clay loam, clay, sandy clay.	CL, CH, SC	A-6, A-7	0-5	95-100	75-100	65-100	40-90	35-60	16-40
	50-60	Stratified sand to sandy clay loam.	SM, SC, SP-SM, SM-SC	A-2, A-4, A-1	0-5	80-100	60-100	35-100	10-40	<30	NP-10
EcD, EcE: Evard-----------	0-7	Gravelly sandy loam.	SM	A-2	5-15	65-85	65-80	55-75	15-35	<30	NP-4
	7-22	Sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7-6	0-2	90-100	90-100	60-95	30-70	25-45	7-18
	22-35	Sandy loam, loam, sandy clay loam.	SM, SC, ML, CL	A-2, A-4	0-2	90-100	90-100	60-95	20-55	<25	NP-9
	35-60	Sandy loam, fine sandy loam, loamy sand.	SM	A-2, A-4	0-2	90-100	90-100	60-90	15-50	---	NP
Cowee-----------	0-7	Gravelly sandy loam.	SM, SM-SC	A-2-4, A-4	5-15	75-95	65-80	55-75	20-50	<30	NP-5
	7-30	Sandy clay loam, loam, sandy loam.	SC, CL, ML, SM-SC	A-4, A-6, A-7	0-15	90-100	65-95	60-85	35-70	25-50	5-14
	30-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
HbC, HbE---------Hibriten	0-13	Very cobbly sandy loam.	GM, SM	A-2, A-1, A-4	25-50	50-95	50-75	25-65	15-45	<35	NP-10
	13-28	Very cobbly clay loam, very cobbly sandy clay loam, very gravelly loam.	GC, CL, SC, GM-GC	A-6, A-4, A-2, A-1	20-50	40-95	50-70	20-80	10-70	<40	NP-15
	28-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
MaB2, MaC2-------Masada	0-8	Sandy clay loam	SM, SC, CL, ML	A-4, A-6	0-5	90-100	75-100	60-95	40-80	26-40	9-17
	8-45	Clay loam, clay	CH, CL	A-7, A-6	0-5	80-100	80-100	65-95	50-80	35-60	15-35
	45-60	Loam, clay loam	CL, ML	A-6, A-7, A-4	0-5	80-100	80-100	65-95	50-80	30-45	7-20
PaD-------------Pacolet	0-9	Sandy loam-------	SM, SM-SC	A-2, A-1-b, A-4	0-5	85-100	75-100	42-90	16-42	<28	NP-7
	9-28	Clay loam, clay	ML, MH	A-6, A-7	0-5	80-100	75-100	60-95	51-75	38-65	11-30
	28-38	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SM-SC, SC	A-2, A-4, A-6	0-5	80-100	75-100	60-80	30-60	20-35	5-15
	38-60	Sandy loam, fine sandy loam, loam.	SM, SM-SC	A-4, A-2-4	0-5	80-100	75-100	60-80	30-50	<28	NP-6

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
PcB2, PcC2: Pacolet	0-9	Sandy clay loam	SM-SC, SC	A-4, A-6	0-5	95-100	75-100	65-85	36-50	20-40	4-17
	9-28	Clay loam, clay	ML, MH	A-6, A-7	0-5	80-100	75-100	60-95	51-75	38-65	11-30
	28-38	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SM-SC, SC	A-2, A-4, A-6	0-5	80-100	75-100	60-80	30-60	20-35	5-15
	38-60	Sandy loam, fine sandy loam, loam.	SM, SM-SC	A-4, A-2-4	0-5	80-100	75-100	60-80	30-50	<28	NP-6
PuC*:											
Pacolet	0-9	Sandy clay loam	SM-SC, SC	A-4, A-6	0-5	95-100	75-100	65-85	36-50	20-40	4-17
	9-28	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0-5	80-100	75-100	60-95	51-75	38-65	11-30
	28-38	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SM-SC, SC	A-2, A-4, A-6	0-5	80-100	75-100	60-80	30-60	20-35	5-15
	38-60	Sandy loam, fine sandy loam, loam.	SM, SM-SC	A-4, A-2-4	0-5	80-100	75-100	60-80	30-50	<28	NP-6
Urban land.											
