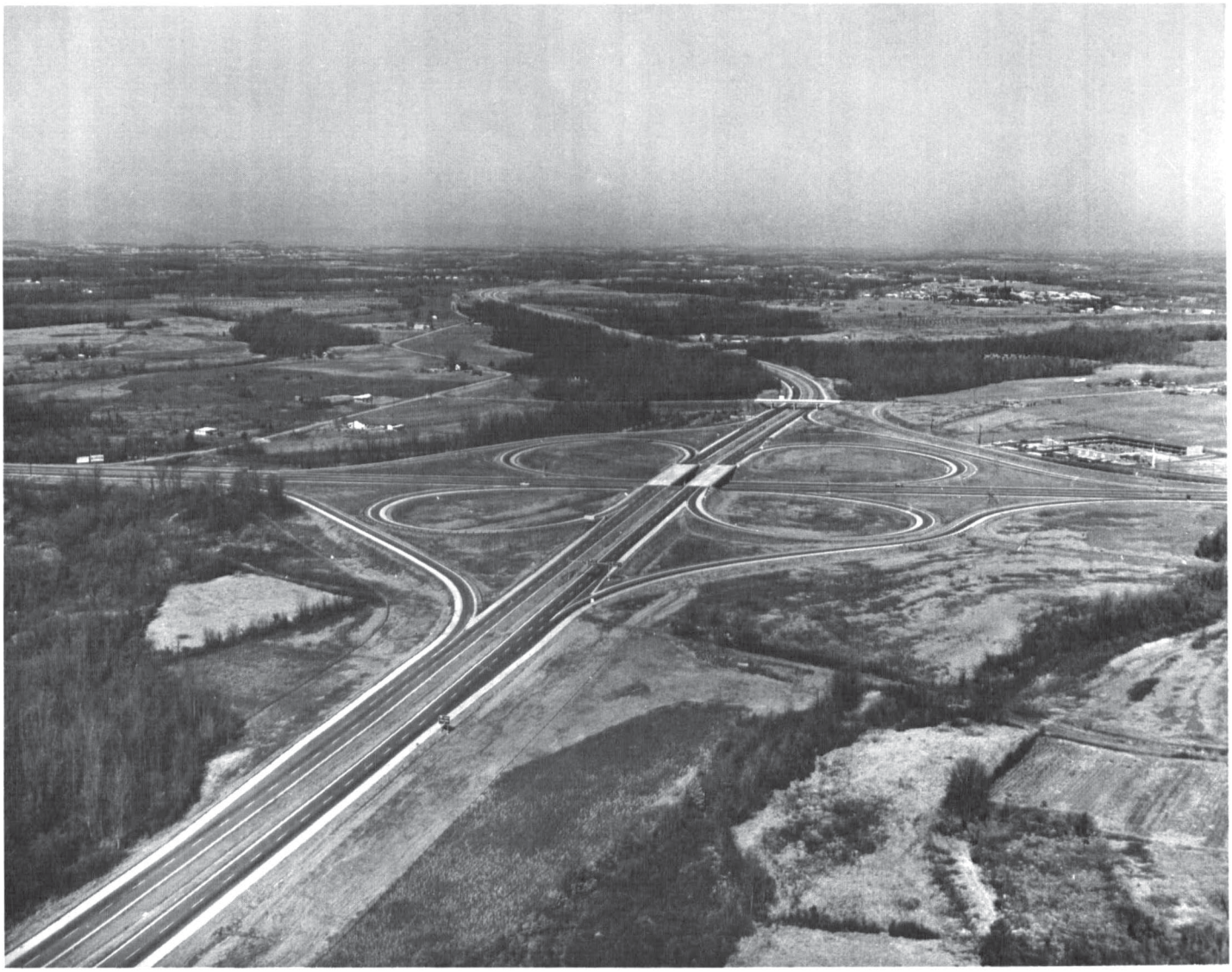
SOIL SURVEY

SPARTANBURG COUNTY SOUTH CAROLINA



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
SOUTH CAROLINA AGRICULTURAL EXPERIMENT STATION

Major fieldwork for this soil survey was done in the period 1960–64. Soil names and descriptions were approved in 1965. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1964. This survey was made cooperatively by the Soil Conservation Service and the South Carolina Agricultural Experiment Station: it is part of the technical assistance furnished to the Spartanburg Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY of Spartanburg County contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in appraising the value of tracts of land for agriculture, industry, or recreation.

Locating Soils

All the soils of Spartanburg County are shown on the detailed map at the back of this survey. This map consists of many sheets that are made from aerial photographs. Each sheet is numbered to correspond with numbers shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists all of the soils of the county in alphabetic order by map symbol. It shows the page where each kind of soil is described, and also the page for the capability unit, woodland group, wildlife group, or any other group in which the soil has been placed.

Individual colored maps showing the relative suitability or limitations of soils for many specific purposes can be developed by using the soil map and information in the text. Interpretations not included in the text can be developed by grouping the soils according to their suitability or limitations for a particular use. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils in the soil descriptions and in the discussions of capability units, woodland suitability groups, and other interpretative groupings.

Foresters and others can refer to the section "Use of Soils as Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the section "Wildlife and Fish."

Community planners and others concerned with suburban development can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the section "Use of Soils in Community Development."

Engineers and builders will find under "Engineering Applications" tables that give engineering descriptions of the soils in the county and that name soil features that affect engineering practices and structures.

Scientists and others can read about how the soils were formed and how they are classified in the section "Formation and Classification of Soils."

Students, teachers, and others will find information about soils and their management in various parts of the text, depending on their particular interest.

Newcomers in Spartanburg County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "Additional Facts About the County."

Cover picture.—Aerial view of a typical highway interchange in Spartanburg County. This interchange took more than 45 acres of good farmland. The soil is Cecil sandy loam.

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Contents

NOTICE TO LIBRARIANS

Series year and series number are no longer shown on soil surveys. See explanation on the next page.

Issued April 1968

EXPLANATION

Series Year and Series Number

Series year and number were dropped from all soil surveys sent to the printer after December 31, 1965. Many surveys, however, were then at such advanced stage of printing that it was not feasible to remove series year and number. Consequently, the last issues bearing series year and number will be as follows:

Series 1957, No. 23, Las Vagas and Eldorado Valleys Area, Nev.
Series 1958, No. 34, Grand Traverse County, Mich.
Series 1959, No. 42, Judith Basin Area, Mont.
Series 1960, No. 31, Elbert County, Colo. (Eastern Part)
Series 1961, No. 42, Camden County, N. J.
Series 1962, No. 13, Chicot County, Ark.
Series 1963, No. 1, Tippah County, Miss.

Series numbers will be consecutive in each series year, up to and including the numbers shown in the foregoing list. The soil survey for Tippah County, Miss., will be the last to have a series year and series number.

SOIL SURVEY OF SPARTANBURG COUNTY, SOUTH CAROLINA

BY WALLACE J. CAMP, SOIL CONSERVATION SERVICE

SOILS SURVEYED BY V. A. ROGERS, E. C. HERREN, AND WALLACE J. CAMP, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH THE SOUTH CAROLINA AGRICULTURAL EXPERIMENT STATION

SPARTANBURG COUNTY is in the northwestern part of South Carolina (fig. 1). The county occupies approximately 832 square miles, or 532,480 acres. Of this area, 5 square miles is water, mostly that of Lake Bowen, on the South Pacolet River, and of Lake Lyman, on the Middle Tyger River. Spartanburg, the county seat, is in the northeastern part of the county.

The first settlements in Spartanburg County were made on the Pacolet and Tyger Rivers between 1750 and 1760. The early settlers were of Scotch-Irish descent and came from northern Ireland and from Pennsylvania, Maryland, Virginia, and North Carolina. A few English settlers came from Virginia and the eastern part of South Carolina.

Practically all of the county is in farms. Most of the soils are loamy, and a large acreage is suitable for cotton, corn, grain sorghum, and other row crops. The soils most used for cultivated crops are the Cecil, Appling, and Madison. These soils are well drained, but the more sloping areas are susceptible to erosion. Many areas are protected against erosion by grassed waterways and other means. Pasture or woodland is a good use in many of the steeper areas. In 1959 about 4 percent of the county was pasture, and about 53 percent was woodland, of which about one-half was pastured.

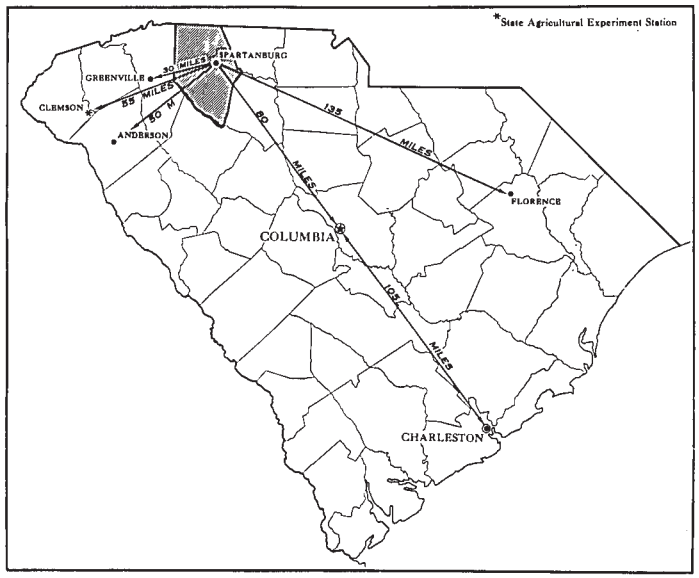

Figure 1.—Location of Spartanburg County in South Carolina.

Most of the farm income is from the sale of peaches, cotton, and livestock or livestock products. As the canning industry grows in the county, there is an increase in the production of plums, pears, apples, grapes, and other fruits, and of tomatoes and other vegetables.

Manufacture of textiles began early in Spartanburg County (*11*)[1], and other industries also have established plants. Vermiculite is mined in the southern part of the country, and rock is quarried at Pacolet and an area west of Cashville.

Streams, ponds, and wells are the chief sources of water for livestock. Dug or drilled wells furnish water for most homes, but the county is divided into water districts, and water for some rural homes is furnished by the Spartanburg City Water Works.

Among the recreational facilities in the county are parks, athletic fields, playgrounds, tennis courts, and golf courses. Swimming and picnicking are enjoyed at Rainbow Lake, Croft State Park, Lake Bowen, and Lake Lyman. Lake Bowen and Lake Lyman also provide water skiing.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Spartanburg County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

[1] Italicized numbers in parentheses refer to Literature Cited, page 80.

The ten soil associations in Spartanburg County are described on the following pages. Information about the soils and land types in each soil association is given in the section "Descriptions of the Soils."

1. Congaree-Mixed Alluvial Land Association

Deep, friable, moderately well drained to poorly drained soils on bottom lands

This association consists mainly of several long, narrow strips of bottom land along the Pacolet, Tyger, and Enoree Rivers and along Fairforest, Lawsons Fork, Big Ferguson, Little Ferguson, and Dutchman Creeks. It occupies about 9 percent of the county.

The Congaree soils make up about 40 percent of this association; Mixed alluvial land, wet, about 25 percent; and minor soils, the remaining 35 percent.

The Congaree soils have a dark-brown to grayish-brown sandy loam to clay loam surface layer and a dark-brown to yellowish-brown clay loam to loamy fine sand subsoil. In areas where deposits are recent, the soil material is stratified sand, silt, and clay. Mixed alluvial land, wet, has a black to yellowish-brown surface layer consisting of loamy sand to clay loam. The subsoil material is stratified sand, silt, and clay.

The minor soils of this association are on terraces and in small areas on adjacent uplands. These soils are the Hiwassee, Wickham, Cecil, Pacolet, Cataula, Wilkes, and Louisburg. The dark-red, well-drained Hiwassee soils formed in old general alluvium. The red, well-drained Wickham soils are lower than the Hiwassee soils and formed in more recent general alluvium. The red, well-drained Cecil and Pacolet soils formed in material weathered from red granite, gneiss, and schist. The red, moderately well drained Cataula soils formed in material weathered from gneiss. The well-drained to excessively drained Wilkes and Louisburg soils formed in material weathered from granite, gneiss, and mixed acid and basic rocks; they have a thin, weakly defined profile.

Most soils in this association are suitable for cultivation, but Mixed alluvial land, wet, is not. Small grain, corn, some truck crops, and pasture plants grow well. Most farms extend into another association. About 60 percent of this association is in forest, and the rest is mostly in pasture. Flooding is the main hazard to farming.

In this association the streams are used for fishing and canoeing and the ponds and lakes for boating. Ducks, raccoons, and squirrels are hunted in season.

The soils of this association have severe limitations as foundation material for roads, for building sites, and for pond dams, as well as for homesites and disposal fields for septic tanks.

2. Cecil-Madison Association

Deep to moderately deep, well-drained, gently sloping to steep soils that are on broad ridges and side slopes and have a red, friable to firm subsoil

This association consists mainly of broad, gently sloping ridges and strong side slopes in the northeastern part of the county along the Cherokee County line. The soils on side slopes adjacent to the larger streams range from sloping to moderately steep. This association occupies about 3 percent of the county.

The Cecil soils make up about 45 percent of this association; Madison soils, about 25 percent; and minor soils, the remaining 30 percent.

The Cecil soils have a dark-brown to yellowish-red sandy loam to clay loam surface layer and a red, firm clay subsoil. The Madison soils have a dark-brown to red sandy loam to clay loam surface layer and red clay subsoil. Madison soils contain mica throughout their profile.

The minor soils of this association are the weakly developed Louisburg; the yellowish-brown, well-drained Appling; the red Pacolet; and the mottled yellowish-brown and gray, somewhat poorly drained Worsham. The Louisburg soils are moderately steep, and the Worsham soils are in low areas at the head of drainageways, along narrow drainageways, and in upland depressions.

All of this association except the moderately steep areas has been cleared and cultivated. About 50 percent now is in forest, 40 percent is in pasture and cultivated crops, and 10 percent is idle or used for nonfarm purposes. The soils are suited to crops locally grown and to pasture grasses and legumes. Farms range from 50 to 500 acres in size and produce small grain, corn, hay, and cotton. Pulpwood is the main forest product. Because erosion is a severe hazard in cultivated fields, practices are needed that control soil losses.

Suitable sites for ponds are available in many places in this association. The ponds can be used to provide water for livestock, for irrigation, and for producing fish. Also, many areas are suitable for campsites, hiking trails, and bridle paths. The soils in this association are generally well suited to management for producing quail and doves.

The soils in this association have moderate limitations as foundation material for roads, for building sites, and for pond dams, and have moderate to severe limitations for use as disposal fields for septic tanks.

3. Hayesville-Cecil Association

Moderately deep to deep, well-drained, gently sloping to steep soils that are on long, narrow ridges and have a red, friable clay loam to clay subsoil

This association consists of one small area in the extreme northwestern corner of the county. Dominant in the association are long, narrow ridges that have gently sloping tops and strongly sloping to steep side slopes. The drainageways are deep and narrow. The total area of this association is only about 2,300 acres, or considerably less than 1 percent of the county.

The Hayesville soils make up about 40 percent of this association; Cecil soils, about 35 percent; and minor soils, the remaining 25 percent.

The Hayesville soils have a grayish-brown sandy loam surface layer and a red, friable clay loam subsoil. They occur throughout the association. The Cecil soils have a grayish-brown to dark-brown sandy loam surface layer and a red clay subsoil. They occupy the gently sloping ridgetops.

The minor soils of this association are the mottled yellowish-brown and gray, poorly drained Worsham and

the well-drained Congaree. The Worsham soils are in the drainageways, and the Congaree soils are along streams.

Most of this association is in hardwoods and pines. The farms range from 100 to 200 acres and are owned mostly by retired people. Areas that are suitable for farming are in pasture, and small patches are in garden crops.

The trend in this association is toward recreation. Facilities for recreation include a steeplechase race course, hiking trails, and picnicking and scenic areas.

The soils of this association are moderately limited for use as foundation material for roads and for buildings and as embankments for ponds. Limitations to use as disposal fields for septic tanks are severe.

4. Cecil-Davidson-Pacolet Association

Deep, well-drained, gently sloping soils that are on medium to broad ridges and have a red or dark-red, firm clayey subsoil

This association consists mainly of medium to broad, gently sloping ridges and many long, crooked, well-defined drainageways. North-facing slopes adjacent to streams are long and more than 15 percent, but the south-facing slopes, in most places, are less than 15 percent. Narrow, nearly level strips occur along the larger streams. This association occupies about 42 percent of the county.

The Cecil soils make up about 45 percent of this association; Davidson, about 15 percent; Pacolet, about 10 percent; and minor soils, the remaining 30 percent.

Cecil soils normally have a grayish-brown to dark-brown sandy loam surface layer, but in eroded areas the surface layer ranges from reddish brown to red in color and from sandy clay loam to clay loam in texture. These soils have a red clay subsoil. They formed from weathered gneiss, schist, and granite. The Davidson soils have a dark-brown to dark-red sandy loam to clay loam surface layer and a dark-red clay subsoil. They formed in residuum from weathered hornblende gneiss. The Pacolet soils have a dark-brown to yellowish-brown sandy loam surface layer and a moderately thick, red, friable clay loam to clay subsoil. These soils formed in weathered gneiss and schist.

The minor soils on uplands in this association are the yellowish-brown to light-red, well drained Appling soils; the red, micaceous, well drained Madison soils; the grayish-brown to yellowish-brown, well drained Lockhart sandy loams; the brown, moderately well drained Enon sandy loams; the weakly developed Louisburg loamy sands; and the weakly developed Wilkes fine sandy loams. The Louisburg and Wilkes soils occur in moderately steep to steep areas. On bottom lands in this association are minor areas of Mixed alluvial land, wet, along the medium to large streams, and of the mottled yellowish-brown and gray, poorly drained Worsham soils along the small streams and drainageways.

Except for the moderately steep and steep areas, most of this association has been cleared and cultivated. About 65 percent now is in cultivated crops and peach orchards, about 15 percent is in pasture, and the remaining 20 percent is in forest or is used for nonfarm purposes. Farms range from 75 to 200 acres in size and are operated by their owners. The main income is from the sale of peaches, small grain, corn, cotton, soybeans, and some truck crops.

Recreation in this association consists mainly of golfing, hiking, and hunting. Farm ponds are used for fishing.

The soils of this association have moderate limitations as foundation material for roads and for buildings and as embankments for ponds. Limitations to use as disposal fields for septic tanks are moderate to severe.

5. Cecil-Musella-Louisburg Association

Deep to shallow, well-drained to excessively drained, sloping to steep soils that are on ridges and side slopes and have a clay to loamy sand subsoil

This association consists of short, sloping ridgetops; strong to steep side slopes; and deep, crooked drainageways. It occurs in rolling areas along the Pacolet River in the northern and eastern parts of the county, and in narrow, nearly level areas along the larger streams. This association occupies about 8 percent of the county.

The Cecil soils make up about 40 percent of this association; Musella soils, about 15 percent; Louisburg soils, about 5 percent; and minor soils, the remaining 40 percent.

The Cecil soils occupy the sloping tops of ridges and the strongly sloping sides. These soils have a brown to red sandy loam surface layer and a red clay subsoil. Musella soils are in the northwestern part of the association and occupy the moderately steep and steep side slopes adjacent to bottoms along streams. These soils have a yellowish-red to red fine sandy loam surface layer and a dark-red to red, thin clay subsoil. Rock is at a depth of 16 to 30 inches. Louisburg soils are in the southeastern half of the association and occupy the moderately steep to steep side slopes adjacent to bottoms along streams. These soils have a grayish-brown to brown loamy sand surface layer and that, in most places, is underlain by a thin subsoil of loamy sand. The subsoil is missing in places.

The minor soils on uplands are the dark-red, well-drained Davidson; the yellowish-brown to yellowish-red, well-drained Appling; and the red, micaceous, well-drained Madison. Mixed alluvial land, wet, is on the stream bottoms.

Most of this association is too rolling for farming. About 75 percent is in forest, and about all of the cultivated areas are in small gardens that produce for home use. The size of farms ranges from 25 to 150 acres, but larger tracts make up the eight industrial sites in the association. Wages from industrial work provide the main source of income.

Recreation in this association consists of hunting raccoons and squirrels in season; picnicking; fishing, boating, and water skiing on Lake Bowen; swimming in Rainbow Lake; and hiking.

The soils of this association have moderate to severe limitations as foundation material for roads and as building sites, embankments for ponds, and as disposal fields for septic tanks.

6. Cecil-Vance-Appling Association

Deep, well drained and moderately well drained, gently sloping soils that are on broad ridges and have a red to brownish-yellow, firm to very firm clayey subsoil

This association consists of broad, gently sloping ridges and a few long, shallow drainageways. The slopes adjacent to streams are long. Those facing north are long and have gradients of more than 10 percent. South-facing slopes are less than 10 percent. Narrow, nearly level areas are along the larger streams. This association, locally called the flatwoods, occupies slightly less than 3 percent of the county.

The Cecil soils make up about 40 percent of this association; Vance soils, about 22 percent; Appling soils, about 18 percent; and minor soils, the remaining 20 percent.

The Cecil soils normally have a dark-brown to grayish-brown sandy loam surface layer, but eroded areas have a red clay loam surface layer. The subsoil is red clay. The Vance soils occupy sloping and gently sloping areas adjacent to shallow drainageways and to upland depressions. These soils have a dark grayish-brown sandy loam surface layer and a yellowish-brown, very firm clay subsoil that is mottled or streaked with light red. The Appling soils occupy broad, gently sloping ridgetops and have a light grayish-brown to yellowish-brown, very friable sandy loam surface layer. Their subsoil is brownish-yellow to yellowish-red, firm sandy clay to clay.

The minor soils of this association are the yellowish-brown, moderately well drained Durham loamy sands on uplands; the mottled yellowish-brown and gray, somewhat poorly drained Worsham soils along drainageways and on bottom lands; and Mixed alluvial land, wet.

Most of this association is in peach orchards and pasture; the rest is in mixed forest or is used for nonfarm purposes. The trend is toward increased use of soils for pasture, for recreation, and for housing developments. The average farm contains about 200 acres and is operated by its owner. The main income is from the sale of small grain, corn, cotton, peaches, soybeans, and some truck crops.

The main kinds of recreation in this association are golfing; fishing and swimming in farm ponds; skating at amusement centers; and hunting.

The soils of this association have moderate to severe limitations as foundation material for roads or buildings, as embankments for ponds, and as disposal fields for septic tanks.

7. Cataula-Cecil-Madison Association

Deep to moderately deep, moderately well drained to well drained, gently sloping to steep soils that are on irregular ridges and have a red, very firm to firm clayey subsoil

This association consists of irregular ridges that have gently sloping crests and strongly sloping to steep sides adjacent to streams. The long, crooked, well-defined drainageways are of a dendritic pattern, and bottom land adjacent to the streams is either narrow or nonexistent. This association occupies about 14 percent of the county.

Cataula soils make up about 40 percent of this association; Cecil soils, about 25 percent; Madison soils, about 20 percent; and minor soils, the remaining 15 percent.

The Cataula soils occur throughout this association, except in moderately steep and steep areas. These soils have a brown to grayish-brown sandy loam to clay loam surface layer and a red to mottled red and brown, very firm clay subsoil. The Cecil soils occupy long gentle slopes and the crests of moderately broad ridges. These soils have a dark-brown to grayish-brown sandy loam to clay loam surface layer and a red clay subsoil. The Madison soils occur on the moderately steep to steep side slopes. These soils have a dark-brown to red sandy loam to clay loam surface layer and a red clay subsoil. Mica is common throughout the profile.

The minor soils on uplands in this association are the red, well drained, moderately steep Pacolet; the grayish-brown, well drained Appling sandy loams; the grayish-brown, well drained Lockhart sandy loams; the grayish-brown, moderately well drained Durham loamy sands; and the shallow, weakly developed, excessively drained Wilkes fine sandy loams. On the bottom lands are the Congaree fine sandy loams to clay loams.

8. Davidson Association

Deep, well-drained, sloping to strongly sloping soils that are on broad ridges and have a dark-red, firm clay subsoil

This association consists mainly of broad, gently sloping ridges and long, shallow drainageways. The slopes adjacent to larger streams are strong. This association occupies about 3 percent of the county.

The Davidson soils make up about 60 percent of this association, and minor soils make up the remaining 40 percent.

The Davidson soils have a dusky-red to weak-red loam to clay loam surface layer and a dark-red clay subsoil. They are well drained.

The minor soils of this association are the Cecil, Enon, Iredell, Mecklenburg, and Wilkes. The Cecil soils are red and well drained and the Enon soils are yellowish brown and moderately well drained. The Iredell soils have a dark grayish-brown fine sandy loam surface layer and a yellowish-brown, very firm, plastic clay subsoil. The Mecklenburg soils have a dark reddish-brown fine sandy loam surface layer and a yellowish-red, firm clay subsoil. The Wilkes soils are shallow, weakly developed, excessively drained fine sandy loams.

Except for the strongly sloping areas, this association has been cleared and cultivated. About 25 percent now is cultivated, and the rest is forested, idle, or used for nonfarm purposes. The trend is toward idle land and woodland. Farms range from 100 to 200 acres in size.

The soils of this association are suited to locally grown crops and pasture plants. Pasture grasses grow well. Because erosion is a severe hazard, practices are needed that prevent soil loss where these soils are cultivated.

On this association recreation is limited mainly to hunting in season. The soils of this association have moderate to severe limitations as foundation material for roads and for buildings and as embankments for dams. Limitations to use as disposal fields for septic tanks are severe.

9. Cecil-Pacolet Association

Deep, well-drained, gently sloping to steep soils that are on narrow ridges and side slopes and have a red, firm clayey subsoil

This association consists of narrow, gently sloping ridges that have short, moderately steep to steep side slopes adjacent to streams. The drainage pattern is dendritic and well developed. This association occupies about 11 percent of the county.

The Cecil soils make up about 40 percent of this association; the Pacolet soils, about 25 percent; and minor soils, the remaining 35 percent.

The Cecil soils occur throughout the association, except in moderately steep and steep areas. These soils have a brown to red sandy loam to clay loam surface layer and a red clay subsoil. The moderately steep to steep Pacolet soils have a dark-brown to red sandy loam to clay loam surface layer and red clay to clay loam subsoil.

Among the minor soils of this association are the Louisburg, the Madison, the Cataula, and the Wilkes, and Moderately gullied land. The excessively drained Louisburg soils have a grayish-brown loamy sand surface layer. The Madison soils are dark brown, well drained, and micaceous. The moderately well drained Cataula is brown to red and firm. The Wilkes soil is shallow and excessively drained.

About 80 percent of this association is in forest, about 7 percent is in cultivated crops, and about 7 percent is in pasture; the rest is idle or is used for nonfarm purposes. The trend is toward an increase in the amount of woodland, and the main income is from the sale of lumber and pulpwood. The farms range from 100 to 500 acres in size.