RnC, RnD, RnE: Rion	0-6	Sandy loam	SM	A-2, A-4	0-5	90-100	85-100	60-80	20-45	<35	NP-7
	6-30	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL-ML, CL	A-2, A-4, A-6	0-5	90-100	85-100	60-85	30-60	20-35	5-15
	30-60	Sandy loam, sandy clay loam, loamy sand.	SC, SM, SM-SC	A-2, A-4, A-6	0-5	90-100	85-100	60-85	15-50	<36	NP-12
RwB:											
Rion	0-6	Sandy loam	SM	A-2, A-4	0-5	90-100	85-100	60-80	20-45	<35	NP-7
	6-30	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL-ML, CL	A-2, A-4, A-6	0-5	90-100	85-100	60-85	30-60	20-35	5-15
	30-60	Sandy loam, loamy sand.	SC, SM, SM-SC	A-2, A-4, A-6	0-5	90-100	85-100	60-85	15-50	<36	NP-12
Wedowee	0-6	Sandy loam	SM, SM-SC	A-4, A-2-4	0-5	95-100	75-100	60-99	23-50	<30	NP-6
	6-40	Sandy clay, clay loam, clay.	SC, ML, CL, MH	A-6, A-7	0-5	95-100	75-100	65-97	45-75	30-58	10-25
	40-60	Clay loam, sandy loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0-5	80-100	75-100	60-80	30-60	20-35	5-15
RxA: Riverview	0-10	Fine sandy loam	ML, SM, CL-ML, SM-SC	A-2, A-4	0	95-100	95-100	85-95	30-60	<20	NP-7
	10-43	Sandy clay loam, silty clay loam, loam.	CL, ML, CL-ML	A-4, A-6	0	100	95-100	90-100	60-95	20-40	3-20
	43-60	Loamy fine sand, sandy loam, fine sandy loam.	SM, SM-SC	A-2, A-4	0	100	95-100	50-95	15-45	<20	NP-7

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
StB-------------- State	0-11	Sandy loam-------	SM, ML, CL-ML, SM-SC	A-2, A-4	0	95-100	95-100	45-85	25-55	<28	NP-7
	11-45	Loam, clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	95-100	95-100	75-100	35-80	24-40	8-22
	45-60	Stratified sand to fine sandy loam.	SM, SM-SC, SP-SM	A-1, A-2, A-3, A-4	0-10	85-100	65-100	40-90	5-50	<25	NP-7
TfB*:											
Tate------------	0-8	Sandy loam-------	ML, SM	A-4, A-6	0-5	96-100	75-100	68-98	40-80	<38	NP-13
	8-55	Clay loam, sandy clay loam, loam.	CL, ML, CL-ML, SM-SC	A-4, A-6	0-5	94-100	75-100	75-99	40-85	20-40	5-15
	55-60	Gravelly fine sandy loam, sandy loam, gravelly sandy loam.	GM, GM-GC, SM, SM-SC	A-4, A-2-4	10-20	60-90	60-90	35-60	30-50	<25	NP-7
French----------	0-12	Sandy loam-------	SM, SM-SC	A-2, A-4	0-5	90-100	85-100	60-90	30-49	<25	NP-7
	12-31	Fine sandy loam, sandy clay loam, loam.	SM-SC, SC, CL	A-4, A-6, A-7	0-15	90-100	85-100	60-95	36-80	20-45	7-25
	31-60	Very gravelly loamy sand, very gravelly sand, very cobbly sand.	GP-GM, GM, SM, SP-SM	A-1	10-50	45-75	35-60	10-40	5-15	---	NP
UdC*: Udorthents.											
Urban land.											
WeA-------------- Wehadkee	0-14	Loam-------------	SM, SC, SM-SC	A-2, A-4	0	100	95-100	60-90	30-50	<30	NP-10
	14-60	Silt loam, clay loam, loam.	CL, CL-ML	A-6, A-7, A-4	0	100	99-100	85-100	45-98	20-58	6-25

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AcD, AcE:										
Ashe	0-5	5-20	1.35-1.60	2.0-6.0	0.10-0.13	4.5-6.0	Low	0.17	2	1-3
	5-26	5-18	1.35-1.60	2.0-6.0	0.10-0.14	4.5-6.0	Low	0.17		
	26	---	---	---	---	---	-------	----		
Cleveland	0-12	5-20	1.20-1.50	2.0-6.0	0.05-0.10	4.5-6.0	Low	0.17	1	.5-2
	12	---	---	---	---	---	-------	----		
BeB, BeC: Bethlehem	0-8	5-20	1.40-1.65	2.0-6.0	0.06-0.10	4.5-6.0	Low	0.15	2	1-3
	8-12	20-35	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.24		
	12-25	35-60	1.25-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low	0.28		
	25-31	20-35	1.40-1.60	0.6-2.0	0.08-0.12	4.5-6.0	Low	0.20		
	31-60	---	---	---	---	---	-------	----		
BrC*:										
Bethlehem	0-8	5-20	1.40-1.65	2.0-6.0	0.06-0.10	4.5-6.0	Low	0.15	2	1-3
	8-12	20-35	1.40-1.60	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.24		
	12-25	35-60	1.25-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low	0.28		
	25-31	20-35	1.40-1.60	0.6-2.0	0.08-0.12	4.5-6.0	Low	0.20		
	31-60	---	---	---	---	---	-------	----		
Urban land.										