In this association recreation includes boating, fishing, hunting, golfing, hiking, and horseback riding. Lyman Lake is used for water skiing.

The soils of this association have moderate limitations as foundation material for roads and for buildings and as embankments for ponds. Limitations to use as disposa fields for septic tanks are moderate to severe.

10. Cecil-Appling-Pacolet Association

Deep, well-drained, gently sloping to moderately steep soils that are on ridges and side slopes and have a red to brownish-yellow, firm clayey subsoil

This association consists of broad, gently sloping ridges and a few long, crooked, shallow drainageways. The south-facing slopes adjacent to streams are short and less than 15 percent in most places, but the north-facing slopes are more than 15 percent. This association occupies about 7 percent of the county.

The Cecil soils make up about 35 percent of this association; Appling soils, about 27 percent; Pacolet soils, about 25 percent; and minor soils, the remaining 13 percent.

The Cecil soils have a grayish-brown to red sandy loam to clay loam surface layer and a red clay subsoil. The Appling soils, on ridgetops and at the head of drains, have a grayish-brown sandy loam surface layer and a mottled yellowish-brown to yellowish-red clay subsoil. The Pacolet soils, on side slopes adjacent to streams, have a grayish-brown to yellowish-brown sandy loam surface layer, and a moderately deep, red clay subsoil

The minor soils of this association are the yellowish-brown, moderately drained Durham loamy sands; the mottled yellowish-brown and gray, somewhat poorly drained Worsham soils; and Congaree soils that are on bottom lands along streams.

The soils of this association are suitable for farming, and they produce good yields of all crops commonly grown in the county. Most of the acreage is in cultivated crops, peach orchards, and pasture. The trend is toward an increase in the acreage of cultivated crops. Farms generally range from about 100 to 200 acres and are operated by their owners. The main income is from the sale of peaches, cotton, small grain, corn, soybeans, and some truck crops.

Recreation on this association is golfing, hunting, and horseback riding. In addition, farm ponds are used for fishing and swimming.

The soils of this association have moderate limitations as foundation material for roads and for buildings and as embankments for ponds. Limitations for use as disposal fields for septic tanks are moderate to severe.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Spartanburg County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. For successful use of this survey, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Cecil and Davidson, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural landscape. Soils of one series can differ somewhat in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same tex-

ture belong to one soil type. Cecil sandy loam and Cecil clay loam are two soil types in the Cecil series. The difference in texture of their surface layers is apparent from their names.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Cecil sandy loam, 2 to 6 percent slopes, eroded, is one of several phases of Cecil sandy loam, a soil type that ranges from nearly level to strongly sloping.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that greatly help in drawing soil boundaries accurately. The soil map in the back of this survey was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientist may show as one mapping unit two or more soils if the differences between them are so small that they do not justify separation for the purpose of the survey. Such a mapping unit is called an undifferentiated soil group; for example, Appling and Cecil sandy loams, 2 to 6 percent slopes. Also, on most soil maps, areas are shown that are so rocky, so shallow, or so frequently worked by wind and water that they scarcely can be called soils. These areas are shown on a soil map like other mapping units, but they are given descriptive names, such as Severely gullied land or Stony land, moderately steep, and are called land types rather than soils.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way that it is readily useful to different groups of readers, among them farmers, managers of woodland, engineers, and home owners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil surveys. On the basis of yield and practice tables and other data, the soil scientists set up trial groups, and then test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

Descriptions of the Soils

In this section each soil series (group of soils) represented in the county is described in alphabetic order, and each series is followed by descriptions of the soils in the series. These are the soils mapped in the county and are the soils shown on the large map at the back of this survey. In alphabetic order with the series, the miscellaneous land types (not true soils) in the county are also described. The approximate acreage and proportionate extent of the soils and land types are given in table 1.

The description of each soil series includes, in fine print, a profile typical of the series. A profile is a record of what the soil scientist saw when he dug into the ground. Those who want only a working knowledge of the soil can omit reading the fine print. But reading the larger print of the series description should not be omitted, because it tells about the important characteristics common to all the soils in the series, characteristics not mentioned in describing the single soils.

In describing the soils, the scientist frequently assigns a letter symbol, for example, "Ap" or "B21t," to the various layers. These symbols have special meanings that concern scientists and others who make a special study of soils. Most readers need to remember only that all symbols beginning with "A" refer to surface soil and subsurface soil; those beginning with "B" refer to subsoil; and those beginning with "C" refer to the substratum, or parent material. It may be helpful to remember that the small letter "p" indicates a plowed layer, and that the small letter "t" indicates an accumulation of clay.

Soil scientists use Munsell notations to indicate the color of a soil precisely, and they provide the equivalent in words for those not familiar with the system. This is an example of a color term and notation, "dark brown (10YR 3/3)." In this survey the colors given are for a moist soil. Terms such as sandy loam are used to describe the texture of the soil, which is the content of sand, silt, and clay. The words "weak, fine, granular" describe the kind of structure, or the way the individual soil particles are arranged in larger grains, or aggregates, and the amount of pore space between the grains.

Consistence is described by three separate terms at three standard moisture contents—dry, moist, and wet. In this survey, if the moisture conditions are not stated in using consistence terms, the moisture content is that under which the particular term is defined in the "Soil Survey Manual" (*9*). Thus *friable* used without a statement of moisture content specifies friable when moist; likewise, *hard* used alone means hard when dry; and *plastic* means plastic when wet. These terms and other terms are defined in the Glossary at the back of this survey and in the "Soil Survey Manual" (*9*).

TABLE 1.—*Approximate acreage and proportionate extent of soils*

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Appling and Cecil sandy loams, 2 to 6 percent slopes	18, 252	3. 4	Madison clay loam, 2 to 6 percent slopes, severely eroded	344	0. 1
Appling and Cecil sandy loams, 6 to 10 percent slopes, eroded	4, 083	. 8	Madison clay loam, 6 to 10 percent slopes, severely eroded	995	. 2
Appling sandy loam, 2 to 6 percent slopes	999	. 2	Madison clay loam, 10 to 15 percent slopes, severely eroded	1, 086	. 2
Cataula clay loam, 2 to 6 percent slopes, severely eroded	3, 905	. 7	Madison clay loam, 15 to 40 percent slopes, severely eroded	9, 065	1. 7
Cataula clay loam, 6 to 10 percent slopes, severely eroded	12, 388	2. 3	Madison sandy loam, 2 to 6 percent slopes, eroded	2, 336	. 4
Cataula clay loam, 10 to 15 percent slopes, severely eroded	6, 786	1. 3	Madison sandy loam, 6 to 10 percent slopes, eroded	2, 099	. 4
Cataula sandy loam, 2 to 6 percent slopes, eroded	7, 610	1. 4	Madison sandy loam, 10 to 15 percent slopes, eroded	1, 231	. 2
Cataula sandy loam, 6 to 10 percent slopes, eroded	8, 845	1. 7	Madison sandy loam, 15 to 25 percent slopes, eroded	13, 282	2. 5
Cataula sandy loam, 10 to 15 percent slopes, eroded	3, 855	. 7	Madison sandy loam, 25 to 40 percent slopes, eroded	2, 570	. 5
Cecil clay loam, 2 to 6 percent slopes, severely eroded	11, 606	2. 2	Madison sandy loam, thin solum variant, 2 to 6 percent slopes, eroded	658	. 1
Cecil clay loam, 6 to 10 percent slopes, severely eroded	30, 656	5. 7	Madison sandy loam, thin solum variant, 6 to 10 percent slopes, eroded	694	. 1
Cecil clay loam, 10 to 15 percent slopes, severely eroded	19, 233	3. 6	Mecklenburg fine sandy loam, 2 to 6 percent slopes, eroded	516	. 1
Cecil sandy loam, 2 to 6 percent slopes, eroded	97, 530	18. 3	Mecklenburg fine sandy loam, 6 to 10 percent slopes, eroded	279	. 1
Cecil sandy loam, 6 to 10 percent slopes, eroded	57, 890	10. 9	Mine pits and dumps	558	. 1
Cecil sandy loam, 10 to 15 percent slopes, eroded	22, 197	4. 1	Mixed alluvial land, wet	11, 583	2. 2
Congaree soils	18, 500	3. 5	Moderately gullied land, firm materials	3, 958	. 7
Davidson clay loam, 2 to 6 percent slopes, severely eroded	2, 165	. 4	Moderately gullied land, friable materials, 2 to 10 percent slopes	1, 518	. 3
Davidson clay loam, 6 to 10 percent slopes, severely eroded	6, 509	1. 2	Moderately gullied land, friable materials, 10 to 40 percent slopes	7, 939	1. 5
Davidson clay loam, 10 to 15 percent slopes, severely eroded	3, 746	. 7	Musella clay loam, 6 to 10 percent slopes, severely eroded	270	. 1
Davidson loam, 2 to 6 percent slopes, eroded	574	. 1	Musella clay loam, 10 to 25 percent slopes, severely eroded	3, 786	. 7
Davidson loam, 6 to 10 percent slopes, eroded	304	. 1	Musella fine sandy loam, 6 to 10 percent slopes, eroded	294	. 1
Davidson sandy clay loam, 2 to 6 percent slopes, eroded	12, 650	2. 4	Musella fine sandy loam, 10 to 15 percent slopes, eroded	866	. 1
Davidson sandy clay loam, 6 to 10 percent slopes, eroded	8, 335	1. 6	Musella fine sandy loam, 15 to 40 percent slopes, eroded	2, 369	. 4
Davidson sandy clay loam, 10 to 15 percent slopes, eroded	3, 150	. 6	Pacolet clay loam, 15 to 25 percent slopes, severely eroded	16, 500	3. 1
Durham loamy sand, 2 to 6 percent slopes	442	. 1	Pacolet sandy loam, 15 to 25 percent slopes	4, 435	. 8
Enon sandy loam, 2 to 6 percent slopes, eroded	4, 604	. 9	Pacolet sandy loam, 15 to 25 percent slopes, eroded	27, 366	5. 1
Enon sandy loam, 6 to 10 percent slopes, eroded	2, 819	. 5	Pacolet sandy loam, 25 to 40 percent slopes	3, 564	. 7
Enon sandy loam, 10 to 15 percent slopes, eroded	838	. 1	Severely gullied land	653	. 1
Hayesville sandy loam, 6 to 15 percent slopes	244	(1)	Stony land, moderately steep	163	(1)
Hayesville sandy loam, 15 to 25 percent slopes	423	. 1	Vance sandy loam, 2 to 6 percent slopes, eroded	2, 174	. 4
Hayesville sandy loam, 25 to 40 percent slopes	239	(1)	Vance sandy loam, 6 to 10 percent slopes, eroded	374	. 1
Hiwassee sandy loam, 2 to 8 percent slopes, eroded	192	(1)	Wickham sandy loam, 2 to 6 percent slopes, eroded	1, 021	. 2
Iredell fine sandy loam, 2 to 6 percent slopes	605	. 1	Wickham sandy loam, 6 to 10 percent slopes, eroded	241	(1)
Local alluvial land	1, 624	. 3	Wilkes fine sandy loam, 2 to 6 percent slopes, eroded	205	(1)
Lockhart sandy loam, 4 to 10 percent slopes, eroded	295	. 1	Wilkes fine sandy loam, 6 to 10 percent slopes, eroded	1, 556	. 3
Louisa sandy loam, 6 to 10 percent slopes, eroded	266	(1)	Wilkes fine sandy loam, 10 to 15 percent slopes, eroded	1, 530	. 3
Louisa sandy loam, 10 to 15 percent slopes, eroded	290	. 1	Wilkes fine sandy loam, 15 to 40 percent slopes, eroded	12, 625	2. 4
Louisa sandy loam, 15 to 25 percent slopes, eroded	339	. 1	Worsham fine sandy loam, 0 to 6 percent slopes	7, 452	1. 4
Louisburg loamy sand, 6 to 10 percent slopes	580	. 1	Water	3, 200	. 6
Louisburg loamy sand, 10 to 15 percent slopes	478	. 1			
Louisburg loamy sand, 15 to 25 percent slopes	3, 176	. 6			
Made land	1, 903	. 3	Total	532, 480	100. 0

[1] Less than 0.05 percent.

Appling Series

The soils of the Appling series are deep and well drained. They occur on broad, gently sloping ridges, where they formed from weathered granite, gneiss, and schist. Depth to hard rock is more than 15 feet.

Typical profile in a cultivated field, one-fourth mile northeast of Oakland Church, on an east-facing slope of 4 percent:

Ap—0 to 10 inches, grayish-brown (10YR 5/2) sandy loam; weak, fine, granular structure; very friable; many small roots; pH 5.3; abrupt, smooth boundary.

B1—10 to 18 inches, yellowish-brown (10YR 5/8) sandy clay loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky when wet; few small roots; pH 4.9; clear, smooth boundary.

B21t—18 to 26 inches, brownish-yellow (10YR 6/8) sandy clay loam to sandy clay; moderate, medium, subangular blocky structure; firm when moist, slightly sticky when wet; patchy clay films on ped faces; pH 5.2; abrupt, smooth boundary.

B22t—26 to 38 inches, brownish-yellow (10YR 6/6) sandy clay; common, fine, prominent mottles of red; moderate, medium, angular blocky structure; firm when moist, sticky when wet; thin patchy clay films on ped faces; pH 5.3; clear, smooth boundary.

B23t—38 to 62 inches, brownish-yellow (10YR 6/8) clay; common, medium, distinct mottles of red and few, fine, faint mottles of light yellowish brown; moderate, fine, angular blocky structure; firm when moist, sticky when wet, hard when dry; few firm, fine flakes of mica; patchy clay films on ped faces; pH 5.0; clear, wavy boundary.