BsC2, BsD2:										
Braddock	0-6	27-40	1.20-1.50	0.6-2.0	0.14-0.19	4.5-5.5	Low	0.32	3	.5-1
	6-60	35-55	1.20-1.50	0.6-2.0	0.12-0.17	4.5-5.5	Moderate	0.24		
Hayesville	0-7	27-40	1.30-1.50	0.6-2.0	0.12-0.18	4.5-6.0	Low	0.24	5	1-3
	7-31	35-60	1.20-1.35	0.6-2.0	0.15-0.20	4.5-6.0	Low	0.24		
	31-41	20-40	1.30-1.40	0.6-2.0	0.12-0.20	4.5-6.0	Low	0.20		
	41-60	5-25	1.45-1.65	2.0-6.0	0.11-0.15	4.5-6.0	Low	0.17		
BuA: Buncombe	0-7	3-12	1.60-1.75	6.0-20	0.06-0.10	4.5-6.5	Low	0.10	5	.5-1
	7-60	3-12	1.60-1.75	6.0-20	0.03-0.07	4.5-5.5	Low	0.10		
CeB2: Cecil	0-8	20-35	1.30-1.50	0.6-2.0	0.13-0.15	4.5-6.0	Low	0.28	3	.5-1
	8-60	35-70	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low	0.28		
CfB*:										
Cecil	0-8	20-35	1.30-1.50	0.6-2.0	0.13-0.15	4.5-6.0	Low	0.28	3	.5-1
	8-60	35-70	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low	0.28		
Urban land.										
ChA: Chewacla	0-8	10-27	1.30-1.60	0.6-2.0	0.15-0.24	4.5-6.5	Low	0.28	5	1-4
	8-41	18-35	1.30-1.60	0.6-2.0	0.12-0.20	4.5-6.5	Low	0.28		
	41-60	---	---	---	---	---	-------	----		
CnF*:										
Cleveland	0-12	5-20	1.20-1.50	2.0-6.0	0.05-0.10	4.5-6.0	Low	0.17	1	.5-2
	12	---	---	---	---	---	-------	----		
Rock outcrop.										

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
CsD, CsE:										
Cowee	0-7	5-20	1.25-1.60	2.0-6.0	0.10-0.15	4.5-6.0	Low	0.20	2	1-3
	7-30	18-35	1.30-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Low	0.24		
	30-60	---	---	---	---	---	-------------	----		
Saluda	0-6	5-20	1.20-1.50	2.0-6.0	0.08-0.12	4.5-5.5	Low	0.15	2	.5-2
	6-18	18-35	1.30-1.50	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.20		
	18-60	---	---	---	---	---	-------------	----		
DaB2, DaC2 Davidson	0-6	27-35	1.30-1.55	0.6-2.0	0.14-0.18	4.5-6.0	Low	0.28	5	.5-2
	6-65	40-75	1.20-1.50	0.6-2.0	0.12-0.16	4.5-6.0	Low	0.24		
DoB Dogue	0-7	5-10	1.35-1.50	2.0-6.0	0.08-0.15	4.5-5.5	Low	0.28	4	.5-1
	7-50	35-50	1.45-1.60	0.2-0.6	0.12-0.19	4.5-5.5	Moderate	0.28		
	50-60	5-30	1.30-1.50	0.6-6.0	0.05-0.14	4.5-5.5	Low	0.17		
EcD, EcE:										
Evard	0-7	5-20	1.20-1.50	2.0-6.0	0.08-0.14	4.5-6.0	Low	0.15	5	<2
	7-22	18-35	1.30-1.50	0.6-2.0	0.15-0.18	4.5-6.0	Low	0.24		
	22-35	12-25	1.20-1.40	0.6-2.0	0.08-0.18	4.5-6.0	Low	0.24		
	35-60	5-20	1.20-1.40	0.6-2.0	0.05-0.17	4.5-6.0	Low	0.24		
Cowee	0-7	5-20	1.25-1.60	2.0-6.0	0.10-0.15	4.5-6.0	Low	0.20	2	1-3
	7-30	18-35	1.30-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Low	0.24		
	30-60	---	---	---	---	---	-------------	----		
HbC, HbE Hibriten	0-13	5-20	1.20-1.65	2.0-6.0	0.04-0.06	4.5-5.5	Low	0.10	2	.5-2
	13-28	18-35	1.25-1.60	0.6-2.0	0.05-0.09	4.5-5.5	Low	0.10		
	28-60	---	---	---	---	---	-------------	----		