B3—62 to 70 inches, brownish-yellow (10YR 6/8) weathered clay loam parent material; common, fine, prominent mottles of red, common, fine, distinct mottles of yellow, and few, fine, faint mottles of light yellowish brown; fragments of partly weathered rock; pH 5.0.

The surface layer is sandy loam in texture and ranges from dark grayish brown to pale brown in color. In the upper part, the B2t horizon ranges from yellowish brown to brown in color and generally from sandy clay loam to sandy clay in texture. The lower part is normally clay and ranges from brownish yellow to yellowish red. The solum ranges from about 40 to 72 inches in thickness but in a few places is as little as 32 inches thick.

Appling soils occur with the Cecil, Durham, Vance, Enon, and Louisburg soils. In color the Appling soils are not so red as the red Cecil soils. They have a finer textured subsoil than the Durham soils. In most places the Appling soils have a thicker A horizon than the Cecil soils and a finer textured A horizon than the Durham soils. In contrast to the Enon and Vance soils, Appling soils have thicker, coarser textured transitional horizons and a less firm and coarser textured B2t horizon. Appling soils have a thicker, continuous Bt horizon and a thicker solum than the Louisburg soils.

The Appling soils are low in natural fertility and in content of organic matter. Infiltration is moderately rapid, and permeability is moderate. Available water capacity is medium, and response to liberal additions of fertilizer is good.

The Appling soils are widely scattered throughout the northern and western parts of the county. The original vegetation was oak, hickory, gum, and pine trees and an understory of vines, briers, and native grasses. These soils are suited to cultivation and respond to good management. About 85 percent of the acreage is in cultivated crops or pasture.

Appling and Cecil sandy loams, 2 to 6 percent slopes (AcB).—These soils adjoin each other and are mapped as one unit. They are deep, well-drained soils that occur on broad, gently sloping ridges, where they formed from weathered granite and gneiss. About 63 percent of this mapping unit is Appling sandy loam, and about 29 percent is Cecil sandy loam. A profile of an Appling soil is given as a part of the description of the Appling series, and one of a Cecil soil as a part of the description of the Cecil series.

The Appling soils have a grayish-brown, very friable sandy loam surface layer ranging from 7 to 14 inches in thickness. The surface layer of the Cecil soils is dark-brown, very friable sandy loam 6 to 10 inches thick. The upper subsoil of Appling soils is brownish-yellow, friable sandy loam, and the lower subsoil is mottled brownish-yellow and red, firm clay. The subsoil of Cecil soils is yellowish-red, reddish-yellow, or red sandy clay loam in the upper part and red, firm clay in the lower part.

Included in areas mapped as this unit are small areas that have a sandy clay loam, fine sandy loam, or loamy sand surface layer. Also included are small patches of Vance soils and small areas of Cataula soils. These included areas make up about 8 percent of the mapping unit.

The plow layer is easily kept in good tilth, and it can be worked through a wide range of moisture content without clodding or crusting. Nevertheless, these soils do not warm so early in spring as do those soils that have a thinner surface layer. In some places the plow layer extends into the subsoil. These soils are low in organic-matter content and natural fertility. The response to added lime and fertilizer is good. Water enters these soils at a moderately rapid rate and passes through them at a moderate rate.

Most of the acreage of this mapping unit is cultivated or pastured. If fertilization is adequate, crops common in the county grow well. Management is needed that controls erosion and lessens the leaching of plant nutrients. (Capability unit IIe–2; woodland suitability group 3; wildlife suitability group 1)

Appling and Cecil sandy loams, 6 to 10 percent slopes, eroded (AcC2).—These soils adjoin each other and are mapped as one unit. They are deep, well-drained soils that formed from weathered granite and gneiss. They occur on short slopes that break from broad, gently sloping ridges at the head of and adjacent to drainageways. About 58 percent of this mapping unit is Appling sandy loam, and about 34 percent is Cecil sandy loam. A profile of an Appling soil is a part of the description of the Appling series, and one of a Cecil soil is a part of the description of the Cecil series.

The surface layer of Appling soils is grayish-brown to yellowish-brown, very friable sandy loam. The surface layer of Cecil soils is brown to yellowish-brown, very friable sandy loam to sandy clay loam. The upper subsoil of the Appling soils is brownish-yellow sandy clay loam, and the upper subsoil of the Cecil soils is yellowish-red sandy clay loam to clay loam. The lower subsoil of the Appling soils is mottled brownish-yellow and red, firm clay, and the lower subsoil of the Cecil soils is red, firm clay. Rills and a few shallow gullies are common.

Included in areas mapped as this unit are small areas that have a loamy sand or sandy clay loam surface

layer. Also included are small areas of Vance soils that have a yellowish-brown, very firm subsoil; of Cataula soils that have a red, firm subsoil; and of Louisburg soils that have a thin or discontinuous B horizon. These included areas make up about 8 percent of this mapping unit.

The plow layer cannot be kept in good tilth easily. It can be worked without clodding and crusting only through a narrow range of moisture content. The plow layer commonly extends into the subsoil. Organic-matter content and natural fertility are low, but response to added lime and fertilizer is good. Water enters and passes through these soils at a moderate rate, and available water capacity is medium.

Most of the acreage is used for cultivated crops, orchards, or pasture (fig. 2). Under good management, all crops commonly grown in the county produce average yields. The main concern in managing these soils is controlling erosion, but reducing leaching and increasing fertility are also important. (Capability unit IIIe-2; woodland suitability group 4; wildlife suitability group 1)

Appling sandy loam, 2 to 6 percent slopes (ApB).—This is a deep, well-drained soil on broad, gently sloping ridges.

This soil has a very dark grayish-brown to light grayish-brown, very friable surface layer 7 to 14 inches thick. The upper subsoil is brownish-yellow, friable sandy loam, and the lower subsoil is mottled brownish-yellow and red, firm clay.

Included in areas mapped as this soil are small areas that have a fine sandy loam or loamy sand surface layer and a few patches with slopes of less than 2 percent. Other inclusions are patches of Vance soils that have a very firm subsoil and of Cecil soils that have a red clay subsoil. These included areas make up less than 10 percent of this mapping unit.

The plow layer is easily kept in good tilth and can be worked through a wide range of moisture content without clodding or crusting. Nevertheless, this soil does not warm so easily in spring as do other soils that have a thinner surface layer. Organic-matter content and natural fertility are low. Water enters this soil at a moderately rapid rate and passes through it at a moderate rate. The available water capacity is medium.

Most of the acreage is in cultivated crops. This soil is well suited to peanuts and potatoes if it is adequately fertilized. It is suited to most crops commonly grown in the county except horticultural crops. Fertilized fields produce fair yields. In managing this soil the main concerns are raising the low fertility, reducing the leaching of plant nutrients, and controlling erosion. (Capability unit IIe-2; woodland suitability group 3; wildlife suitability group 1).

Figure 2.—**A young peach orchard on Appling and Cecil sandy loams, 6 to 10 percent slopes, eroded. The trees are set on the contour, and a meadow strip of fescue serves as an outlet for water.**

Cataula Series

The soils of the Cataula series are moderately deep to deep and moderately well drained to well drained. They formed in material weathered from gneiss and schist that are influenced locally by slightly basic rocks. Depth to hard rock is more than 10 feet.

Typical profile in a field of sericea lespedeza, 1 mile northwest of Switzer, on a slope of 5 percent on a high, west-facing ridge crest:

Ap—0 to 6 inches, yellowish-brown (10YR 5/4) sandy loam; weak, fine, granular structure; very friable; abundant small roots; few small pebbles of quartz and many coarse grains of sand; pH 5.7; abrupt, smooth boundary.

B1—6 to 7 inches, reddish-brown (5YR 5/4) sandy clay loam; weak, medium, subangular blocky structure; friable; abundant small roots; pH 5.3; clear, smooth boundary.

B21t—7 to 16 inches, red (2.5YR 5/8) heavy clay loam; strong, medium, angular blocky structure; very firm; few fine and medium roots; few fine mica flakes; clay films on horizontal faces of peds; pH 5.2; clear, smooth boundary.

B22t—16 to 27 inches, red (2.5YR 4/8) clay with common, fine and medium, distinct mottles of yellow; strong, coarse, angular blocky structure; very firm; continuous clay films on vertical and horizontal faces of peds; pH 5.4; clear, smooth boundary.

B3—27 to 37 inches, red (2.5YR 4/8) sandy clay loam with common, fine and medium, distinct mottles of yellow and few, fine, faint mottles of very pale brown; medium, fine, subangular blocky structure; firm; few fine mica flakes; pH 5.6; clear, wavy boundary.

C—37 to 50 inches, red (2.5YR 4/6) weathered gneiss to a loam with common, medium, prominent mottles of yellow and few, medium, distinct mottles of very pale brown; massive; few thin pieces of partly weathered gneiss; few fine mica flakes.

The surface layer is clay loam or sandy loam. It is clay loam where accelerated erosion has removed the original surface soil. The surface layer is grayish-brown, brown, yellowish-red, or red and 1 to 10 inches thick. The B1 horizon is absent in most places, but where it occurs, it is yellowish-red to reddish-brown sandy clay loam 1 to 4 inches thick. The B2t horizon is red mottled with yellow, pale-brown, and strong brown, very firm clay 14 to 28 inches thick. The C horizon is variable in color and contains some fine mica.

The Cataula soils occur with Appling, Cecil, Pacolet, Enon, and Wilkes soils. The Cataula soils have thinner A and B1 horizons than the Appling soils and are finer textured and redder in the B horizon. They have a firmer B horizon, and a thinner solum than the Cecil soils and a

firmer and thicker solum than the Pacolet soils. The Cataula soils have a redder and less plastic B horizon than the Enon soils. The solum of Cataula soils is thicker than that of the Wilkes soils, and it has much more distinct horizons.

The Cataula soils are low in natural fertility and in content of organic matter. Infiltration ranges from moderate in the eroded areas to slow in the severely eroded areas. Available water capacity is medium to low. Cataula soils have a moderately deep to deep root zone. They are medium to strongly acid, and crops on them respond to liberal fertilization.

In this county, most of the acreage of Cataula soils is in the southern part. These soils are on gently sloping ridges of medium width and short, strong slopes adjacent to streams. The native trees were oak, elm, gum, and some redcedar and pine, and there was an undergrowth of vines, briers, and native grasses. Except for the strong slopes, most areas have been cleared and cultivated. About 80 percent is wooded or is cultivated, and the rest is in pasture, is idle, or is in nonfarm use. Crops on these soils respond to good management.

Cataula clay loam, 2 to 6 percent slopes, severely eroded (CaB3).—This is a moderately deep, well-drained soil that overlies gneiss and schist.

The surface layer of this soil is brown to red, friable clay loam 1 to 3 inches thick. The subsoil, which is exposed in most places, is red, very firm clay. Shallow gullies, sheet erosion, and rills are common.

Included in areas mapped as this soil where erosion has not been so severe, are patches that have a sandy loam surface layer. Also included are areas that have a sandy clay loam surface layer and a few patches with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Cecil soils, small areas of Madison soils, and small areas of Enon soils. These included areas make up less than 12 percent of this mapping unit.

Unless this soil is worked within a narrow range of moisture content, maintaining good tilth without clodding or crusting is difficult. All tillage is in the subsoil material. This soil is low in organic-matter content and natural fertility. Water enters the soil at a slow rate and passes through it at a moderate to moderately slow rate. The available water capacity is low.

Most of this soil has been cleared and cultivated, chiefly to cotton, but it is now mostly in pine forest Crop yields are fair if fertilization is adequate. In managing this soil the main concerns are controlling erosion, compensating for the restricted root zone, and raising the low fertility. (Capability unit IIIe–3; woodland suitability group 9; wildlife suitability group 3)

Cataula clay loam, 6 to 10 percent slopes, severely eroded (CaC3).—This is a moderately deep soil that has a very firm subsoil and overlies gneiss or schist.

The surface layer is brown to red, friable clay loam 1 to 3 inches thick. The subsoil, which is exposed in most places, is red, very firm clay.

Included in areas mapped as this soil, where erosion has not been so severe, are patches that have a sandy loam surface layer. Also included are areas that have a sandy clay loam surface layer, a few patches with slopes ranging from 2 to 6 percent, and a few with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Cecil soils, of Madison soils, and of Wilkes soils. These included areas make up less than 11 percent of this mapping unit.

Maintaining good tilth without clodding or crusting is difficult unless this soil is worked within a very narrow range of moisture content. All tillage is in the subsoil material. Organic-matter content and natural fertility are low. Water enters this soil at a slow rate and passes through it at a moderate to moderately slow rate. The available water capacity is low.

Most of the acreage has been cleared and cultivated chiefly to cotton, but it is now mostly in pine forest. Crop yields are only fair if fertilization is adequate. In managing this soil the main concerns are controlling erosion, compensating for the restricted root zone, and raising the low fertility. (Capability unit IVe–2; woodland suitability group 9; wildlife suitability group 3)

Catuala clay loam, 10 to 15 percent slopes, severely eroded (CaD3).—This is a moderately deep, well-drained soil that overlies gneiss or schist.

The surface layer is brown to red, friable clay loam 1 to 3 inches thick. The subsoil, which is exposed in most places, is red to dark-red, very firm clay. Rills and shallow gullies are common.

Included in areas mapped as this soil, where erosion has not been so severe, are patches that have a sandy loam surface layer. Also included are areas that have a sandy clay loam surface layer and a few patches with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Cecil soils, of Madison soils, and of Wilkes soils. These included areas make up less than 10 percent of this mapping unit.

Because slopes are strong and further erosion is likely, cultivation of this soil is not practical. Maintaining good tilth without clodding or crusting is difficult unless this soil is worked within a very narrow range of moisture content. All tillage is in the subsoil material. Organic-matter content and natural fertility are low. Water enters this soil at a slow rate and passes through it at a moderate rate. The available water capacity is low.

Most areas of this soil are in pine forest. Kudzu and sericea lespedeza produce only fair yields if adequately fertilized. In managing this soil the main concerns are controlling erosion, compensating for the restricted root zone, and raising the low fertility. (Capability unitVIe-3; woodland suitability group 9; wildlife suitability group 3)

Cataula sandy loam, 2 to 6 percent slopes, eroded (CdB2).—This is a moderately deep to deep soil that has a very firm subsoil and overlies gneiss and schist.

The surface layer is brown to yellowish-red, very friable sandy loam 1 to 5 inches thick. The subsoil, which is exposed in small- and medium-sized areas, is red to dark-red, very firm clay. Small rills are common, and a few shallow gullies occur.

Included in areas mapped as this soil are patches that have a sandy clay loam surface layer and a few patches with slopes ranging from 6 to 10 percent. Also included are small areas of Appling soils, of Lockhart soils, and of Cecil soils. These included areas make up less than 9 percent of this mapping unit.

Except in small areas where erosion is severe, the plow layer is fairly easily kept in good tilth, and it can be worked, without clodding or crusting, within a medium range of moisture content. In most places all tillage extends into the subsoil material. Organic-matter content and natural fertility are low, but response to added lime

and fertilizer is good. Water enters and passes through this soil at a moderate to moderately slow rate. The available water capacity is medium.

About half the acreage of this soil is in cultivated crops and pasture. All crops common in the county produce fair yields. In managing this soil the main concerns are controlling erosion and compensating for the restricted root zone. (Capability unit IIe–3; woodland suitability group 10; wildlife suitability group 4)

Cataula sandy loam, 6 to 10 percent slopes, eroded (CdC2).—This is a moderately deep to deep soil that has a very firm subsoil and overlies gneiss or schist.

The surface layer is brown to yellowish-red, very friable sandy loam 1 to 5 inches thick. The subsoil, which is exposed in small- and medium-sized areas, is red to dark-red, very firm clay. Small rills are common, and a few shallow gullies occur.

Included in areas mapped as this soil are patches that have a sandy clay loam to clay loam surface layer and a few, small, narrow areas on ridge crests that have a gravelly sandy loam surface layer. Also included are a few patches with slopes ranging from 2 to 6 percent and a few with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Appling soils, of Lockhart soils, and of Cecil soils. These included areas make up less than 10 percent of the acreage mapped.

Except in small areas where erosion is severe, the plow layer can be fairly easily kept in good tilth, and it can be worked without clodding through a medium range of moisture content. In most places all tillage extends into the subsoil material. Organic-matter content and natural fertility are low, but response to added lime and fertilizer is good. Water enters and passes through this soil at a moderate to moderately slow rate. The available water capacity is medium.

Most of the acreage is in forest and pasture. All crops common in the area produce fair yields. In managing this soil the main concerns are controlling erosion and compensating for the restricted root zone. (Capability unit IIIe–3; woodland suitability group 10; wildlife suitability group 4)

Cataula sandy loam, 10 to 15 percent slopes, eroded (CdD2).—This is a moderately deep to deep soil that has a very firm subsoil and overlies gneiss or schist.

The surface layer is brown to yellowish-red, very friable sandy loam 1 to 5 inches thick. The subsoil, which is exposed in small- to medium-sized areas, is red to dark-red, very firm clay. Rills are common, and a few shallow gullies occur.

Included in areas mapped as this soil are patches that have a sandy clay loam to clay loam surface layer and a few narrow areas on ridge crests that have a gravelly sandy loam surface layer. Also included are a few patches with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Cecil soils, of Madison soils, and of Wilkes soils. These included areas make up less than 12 percent of the total acreage.

Except in small areas where accelerated sheet erosion is severe, the plow layer can be fairly easily kept in good tilth, and it can be worked without clodding only through a medium range of moisture content. Where the moisture content is unfavorable, germination of seeds is impeded. This soil is low in organic-matter content and natural fertility, but response to added lime and fertilizer is good. Water enters this soil at a moderately slow rate and passes through it at a moderate to moderately slow rate. The available water capacity is low.

Most of the acreage is in forest consisting of mixed hardwoods and pines. Crops common in the county produce fair yields. In managing this soil the main concerns are controlling erosion and compensating for the restricted root zone. (Capability unit IVe–2; woodland suitability group 10; wildlife suitability group 4)

Cecil Series

In the Cecil series are deep and well-drained soils that formed in material weathered from granite, gneiss, and schist. In most places depth to hard rock is more than 15 feet.

Typical profile in a peach orchard, 2 miles southeast of Carlisle School, on a slope of 4 percent on a high, south-facing ridge crest:

Ap—0 to 7 inches, dark-brown (10YR 4/3) sandy loam; weak, fine, granular structure; very friable; abundant fine roots; few, fine, dark concretions; pH 5.9; abrupt, smooth boundary.

B1t—7 to 12 inches, red (2.5YR 5/6) sandy clay loam; moderate, medium, subangular blocky structure; friable; many fine roots; few coarse grains of sand; few fine mica flakes; few patchy clay films; pH 6.2; clear, smooth boundary.

B21t—12 to 28 inches, red (2.5YR 4/8) clay; moderate, medium, subangular blocky structure; firm; few medium roots; few coarse grains of sand; few fine mica flakes; continuous clay films; pH 5.5; clear, smooth boundary.

B22t—28 to 43 inches, red (2.5YR 5/8) clay; moderate, fine, subangular blocky structure; firm; few coarse grains of sand; few fine mica flakes; continuous clay films; pH 5.2; clear, wavy boundary.

B3—43 to 72 inches, red (2.5YR 4/8) clay loam; few, fine, distinct and few, medium, prominent mottles of reddish yellow; weak, fine and medium, subangular blocky structure; friable to firm; mica flakes common; few small quartz pebbles; pH 5.0.

The surface layer is clay loam or sandy loam. It is clay loam where accelerated erosion has removed the original surface soil. The surface layer ranges from 1 to 10 inches in thickness and is dark grayish brown, dark brown, brown, yellowish red, or red. The B1t horizon is yellowish-red to red sandy clay loam to clay loam 2 to 8 inches thick. The B2t horizon is red, firm clay 31 to 60 inches thick. The C horizon has variable color.

The Cecil soils occur with the Appling, Durham, Cataula, Enon, Mecklenburg, Davidson, Pacolet, Louisburg, and Wilkes soils. The Cecil soils have a redder B horizon than the Appling and Durham soils. They do not have a mottled, very firm subsoil like that in Cataula soils. Cecil soils are redder and less plastic than the Enon and Mecklenburg soils, and they have a lighter colored A horizon and a lighter red B horizon than the Davidson soils. They have a firmer, thicker B horizon than the Pacolet soils. In contrast to Madison soils, the Cecil soils do not have mica throughout the solum. They have a much thicker solum than the Louisburg and Wilkes soils.

The Cecil soils are low in natural fertility and in content of organic matter. Infiltration, permeability, and available water capacity are moderate. Crops on Cecil soils respond to added fertilizer.

The Cecil soils are widely distributed throughout the county. They range from nearly level to strongly sloping. These soils developed under forest, and the

native trees were oak, hickory, gum, pine, and some redcedar. The understory was made up of briers, vines, and native grasses. The Cecil soils are suited to cultivation, and about half the acreage is cultivated. Crops on these soils respond to good management.

Cecil clay loam, 2 to 6 percent slopes, severely eroded (CeB3).—This is a deep, well-drained soil that formed in material weathered from granite, gneiss, and schist.

The surface layer is yellowish-red to red, friable clay loam 1 to 3 inches thick. The subsoil, which is exposed in all except a few small areas, is red, firm clay. Small rills are common, and there are a few shallow to moderately deep gullies.

Included in areas mapped as this soil are patches that have a sandy loam or sandy clay loam surface layer. Also included are small patches with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Madison soils, of Cataula soils, and, in the northern part of the county, small areas of Appling soils. These included areas make up less than 12 percent of this mapping unit.

The plow layer cannot be easily kept in good tilth, and it can be worked without clodding only through a narrow range of moisture content. Uniform stands of crops are difficult to obtain. In most places tillage extends into the subsoil material. Organic-matter content and natural fertility are low. Water enters this soil at a moderately slow rate and passes through it at a moderate rate. Available water capacity is medium to low.

Most of this soil is in cultivated crops and pasture. All crops common in the county grow well, but a heavy application of fertilizer is required for profitable yields. In managing this soil the main concerns are controlling erosion and increasing fertility and organic-matter content. (Capability unit IIIe–1; woodland suitability group 6; wildlife suitability group 3)

Cecil clay loam, 6 to 10 percent slopes, severely eroded (CeC3).—This is a deep, well-drained soil on slopes adjacent to streams and on narrow ridgetops. It formed in material that weathered from granite, gneiss, and schist.

The surface layer is yellowish-red to red, friable clay loam 1 to 3 inches thick. The subsoil, which is exposed in all places except a few small spots, is red, firm clay. Rills and large galled areas are common, and there are a few shallow gullies and an occasional moderately deep one.

Included in areas mapped as this soil are patches that have a sandy loam or sandy clay loam surface layer. Also included are small patches with slopes ranging from 2 to 6 percent and some with slopes ranging from 10 to 15 percent. In the northern part of the county, other inclusions are small areas of Madison soils, of Appling soils, and of Musella soils. In the southern part of the county, small areas of Cataula soils are included. These included areas make up less than 10 percent of this mapping unit.

The plow layer cannot be easily kept in good tilth, and it can be worked without clodding only through a narrow range of moisture content. Uniform stands of crops are difficult to obtain. Tillage extends into the subsoil material in most places. Organic-matter content and natural fertility are low. Water enters this soil at a moderately slow rate and passes through it at a moderate rate. The available water capacity is medium to low.

Most of the acreage is in pine forest. If crops and pasture are adequately fertilized, they grow well. In managing this soil the main concerns are controlling erosion and increasing fertility and organic-matter content. (Capability unit IVe-1; woodland suitability group 6; wildlife suitability group 3)

Cecil clay loam, 10 to 15 percent slopes, severely eroded (CeD3).—This is a deep, well-drained, strongly sloping soil adjacent to medium-sized streams and at the head of small streams. It overlies granite, gneiss, and schist.

The surface layer is yellowish-red to red, friable clay loam 1 to 3 inches thick. The subsoil is red, firm clay. It is exposed in all except a few small areas. Rills are common, and there are a few shallow and moderately deep gullies.

Included in areas mapped as this soil are patches that have a sandy loam, sandy clay loam, or gravelly sandy loam surface layer. Also included are small patches with slopes ranging from 6 to 10 percent and some with slopes of more than 15 percent. In the northern part of the county, other inclusions are small areas of Madison soils and of Musella soils. In the southern part of the county, small areas of Cataula soils are included. All included areas make up less than 9 percent of this mapping unit.

The plow layer cannot be easily kept in good tilth, and it can be worked without clodding only through a narrow range of moisture content. Tillage extends into the subsoil material in most places. Organic-matter content and natural fertility are low. Water enters this soil at a moderately slow rate and passes through it at a moderate rate. Available water capacity is medium to low.

Most of the acreage is in pine forest. Because runoff is rapid and erosion is likely, cultivating this soil is not practical. The chief hazard to management is erosion. (Capability unit VIe-1; woodland suitability group 6; wildlife suitability group 3)

Cecil sandy loam, 2 to 6 percent slopes, eroded (CIB2).—This is a well-drained soil that overlies granite, gneiss, or schist. It is the most extensive soil in Spartanburg County.

The surface layer is brown or light yellowish-brown, very friable sandy loam 1 to 5 inches thick. It is mixed with subsoil material in many places. The subsoil, a red, firm clay, is exposed in many small- and medium-sized areas.

Included in areas mapped as this soil are patches that have a loamy sand, gravelly sandy loam, and sandy clay loam surface layer. Also included are patches with slopes ranging from 6 to 10 percent. In the northern part of the county, other inclusions are small areas of Appling soils. In the southern part of the county, there are small areas of Lockhart soils and small areas of Cataula soils. These included areas make up less than 10 percent of this mapping unit.

The plow layer cannot be easily kept in good condition, and it can be worked without clodding only through a medium to narrow range of moisture content. This soil is generally in poor tilth in areas where the subsoil is exposed. It is low in content of organic matter and natural fertility, but crops on it respond to added lime and fertilizer. Water enters and passes through this soil at a moderate rate. Available water capacity is medium.

Most of this soil is in cultivated crops, peach orchards, or pasture. All crops commonly grown in the county grow well. Erosion is the chief hazard to management. (Capability unit IIe–1; woodland suitability group 3; wildlife suitability group 1)

Cecil sandy loam, 6 to 10 percent slopes, eroded (CIC2).—This extensive soil is deep and well drained. It overlies granite, gneiss, or schist.

The surface layer is dark-brown to yellowish-brown, very friable sandy loam 1 to 5 inches thick. The subsoil, which is exposed in many medium-sized areas, is red, firm clay. Rills and a few shallow gullies are common.

Included in areas mapped as this soil are patches that have a loamy sand, gravelly loamy sand, or sandy clay loam surface layer. Also included are a few small areas with slopes less than 6 percent and a few with slopes ranging from 10 to 15 percent. In the northern and western parts of the county, other inclusions are small areas of Appling soils and of Madison soils. In the southern part of the county, there are a few small areas of Lockhart soils and of Cataula soils. These included areas make up less than 9 percent of this mapping unit.