MaB2, MaC2 Masada	0-8	20-35	1.30-1.50	0.6-2.0	0.10-0.17	4.5-6.0	Low	0.28	4	.5-1
	8-45	35-55	1.30-1.60	0.6-2.0	0.10-0.17	4.5-6.0	Moderate	0.24		
	45-60	15-35	1.30-1.60	0.6-2.0	0.10-0.17	4.5-6.0	Moderate	0.24		
PaD Pacolet	0-9	5-20	1.00-1.50	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.20	3	.5-2
	9-28	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low	0.28		
	28-38	15-35	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low	0.28		
	38-60	5-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low	0.28		
PcB2, PcC2 Pacolet	0-9	5-20	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.0	Low	0.24	2	.5-1
	9-28	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low	0.28		
	28-38	15-35	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low	0.28		
	38-60	5-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low	0.28		
PuC*:										
Pacolet	0-9	5-20	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.5	Low	0.24	2	.5-1
	9-28	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low	0.28		
	28-38	15-35	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low	0.28		
	38-60	5-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low	0.28		
Urban land.										
RnC, RnD, RnE Rion	0-6	5-20	1.30-1.50	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.24	3	.5-2
	6-30	18-35	1.40-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low	0.20		
	30-60	2-20	1.30-1.50	2.0-6.0	0.06-0.12	4.5-6.0	Low	0.20		
RwB:										
Rion	0-6	5-20	1.30-1.50	2.0-6.0	0.08-0.12	4.5-6.0	Low	0.24	3	.5-2
	6-30	18-35	1.40-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low	0.20		
	30-60	2-20	1.30-1.50	2.0-6.0	0.06-0.12	4.5-6.0	Low	0.20		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
RwB:										
Wedowee	0-6	5-20	1.25-1.60	2.0-6.0	0.10-0.18	4.5-5.5	Low	0.24	3	<1
	6-40	35-45	1.30-1.50	0.6-2.0	0.12-0.18	4.5-5.5	Moderate	0.28		
	40-60	5-20	1.20-1.50	0.6-2.0	0.08-0.15	4.5-5.5	Low	0.28		
RxA Riverview	0-10	5-20	1.30-1.60	0.6-2.0	0.12-0.18	4.5-6.0	Low	0.24	5	5-2
	10-43	18-35	1.20-1.40	0.6-2.0	0.15-0.22	4.5-6.0	Low	0.24		
	43-60	4-20	1.20-1.50	2.0-6.0	0.07-0.11	4.5-6.0	Low	0.17		
StB State	0-11	5-20	1.25-1.40	0.6-6.0	0.08-0.15	4.5-5.5	Low	0.28	5	<2
	11-45	18-35	1.35-1.50	0.6-2.0	0.14-0.19	4.5-5.5	Low	0.28		
	45-60	2-20	1.35-1.50	>2.0	0.02-0.10	4.5-5.5	Low	0.17		
TfB*:										
Tate	0-8	5-20	1.35-1.60	2.0-6.0	0.17-0.19	4.5-6.0	Low	0.24	5	1-3
	8-55	18-35	1.30-1.45	0.6-2.0	0.17-0.19	4.5-6.0	Low	0.28		
	55-60	2-20	1.45-1.65	2.0-6.0	0.08-0.14	4.5-6.0	Low	0.17		
French	0-12	5-20	1.50-1.70	0.6-2.0	0.10-0.15	4.5-6.0	Low	0.24	3	1-4
	12-31	8-35	1.30-1.50	0.6-2.0	0.12-0.20	4.5-6.0	Low	0.32		
	31-60	1-12	1.40-1.60	6.0-20	0.02-0.05	4.5-6.0	Low	0.05		
UdC*:										
Udorthents.										