The plow layer cannot be easily kept in good tilth, and it can be worked without clodding only through a medium to narrow range of moisture content. This soil is generally in poor tilth in areas where the subsoil is exposed.

Natural fertility and organic-matter content are low, but response to added lime and fertilizer is good. Water enters and passes through this soil at a moderate rate. Available water capacity is medium.

Most of this soil is in cultivated crops, peach orchards, or pasture. All crops commonly grown in the county grow well. Erosion is the chief hazard to management. (Capability unit IIIe–1; woodland suitability group 3; wildlife suitability group 1)

Cecil sandy loam, 10 to 15 percent slopes, eroded (CID2).—This is a deep, well-drained soil that overlies granite, gneiss, or schist.

The surface layer is dark-brown to yellowish-brown, very friable sandy loam 1 to 5 inches thick. The subsoil, a red, firm clay, is exposed in many small- and medium-sized spots. Shallow gullies and small rills are common.

Included in areas mapped as this soil are patches that have a loamy sand, gravelly sandy loam, and sandy clay loam surface layer. Also included are a few patches with slopes ranging from 6 to 10 percent and a few with slopes of more than 15 percent. In the northern and eastern parts of the county, other inclusions are small patches of Madison soils. Included in the southern part of the county are small areas of Cataula soils. These included areas make up less than 10 percent of this mapping unit.

The plow layer cannot be easily kept in good tilth, and it can be worked without clodding only through a medium to narrow range of moisture content. This soil is generally in poor tilth in areas where the subsoil is exposed. Organic-matter content and natural fertility are low, but response to added lime and fertilizer is good. Water enters and passes through this soil at a moderate rate. Available water capacity is medium.

Most of the acreage is in forest consisting of mixed hardwoods and pines. Peach trees grow well on this soil. Sericea lespedeza also grows well and provides supplemental grazing. Erosion is the chief hazard to management. (Capability unit IVe–1; woodland suitability group 4; wildlife suitability group 2)

Congaree Series

The soils of the Congaree series are deep and well drained. They are on first bottoms along streams. These soils formed in alluvium that washed from areas underlain by granite, gneiss, or schist. Depth to hard rock is more than 10 feet.

Typical profile in a cornfield along the North Pacolet River, 3 miles east of Landrum on a first bottom of medium width that has a slope of 1 percent and faces northeast:

Ap—0 to 10 inches, dark-brown (7.5YR 3/2) clay loam; weak, fine, granular structure; very friable; abundant fine roots; common fine mica; pH 4.8; abrupt, smooth boundary; 8 to 12 inches thick.

A2—10 to 23 inches, dark-brown (10YR 4/3) sandy clay loam; weak, medium, granular structure; very friable; many fine roots; common fine mica; pH 5.1; clear, smooth boundary.

C1—23 to 31 inches, yellowish-brown (10YR 5/6) clay loam; weak, medium, granular structure; friable; common fine mica; pH 5.5; gradual, smooth boundary.

C2—31 to 43 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, subangular blocky structure; friable; common fine mica; pH 5.5; clear, wavy boundary.

C3—43 to 60 inches +, brown (10YR 5/3) loamy fine sand; few, fine, faint mottles of yellowish brown; loose; abundant fine mica; pH 5.6.

The surface layer is dark-brown to light brownish-gray fine sandy loam, loam, silt loam, or clay loam. At a depth of 27 to 50 inches is yellowish-brown sandy loam mottled with brownish yellow. Mica flakes are common throughout the profile. The alluvium recently deposited on the surface ranges from 6 inches to 24 inches or more in thickness.

The Congaree soils occur among areas of Mixed alluvial land, wet. The Congaree soils are better drained than Mixed alluvial land, wet, and their surface layer has more uniform texture.

The Congaree soils are moderate in natural fertility and high in content of organic matter. Both infiltration and permeability are moderately rapid, and available water capacity is medium to high. Crops on these soils respond to fertilization.

In this county, the Congaree soils occupy long, narrow areas adjacent to most streams. The native trees were oak, hickory, elm, beech, gum, ash, and cottonwood, and there was an undergrowth of vines, canes, briers, and native grasses.

Much of the acreage of Congaree soils is suitable for cultivation, if management is good, but loss of crops can be expected in 1 of every 4 years. Corn, oats, some truck crops, and pasture grasses are suitable crops.

Congaree soils (Co).—These are deep, nearly level, well-drained soils on the first bottoms of streams. Slopes range from 0 to 2 percent. These soils are subject to occasional floods, from which they receive fresh deposits of alluvium.

The surface layer is dark-brown to dark grayish-brown, very friable sandy clay loam to sandy loam 6 to 14 inches thick. The subsurface layer is dark-brown to yellowish-brown, very friable sandy clay loam to loam. The underlying material to a depth of about 60 inches is yellowish-brown, brownish-yellow, grayish-brown, or brown clay loam to loamy fine sand.

Included in areas mapped as these soils are small areas of Mixed alluvial land, wet. These included areas make up less than 7 percent of this mapping unit.

Good tilth is fairly easy to maintain on these soils. They have a thick root zone and are moderate in natural fertility and high in organic-matter content. Water

enters and passes through these soils at a moderately rapid rate. The available water capacity is medium to high.

Most of the acreage is in pasture. Corn, truck crops, and pasture plants are suited and respond to good management. Flooding is the chief hazard to management. (Capability unit IIw–2; woodland suitability group 1; wildlife suitability group 6)

Davidson Series

The soils of the Davidson series are deep and well drained. Locally they are called push dirt. These soils formed in material that weathered from gabbro, diorite, hornblende schist, and hornblende gneiss. Depth to hard rock is more than 15 feet.

Typical profile in a pasture, 3 miles northeast of Glenn Springs, on a slope of 4 percent facing southeast:

Ap—0 to 5 inches, dusky-red (10R 3/3) loam; weak, fine, granular structure; friable when moist, hard when dry, sticky when wet; many fine roots; few, fine, dark concretions; pH 6.3; abrupt, smooth boundary.

B21t—5 to 20 inches, dusky-red (10R 3/4) clay; moderate, fine, subangular blocky structure; firm when moist, hard when dry, very sticky when wet; common fine and medium roots; discontinuous thin clay films; pH 5.8; clear, smooth boundary.

B22t—20 to 61 inches, dark-red (10R 3/6) clay; moderate, medium, subangular blocky structure; firm when moist, hard when dry, very sticky when wet; continuous thick clay films; pH 5.8.

The surface layer is loam, sandy clay loam, or clay loam. It is clay loam where accelerated erosion has removed the original surface soil. The surface layer ranges from 1 to 6 inches in thickness and from dusky red to dark brown in color. The B2t horizon is dark-red to dusky-red, firm clay 48 to 72 inches thick.

The Davidson soils occur with the Cecil, Mecklenburg, and Iredell soils. The Davidson soils have a redder surface layer and a darker red subsoil than those soils.

The Davidson soils are moderately high in natural fertility, and crops on them respond to added fertilizer. The content of organic matter is moderate. Infiltration is moderately slow, permeability is moderate, and available water capacity is medium. The root zone is deep.

In this county, the Davidson soils occur on gently sloping and sloping ridgetops. The native trees were oak, hickory, redcedar, yellow-poplar, and some pine. The understory was dogwood, holly, vines, briers, and native grasses. These soils are suited to cultivation, and crops on them respond to good management. Most of the acreage is in cultivated crops, peach orchards, and pasture.

Davidson clay loam, 2 to 6 percent slopes, severely eroded (DaB3).—This is a deep, well-drained soil that formed in material weathered from diorite and from hornblende gneiss.

The surface layer is dusky-red to dark-red, friable clay loam 1 to 3 inches thick. The subsoil, which is exposed in most places, is dusky-red to dark-red, firm clay.

Included in areas mapped as this soil are patches that have a loam to sandy clay loam surface layer. Also included are patches with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Cecil soils and of Mecklenburg soils. These included areas make up less than 7 percent of this mapping unit.

The plow layer is generally in poor tilth and can be worked without clodding only through a narrow range of moisture content. This soil is moderately high in natural fertility and low in content of organic matter. Water enters this soil at a slow rate and passes through it at a moderate rate. Runoff is rapid, and the available water capacity is medium.

Most of the acreage is in pasture and forest. Corn, small grain, soybeans, pasture plants, and peach trees produce average yields. In managing this soil the main concerns are controlling erosion and improving tilth. (Capability unit IIIe–1; woodland suitability group 6; wildlife suitability group 3)

Davidson clay loam, 6 to 10 percent slopes, severely eroded (DaC3).—This is a deep, well-drained soil that formed in material weathered from hornblende gneiss and diorite.

The surface layer is dusky-red to dark-red, friable clay loam 1 to 3 inches thick. The subsoil is dusky-red to dark-red, firm clay.

Included in areas mapped as this soil are patches that have a loam to sandy clay loam surface layer. Also included are patches with slopes ranging from 2 to 6 percent. Other inclusions are small areas of Cecil soils and of Mecklenburg soils. These included areas make up less than 10 percent of this mapping unit.

Good tilth in the plow layer is difficult to maintain. The plow layer can be worked without clodding only through a narrow range of moisture content. This soil is moderately high in natural fertility and low in content of organic matter. Water enters this soil at a slow rate and passes through it at a moderate rate. Runoff is rapid, and the available water capacity is medium.

Most of this soil is in forest, but fair yields of small grain and pasture plants are produced. In managing this soil the main concerns are controlling erosion and improving tilth. (Capability unit IVe–1; woodland suitability group 6; wildlife suitability group 3)

Davidson clay loam, 10 to 15 percent slopes, severely eroded (DaD3).—This is a deep, well-drained soil that formed in material weathered from hornblende gneiss and diorite.

The surface layer is reddish-brown to dark-red, friable clay loam 1 to 4 inches thick. The subsoil is exposed in most places and consists of dark-red, firm clay. Rills and shallow gullies are common.

Included in areas mapped as this soil are patches that have a sandy clay loam surface layer. Also included are small areas with slopes ranging from 6 to 10 percent. Other inclusions throughout the county are small areas of Cecil soils and of Wilkes soils. Inclusions in the northern part of the county are small areas of Musella soils and in the southern part are small areas of Cataula soils. These included areas make up less than 9 percent of this mapping unit.

On this soil runoff is rapid and abundant. Organic-matter content and natural fertility are moderate. Water enters the soil at a slow rate and passes through it at a moderate rate. Available water capacity is medium.

Most of this soil is in pine forest. Kudzu and sericea lespedeza are adapted, but it is not practical to use this forested soil for cultivated crops or pasture. Erosion is the chief hazard to management. (Capability unit IVe–1; woodland suitability group 6; wildlife suitability group 3)

Davidson loam, 2 to 6 percent slopes, eroded (DdB2).—This is a deep, well-drained soil that overlies diorite and hornblende schist.

The surface layer is dusky-red, friable loam 2 to 5 inches thick. The subsoil is exposed in many small- and medium-sized areas and consists of dusky-red to dark-red, firm clay. There are a few rills and galled areas.

Included in areas mapped as this soil are patches that have a clay loam surface layer. Also included are patches with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Cecil soils and of Mecklenburg soils. These included areas make up less than 6 percent of this mapping unit.

Because this soil is sticky, keeping it in good tilth is difficult. The plow layer can be worked without clodding only through a narrow range of moisture content. Tilth is generally poor where the subsoil material is exposed. This soil is moderately high in natural fertility and moderate in content of organic matter, but response to added fertilizer is good. Water enters this soil at a moderately slow rate and passes through it at a moderate rate. Available water capacity is medium.

Most of this soil is in crops or pasture. Yields are favorable for corn, small grain, soybeans, pasture plants, and peach trees. In managing this soil the main concerns are controlling erosion and improving tilth. (Capability unit IIe–1; woodland suitability group 3; wildlife suitability group 1)

Davidson loam, 6 to 10 percent slopes, eroded (DdC2).—This is a deep, well-drained soil that overlies diorite and hornblende gneiss.

The surface layer is dusky-red, friable loam 2 to 5 inches thick. The subsoil is exposed in many small- and medium-sized areas and consists of dusky-red to dark-red, firm clay. A few rills and galled areas occur.

Included in areas mapped as this soil are patches that have a clay loam surface layer. Also included are patches with slopes ranging from 2 to 6 percent. Other inclusions are small areas of Cecil soils and of Mecklenburg soils. These included areas make up less than 5 percent of this mapping unit.

Because this soil is sticky, keeping it in good tilth is difficult. The plow layer can be worked without clodding only through a narrow range of moisture content. Tilth is generally poor where the subsoil material is exposed. This soil is moderately high in natural fertility and moderate to low in content of organic matter, but response to added fertilizer is good. Water enters this soil at a moderately slow rate and passes through it at a moderate rate. Available water capacity is medium.

Most of this soil is in crops or pasture. Yields are favorable for corn, small grain, soybeans, pasture plants, and peach trees. In managing this soil the main concerns are controlling erosion and improving tilth. (Capability unit IIIe–1; woodland suitability group 4; wildlife suitability group 1)

Davidson sandy clay loam, 2 to 6 percent slopes, eroded (DsB2).—This is a deep, well-drained soil that overlies hornblende gneiss and hornblende schist.

The surface layer is dark reddish-brown to reddish-brown, friable sandy clay loam 2 to 6 inches thick. The subsoil is exposed in a few small- and medium-sized areas and consists of dark-red, firm clay. Some areas are rilled, and there are a few shallow gullies.

Included in areas mapped as this soil are patches that have a sandy loam or clay loam surface layer. Also included are patches with slopes that range from 6 to 10 percent. Other inclusions in the northern and northwestern parts of the county are small areas of Cecil soils and of Appling soils, and in the southern part are small areas of Mecklenburg and of Cataula soils. These included areas make up less than 11 percent of this mapping unit.

In most places the plow layer is easily kept in good tilth. It can be worked within a medium range of moisture content without clodding, but tilth is generally poor in areas where the subsoil material is exposed. Tillage extends into the subsoil in most places. This soil is low in organic-matter content and moderate in natural fertility. Crops on it respond to added fertilizer and lime. Water enters and passes through this soil at a moderate rate, and available water capacity is medium.

Most of this soil is in cultivated crops, peach orchards, or pasture. Yields of all crops commonly grown in the county are favorable. Erosion is the chief hazard to management. (Capability unit IIe-1; woodland suitability group 3; wildlife suitability group 1)

Davidson sandy clay loam, 6 to 10 percent slopes, eroded (DsC2).—This is a deep, well-drained soil that overlies hornblende gneiss and hornblende schist.

The surface layer is dark-brown, very friable sandy clay loam 2 to 5 inches thick. The subsoil is exposed in a few small areas and consists of dark-red, firm clay.

Included in areas mapped as this soil are a few patches with slopes ranging from 2 to 6 percent and a few with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Cecil soils and, in the northwestern part of the county, small areas of Appling soils. Inclusions in the southern part of the county are small areas of Mecklenburg soils and of Cataula soils. These included areas make up less than 10 percent of this mapping unit.

The plow layer is easily kept in good tilth, and it can be worked through a medium range of moisture content without clodding. Tillage extends into the subsoil. This soil is low in content of organic matter and moderate in natural fertility. Its response to added lime and fertilizer is good. Water enters and passes through this soil at a moderate rate, and the available water capacity is medium.

Most of this soil is in cultivated crops. Yields of all crops commonly grown in the county are favorable. Erosion is the chief hazard to management. (Capability unit IIIe-1; woodland suitability group 4; wildlife suitability group 1)

Davidson sandy clay loam, 10 to 15 percent slopes, eroded (DsD2).—This is a deep, well-drained soil that overlies hornblende gneiss and hornblende schist.

The surface layer is dark reddish-brown to reddish-brown, friable sandy clay loam 2 to 5 inches thick. The subsoil is exposed in a few small- and medium-sized areas and consists of dark-red, firm clay. Rills are common, and there are a few shallow gullies.

Included in areas mapped as this soil are patches that have a sandy loam or clay loam surface layer. Also included are a few small areas with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Cecil soils and, in the northwestern and northern parts of the county, small areas of Musella soils. Included in the southern part of the county are small areas of Cataula

soils. These included areas make up less than 11 percent of this mapping unit.

The plow layer can be kept in good tilth fairly easily, though it can be worked without clodding through only a narrow range of moisture content. Tillage extends into the subsoil. This soil is low in organic-matter content and natural fertility, but crops on it respond well to added lime and fertilizer. Water enters this soil at a moderately slow rate and passes through it at a moderate rate. Runoff is rapid, and the available water capacity is medium.

Most of the acreage is in forest, pasture, and peach orchards (fig. 3). Under good management, pasture and peach orchards produce average yields. Erosion is the chief hazard to management. (Capability unit IVe-1; woodland suitability group 4; wildlife suitability group 2)

Durham Series

The soils of the Durham series are deep and moderately well drained. These soils formed in material that weathered from granite and gneiss. Depth to hard rock is more than 15 feet.

Typical profile in an idle field, three-fourths of a mile southeast of Abney Church near State Route 101, on a southeast-facing slope of 3 percent:

Ap—0 to 5 inches, brown (10YR 5/3) loamy sand; weak, fine, granular structure; very friable; many fine and medium roots; pH 7.4; clear, smooth boundary.

A2—5 to 9 inches, grayish-brown (2.5Y 5/2) loamy sand; weak, fine, granular structure; very friable; many fine and medium roots; pH 7.1; clear, smooth boundary.

B1t—9 to 18 inches, olive-yellow (2.5Y 6/6) sandy clay loam; weak, medium, subangular blocky structure; friable when moist, slightly sticky when wet; common fine and medium roots; thin patchy clay films; pH 5.7; clear, smooth boundary.

B21t—18 to 24 inches, olive-yellow (2.5Y 6/6) sandy clay to clay; mottled with yellowish brown; moderate, medium, blocky structure; firm when moist, sticky when wet, hard when dry; few medium roots; patchy clay films; pH 5.7; clear, smooth boundary.

B22t—24 to 32 inches, brownish-yellow (10YR 6/6) clay; common, medium, distinct mottles of light red; strong, coarse, blocky structure; firm to very firm; sticky when wet, hard when dry; few medium roots; continuous clay films on ped faces; pH 5.6; clear, smooth boundary.

Figure 3.—**Fescue makes good pasture on Davidson sandy clay loam, 10 to 15 percent slopes, eroded.**

B3—32 to 47 inches, light yellowish-brown (2.5Y 6/4) sandy clay loam; common, medium, distinct mottles of yellowish brown, pale red, and gray; moderate, medium, blocky structure; friable; sticky when wet, hard when dry; pH 5.2; clear, wavy boundary.

Cg—47 to 60 inches, light-gray (10YR 7/1) sandy loam; common, medium, faint mottles of olive yellow; massive; friable; pH 5.1.

The surface layer is brown to grayish brown. The B1t horizon is olive-yellow to yellowish-brown sandy clay loam. The B2t and B3 horizons are olive-yellow, brownish-yellow, and yellowish-brown sandy clay to clay mottled with light red, pale red, and gray. Combined, the B2t and B3 horizons range from 18 to 32 inches in thickness. The C horizon is generally gleyed and is light gray mottled with olive yellow. In some places gleying occurs at a depth of 32 to 40 inches.

The Durham soils occur with the Appling, Vance, and Worsham soils. The Durham soils have a sandier surface layer and sandier B horizon than the Appling soils. Unlike the Vance soils, Durham soils do not have a very firm subsoil. The Durham soils are better drained than Worsham soils and are in higher positions.

The Durham soils are low in natural fertility and in content of organic matter. Infiltration is rapid, and permeability is moderately slow. The available water capacity is medium to low. Response to liberal fertilization is good.

The Durham soils occur at the head of drainageways and on saddles of ridges between drainageways. The native trees were oak, hickory, and pine, and the understory consisted of vines, briers, and native grasses. Most areas of Durham soils are in pasture or forest.

Durham loamy sand, 2 to 6 percent slopes (DvB).—This is a deep, moderately well drained soil that overlies granite and gneiss. It occurs near the heads of drainageways and in the saddles of the ridges between drainageways.

The surface layer is dark grayish-brown to light yellowish-brown, very friable loamy sand 5 to 14 inches thick. The subsoil is mottled brownish-yellow, yellowish-brown, light-red, pale-red, and gray, friable sandy clay loam to clay loam.

Included in areas mapped as this soil are patches that have a sandy loam surface layer. Also included are patches of Appling and of Vance soils. These included areas make up less than 8 percent of this mapping unit.

The plow layer is easily kept in good tilth. It can be worked without clodding through a wide range of moisture content. Germination is impeded early in spring because the soil warms slowly. Organic-matter content and natural fertility are low. Water enters this soil at a moderately rapid rate and passes through it at a moderately slow rate. Available water capacity is medium.

Most of this soil is in pasture or cultivated crops. Corn, small grain, and some truck crops are suited, but only fair yields can be expected. In managing this soil the main concerns are raising the low fertility, reducing the leaching of plant nutrients, and delaying spring planting. (Capability unit IIe–2; woodland suitability group 3; wildlife suitability group 1)

Enon Series

The soils of the Enon series are deep and well drained to moderately well drained. These soils formed in material weathered from granite and gneiss containing intrusions of diorite, hornblende, and gabbro. Depth to hard rock is more than 5 feet.

Typical profile in an abandoned field reverting to pine trees, 5 miles southeast of Mount Pleasant Church, on a slope of 5 percent on a long, narrow, west-facing ridge:

Ap—0 to 6 inches, dark yellowish-brown (10YR 4/4) sandy loam; weak, fine, granular structure; very friable; few quartz pebbles on surface; many small and medium roots; pH 5.3; abrupt, smooth boundary.

B21t—6 to 23 inches, yellowish-brown (10YR 5/8) clay; few, fine, faint, reddish-yellow and few, medium, distinct, yellowish-red mottles; strong, medium, blocky structure; very firm when moist, slightly plastic when wet, hard when dry; few medium roots; thin, continuous clay films; pH 5.2; gradual, smooth boundary.

B22t—23 to 29 inches, strong-brown (7.5YR 5/8) clay; common, medium, distinct, yellowish-brown and few, fine, faint, very pale brown mottles; strong, coarse, blocky structure; very firm when moist, hard when dry, slightly plastic when wet; continuous, distinct clay films; pH 5.4; clear, smooth boundary.

B23t—29 to 34 inches, strong-brown (7.5YR 5/8) clay; common, fine, faint, yellowish-brown and pale-brown mottles; moderate, coarse, blocky structure; firm when moist, slightly plastic when wet, hard when dry; thin, patchy clay films; pH 5.5; clear, wavy boundary.

B3—34 to 42 inches, strong-brown (7.5YR 5/8) sandy clay loam; few, fine, distinct, yellow and few, fine, faint, pale-brown mottles; moderate, medium, blocky structure; friable to firm; few fragments of partly weathered gneiss and a few small quartz pebbles; pH 5.6.

The surface layer is sandy loam. In a few places this layer contains quartz pebbles and some concretions. This layer is very dark yellowish brown to yellowish brown and 2 to 8 inches thick. The subsoil is yellowish-brown to strong-brown, slightly plastic clay mottled with reddish yellow, yellowish red, yellowish brown, and very pale brown. This layer is generally 20 to 40 inches thick, but in the more strongly sloping soils it is 18 to 34 inches.

The Enon soils occur with the Cecil, Davidson, Cataula, Mecklenburg, Iredell, and Wilkes soils. The Enon soils have a less red, more plastic subsoil than the Cecil, Davidson, and Cataula soils. In contrast with the Mecklenburg soils, the Enon soils are influenced less by basic rocks, have a browner subsoil, and are more plastic. They are better drained than Iredell soils and are less plastic. The Enon soils have better developed, more distinct horizons than the Wilkes soils.

The Enon soils are low in natural fertility and in content of organic matter. Infiltration is moderately rapid in uneroded areas and moderate in eroded areas. Permeability is moderately slow, and available water capacity is medium. The root zone is moderately deep to deep.

Most areas of Enon soils are in the southeastern part of the county. The native trees were oak, gum, elm, redcedar, and pine, and the understory was briers, vines, and native grasses. Much of the acreage has been cultivated, chiefly to cotton, but it is now idle and is gradually reverting to pines.

Enon sandy loam, 2 to 6 percent slopes, eroded (EnB2).—This is a deep, moderately well drained to well drained, slightly plastic soil that overlies mixed acid and basic rocks

The surface layer is dark yellowish-brown to yellowish-brown, very friable sandy loam 2 to 5 inches thick. The subsoil is yellowish-brown to strong-brown, firm clay mottled with reddish yellow and pale brown

Included in areas mapped as this soil are patches that have a loamy sand surface layer. Also included are small

areas with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Iredell soils and of Wilkes soils. These included areas make up less than 7 percent of this mapping unit.

The plow layer can be kept in good tilth fairly easily, and it can be worked within a medium to narrow range of moisture content without clodding. Tillage extends into the subsoil. This soil is low in content of organic matter and natural fertility, but crops on it respond well to added lime and fertilizer. Water enters this soil at a moderate rate and passes through it at a moderately slow rate. The available water capacity is medium.

Most of the acreage is in forest and pasture. Corn, small grain, and pasture plants produce average yields. In managing this soil the main concerns are controlling erosion, compensating for the restricted root zone, and raising the low fertility. (Capability unit IIe–3; woodland suitability group 10; wildlife suitability group 4)

Enon sandy loam, 6 to 10 percent slopes, eroded (EnC2).—This is a deep, moderately well drained to well drained soil that overlies mixed acidic and basic rocks.

The surface layer is dark yellowish-brown to yellowish-brown, very friable sandy loam 2 to 5 inches thick. The subsoil is yellowish-brown to strong-brown, firm clay mottled with reddish yellow and pale brown.

Included in areas mapped as this soil are patches that have a loamy sand surface layer. Also included are small areas with slopes ranging from 2 to 6 percent and some with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Cataula soils and of Wilkes soils. The included areas make up less than 11 percent of this mapping unit.

The plow layer can be kept in good tilth fairly easily, and it can be worked within a medium range of moisture content without clodding. Tillage extends into the subsoil. This soil is low in content of organic matter and natural fertility, and its response to added lime and fertilizer is good. Runoff is moderately rapid, and further erosion is likely. Water enters this soil at a moderate rate and passes through it at a moderately slow rate. The available water capacity is medium.

Most of the acreage is in forest. Corn, small grain, and pasture plants produce average yields. In managing this soil the main concerns are controlling erosion, compensating for the restricted root zone, and raising the low fertility. (Capability unit IIIe–3; woodland suitability group 10; wildlife suitability group 4)

Enon sandy loam, 10 to 15 percent slopes, eroded (EnD2).—This is a deep, moderately well drained to well drained soil that formed in material weathered from mixed acidic and basic rocks.