Urban land.										
WeA Wehadkee	0-14	5-20	1.35-1.60	2.0-6.0	0.10-0.15	4.5-7.3	Low	0.24	5	2-5
	14-60	18-35	1.30-1.50	0.6-2.0	0.16-0.20	4.5-7.3	Low	0.32		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," and "apparent" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
AcD, AcE:											
Ashe	B	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
Cleveland	C	None	---	---	>6.0	---	---	10-20	Hard	Low	High.
BeB, BeC Bethlehem	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High.
BrC*:											
Bethlehem	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High.
Urban land.											
BsC2, BsD2:											
Braddock	B	None	---	---	>6.0	---	---	>60	---	High	Moderate.
Hayesville	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
BuA Buncombe	A	Occasional	Very brief	Feb-Jun	>6.0	---	---	>60	---	Low	Moderate.
CeB2 Cecil	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
CfB*:											
Cecil	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Urban land.											
ChA Chewacla	C	Frequent	Brief	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60	---	High	Moderate.
CnF*:											
Cleveland	C	None	---	---	>6.0	---	---	10-20	Hard	Low	High.
Rock outcrop.											
CsD, CsE:											
Cowee	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High.
Saluda	C	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High.
DaB2, DaC2 Davidson	B	None	---	---	>6.0	---	---	>60	---	High	Moderate.
DoB Dogue	C	Rare	---	---	1.5-3.0	Apparent	Jan-Mar	>60	---	High	High.
EcD, EcE:											
Evard	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
Cowee	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High.
HbC, HbE Hibriten	B	None	---	---	>6.0	---	---	20-40	Soft	Moderate	High.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hard-ness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In			
MaB2, MaC2 Masada	C	None	---	---	>6.0	---	---	>60	---	High	High.
PaD, PcB2, PcC2 Pacolet	B	None	---	---	>6.0	---	---	>60	---	High	High.
PuC*:											
Pacolet	B	None	---	---	>6.0	---	---	>60	---	High	High.
Urban land.											
RnC, RnD, RnE Rion	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
RwB:											
Rion	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
Wedowee	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
RxA Riverview	B	Frequent	Brief	Dec-Mar	3.0-5.0	Apparent	Dec-Mar	>60	---	Low	Moderate.
StB State	B	None	---	---	4.0-6.0	Apparent	Dec-Jun	>60	---	Moderate	High.
TfB:											
Tate	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
French	C	Frequent	Very brief	Dec-Apr	1.0-2.5	Apparent	Dec-May	>60	---	Moderate	Moderate.
UdC*:											
Udorthents.											
Urban land.											
WeA Wehadkee	D	Frequent	Brief	Nov-Jun	0-1.0	Apparent	Nov-May	>60	---	High	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Ashe	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Bethlehem	Clayey, kaolinitic, thermic Typic Hapludults
Braddock	Clayey, mixed, mesic Typic Hapludults
Buncombe	Mixed, thermic Typic Udipsamments
Cecil	Clayey, kaolinitic, thermic Typic Hapludults
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Cleveland	Loamy, mixed, mesic Lithic Dystrochrepts
Cowee	Fine-loamy, mixed, mesic Typic Hapludults
Davidson	Clayey, kaolinitic, thermic Rhodic Paleudults
Dogue	Clayey, mixed, thermic Aquic Hapludults
Evard	Fine-loamy, oxidic, mesic Typic Hapludults
French	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Fluvaquentic Dystrochrepts
Hayesville	Clayey, oxidic, mesic Typic Hapludults
Hibriten	Loamy-skeletal, mixed, thermic Typic Hapludults
Masada	Clayey, mixed, thermic Typic Hapludults
Pacolet	Clayey, kaolinitic, thermic Typic Kanhapludults
Rion	Fine-loamy, mixed, thermic Typic Hapludults
Riverview	Fine-loamy, mixed, thermic Fluventic Dystrochrepts
Saluda	Loamy, mixed, mesic, shallow Typic Hapludults
State	Fine-loamy, mixed, thermic Typic Hapludults
Tate	Fine-loamy, mixed, mesic Typic Hapludults
Udorthents	Udorthents
Wedowee	Clayey, kaolinitic, thermic Typic Hapludults
*Wehadkee	Fine-loamy, mixed, nonacid, thermic Typic Fluvaquents

* The soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series.

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