The surface layer is dark yellowish-brown to yellowish-brown, very friable sandy loam 1 to 4 inches thick. The subsoil is yellowish-brown to strong-brown, firm clay mottled with reddish yellow and pale brown. Rills and shallow gullies are common.

Included in areas mapped as this soil are patches that have a loamy sand surface layer. Also included are small areas with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Cataula soils and of Wilkes soils. These included areas make up less than 7 percent of this mapping unit.

This soil is low in organic-matter content and natural fertility, but crops on it respond well to added fertilizer. Runoff is rapid, and further erosion is likely. Water enters this soil at a moderate rate and passes through it at a moderately slow rate. The available water capacity is medium to low.

Most of the acreage is in forest. Pasture grasses and legumes produce only fair yields. In managing this soil the main concerns are controlling erosion, compensating for the restricted root zone, and raising the low fertility. (Capability unit IVe-2; woodland suitability group 10; wildlife suitability group 4)

Hayesville Series

The soils of the Hayesville series are moderately deep and well drained. They occur in gently sloping to steep areas, where they are formed in material that weathered from mica gneiss and mica schist. Depth to hard rock is more than 5 feet.

Typical profile in a hardwood forest, about 3 miles northwest of Landrum and 200 yards from the North Carolina State line, on an east-facing slope of 8 percent:

A1—0 to 4 inches, yellowish-brown (10YR 5/4) sandy loam; weak, fine, granular structure; very friable; many fine and medium roots; few fine pebbles of quartz and few fine mica flakes; pH 5.5; clear, smooth boundary.

A2—4 to 8 inches, yellowish-brown (10YR 5/8) sandy loam; weak, fine to medium, granular structure; very friable; many fine and medium roots; few fine pebbles of quartz and few fine mica flakes; pH 5.5; clear, wavy boundary.

A3—8 to 12 inches, strong-brown (7.5YR 5/8) sandy loam; weak, fine, subangular blocky structure; friable to very friable; common fine and medium roots; few fine mica flakes; pH 5.7; clear, smooth boundary.

B21t—12 to 18 inches, yellowish-red (5YR 5/8) sandy clay loam; moderate, medium, subangular blocky structure; friable; few medium roots; common fine mica flakes; patchy clay films; pH 5.5; clear, smooth boundary.

B22t—18 to 33 inches, red (2.5YR 4/8) sandy clay loam; moderate, medium, subangular blocky structure; friable; few medium roots; few quartz pebbles and common fine mica flakes; patchy clay films; pH 5.1; clear, smooth boundary.

B3—33 to 35 inches, strong-brown (7.5YR 5/8) light sandy clay loam; many, medium, distinct mottles of reddish yellow; weak, coarse, subangular blocky structure; friable; many fine mica flakes; pH 5.2; clear, wavy boundary.

C—35 to 44 inches, red (2.5YR 4/8) sandy clay loam weathered from mica gneiss; common, medium, distinct mottles of yellowish red and few, fine, faint mottles of reddish yellow and yellow; pH 5.2.

The surface layer typically is yellowish-brown loamy sand 6 to 14 inches thick. In some wooded areas, however, the surface layer is dark gray to dark brown. The B21t horizon is yellowish-red to light-red, friable sandy clay loam. The B22t horizon is red, friable to firm sandy clay loam to clay. The solum is 20 to 38 inches thick. The C horizon is weathered mica gneiss or mica schist that has variable color.

The Hayesville soils occur with the Cecil soils. Their subsoil is not so firm nor so clayey as that in the Cecil soils, and they are at higher elevations.

The Hayesville soils are low in natural fertility and in content of organic matter. Infiltration and permeability are moderately rapid, and the available water capacity is medium to low. These soils have a moderately deep root zone.

The native trees were oak, sourwood, hickory, and pine, and there was an understory of briers, vines, and native grasses.

Most of the acreage of Hayesville soils has never been cleared for crops because the slopes are steep. These soils are well suited to mixed forest, but erosion is a severe hazard in cultivated areas.

Hayesville sandy loam, 6 to 15 percent slopes (HaD).—This is a moderately deep, well-drained soil that formed in material weathered from mica schist and mica gneiss.

The surface layer is yellowish-brown, very friable sandy loam 6 to 12 inches thick. The subsoil is yellowish-red to red, friable sandy clay loam to sandy clay.

Included in areas mapped as this soil are patches that have a gravelly sandy loam surface layer. Also included are a few small areas with slopes ranging from 2 to 6 percent and a few with slopes ranging from 15 to 25 percent. Other inclusions are small areas of Cecil soils. These included areas make up less than 7 percent of this mapping unit.

The plow layer is easily kept in good tilth, and it can be worked through a wide range of moisture content without clodding. This soil is low in content of organic matter and in natural fertility, but crops on it respond well to added lime and fertilizer. Water enters and passes through this soil at a moderately rapid rate, and the available water capacity is medium to low.

Most of this soil is in hardwood forest. Corn, small grain, peach trees, and apple trees grow well. Erosion and fire are the main hazards to management. (Capability unit IVe–1; woodland suitability group 4; wildlife suitability group 1)

Hayesville sandy loam, 15 to 25 percent slopes (HaE).—This is a moderately deep, well-drained soil that formed in material weathered from mica schist and mica gneiss.

The surface layer is yellowish-brown, very friable sandy loam 6 to 12 inches thick. The subsoil is yellowish-red to red, friable sandy clay loam to sandy clay.

Included in areas mapped as this soil are patches that have a gravelly sandy loam surface layer. Also included are a few small areas with slopes ranging from 10 to 15 percent and a few with slopes ranging from 25 to 40 percent. Other inclusions are small areas of Cecil soils. These included areas make up less than 5 percent of this mapping unit.

This soil is low in content of organic matter and in natural fertility. Runoff is rapid. Water enters and passes through this soil at a moderately rapid rate. The available water capacity is medium to low.

Because it is steeply sloping, this soil is not suited to cultivated crops. Most of the acreage is in hardwood forest. Erosion and fire are hazards to management. (Capability unit VIe–1; woodland suitability group 5; wildlife suitability group 2)

Hayesville sandy loam, 25 to 40 percent slopes (HaF).—This is a moderately deep, well-drained soil that formed in material weathered from mica schist and mica gneiss.

The surface layer is yellowish-brown, very friable sandy loam 6 to 12 inches thick. The subsoil is yellowish-red to red, friable sandy clay loam.

Included in areas mapped as this soil are patches that have a gravelly sandy loam surface layer and a few small areas where rock crops out. Also included are a few small areas with slopes ranging from 15 to 25 percent. Other inclusions are small areas of Cecil soils and of Louisburg soils. These included areas make up less than 5 percent of this mapping unit.

This soil is low in organic-matter content and natural fertility. Runoff is rapid. Water enters and passes through the soil at a moderately rapid rate, and the available water capacity is low.

Most of this soil is in hardwood forest. Cultivation is not practical, because this soil is steep to very steep and runoff is rapid. Erosion is a serious hazard to management. (Capability unit VIIe–1; woodland suitability group 5; wildlife suitability group 3)

Hiwassee Series

The soils of the Hiwassee series are deep and well drained. They formed in old alluvium that washed from higher lying dark soils. Depth to hard rock is more than 10 feet.

Typical profile in a pasture, 3 miles west of Fingerville, on a northeast-facing slope of 4 percent:

Ap—0 to 6 inches, dark reddish-brown (5YR 3/4) sandy loam, weak, fine, granular structure; very friable; many fine and medium roots; few water-rounded pebbles; pH 6.5; abrupt, smooth boundary.

B21t—6 to 15 inches, dark-red (10R 3/6) clay; weak, fine subangular blocky structure; friable when moist, sticky when wet; many fine and few medium roots; few water-rounded pebbles; patchy clay films; pH 5.6; clear, smooth boundary.

B22t—15 to 29 inches, dark-red (10R 3/6) clay; few, fine, distinct mottles of brownish yellow; moderate, medium, subangular blocky structure; firm when moist, sticky when wet; few water-rounded pebbles; thin discontinuous clay films; pH 5.7; gradual, smooth boundary.

IIB23t—29 to 45 inches, weak-red (10R 4/4) clay; few, fine, distinct mottles of brownish yellow; moderate, medium, subangular blocky structure; firm when moist, sticky when wet, hard when dry; many water-rounded pebbles; thin, discontinuous clay films; pH 5.7; clear, wavy boundary.

IIIB3—45 to 53 inches, red (10R 4/6 to 4/8) loam; many, fine, distinct, brownish-yellow and few, fine, prominent, white mottles; moderate, medium, subangular blocky structure; firm; few water-rounded pebbles; fragments of gneiss and quartz; pH 5.5.

The surface layer ranges from nearly black to dark brown. The subsoil is dark-red to red clay. In places a few water-rounded pebbles are on the surface, and in some places the B3 horizon contains stones and gravel.

The Hiwassee soils occur with the Cecil, Davidson, Wickham, and Wilkes soils. They are darker red than the Cecil and formed in a different kind of material than the Davidson. They are darker red throughout the profile and are higher in content of clay than the Wickham soils. The profile of Hiwassee soils is more strongly developed than that of the Wilkes soils.

The Hiwassee soils are high in natural fertility and low in content of organic matter. Infiltration and permeability are moderate, and the available water capacity is medium. These soils have a deep root zone.

In this county, most of the acreage of Hiwassee soils, which is very small, is in the northern part of the county. The native trees were oak, hickory, dogwood, sourwood, holly, redcedar, and pine, and there was an undergrowth of brambles, shrubs, briers, vines, and native grasses. Most areas of these soils are in improved pasture. Under good management, Hiwassee soils are suited to cultivated

crops and pasture, and crops on them respond well to added lime and fertilizer.

Hiwassee sandy loam, 2 to 8 percent slopes, eroded (HwC2).—This is a deep, well-drained soil that formed in old alluvium washed from higher lying soils. Only a small acreage is mapped in Spartanburg County.

The surface layer is dark reddish-brown, very friable sandy loam 2 to 7 inches thick. The subsoil is mottled red and brownish-yellow, firm clay. It is exposed in small- and medium-sized spots where erosion is severe.

Included in areas mapped as this soil are patches that have a sandy clay loam or clay loam surface layer. Also included are a few small areas with slopes ranging from 8 to 10 percent. Other inclusions are small areas of Cecil soils. These included areas make up less than 5 percent of this mapping unit.

Tillage extends into the clayey subsoil in most places and mixes clay with the sandy loam surface layer. As a result, this layer is sticky, and good tilth is fairly difficult to maintain. Germination is impeded in galled areas. This soil is low in content of organic matter and high in natural fertility. Crops respond well to added lime and fertilizer. Water enters and passes through this soil at a moderate rate, and the available water capacity is medium.

Most areas of this soil are in cultivated crops or pasture. Corn, small grain, and pasture plants grow well. Erosion is the chief hazard to management. (Capability unit IIIe–1; woodland suitability group 3; wildlife suitability group 1)

Iredell Series

The Iredell series consists of moderately deep soils that are moderately well drained to somewhat poorly drained. These soils formed in material that weathered from diorite, gabbro, and hornblende gneiss. Depth to hard rock is more than three feet.

Typical profile in a field, 4.5 miles northeast of Cross Anchor near State Route 56, on an east-facing slope of 3 percent:

Ap—0 to 6 inches, brown (10YR 5/3) fine sandy loam; weak, fine, granular structure; very friable; abundant fine roots; few dark concretions; pH 5.9; abrupt, smooth boundary.

B21t—6 to 16 inches, yellowish-brown (10YR 5/8) clay; few, fine, faint mottles of pale brown; strong, coarse, blocky structure; hard when dry, very firm when moist, and plastic to very sticky when wet; discontinuous clay films on ped faces; few fine roots; few dark concretions; pH 5.8; clear, smooth boundary.

B22t—16 to 23 inches, yellowish-brown (10YR 5/8) clay; common, medium, distinct mottles of pale brown; strong, medium to fine, blocky structure; hard when dry, very firm when moist, very plastic when wet; thick continuous clay films; many dark concretions; pH 5.9; abrupt, smooth boundary.

B3—23 to 26 inches, yellowish-brown (10YR 5/8) loam; common, medium, prominent mottles of gray; moderate, medium, blocky structure; firm; abundant dark concretions; pH 5.8; clear, wavy boundary.

C—26 to 33 inches, pale-brown (10YR 6/3) fine sandy loam; common, medium, distinct mottles of white and common, medium, distinct mottles of olive; massive; pH 5.9.

The fine sandy loam surface layer ranges from grayish brown to light brown. A few fragments of diorite 12 to 18 inches across are widely scattered on the surface. In most places dark concretions are also on the surface, and they occur throughout the profile in many places. The B2t horizon is yellowish-brown, very firm, plastic clay mottled with pale brown. The C horizon is variable in color and contains fragments of partly weathered basic rock.

The Iredell soils occur with the Mecklenburg, Enon, and Wilkes soils. The Iredell soils have a thinner solum than Mecklenburg and Enon soils and a more plastic and less permeable subsoil. They have a thicker solum and more distinct horizons than the Wilkes soils.

The Iredell soils are low in natural fertility and in content of organic matter. Infiltration is moderate, and permeability is very slow. The available water capacity is high.

The Iredell soils are mainly in the southeastern part of the county. The native trees were oak, redcedar, and hickory, and there was an undergrowth of native grasses and shrubs. The Iredell soils are suited to cultivated crops, but good management is needed. Most of the acreage is idle or is in improved pasture.

Iredell fine sandy loam, 2 to 6 percent slopes (IdB).—This is a moderately deep, moderately well drained to somewhat poorly drained soil that formed in material weathered from diorite, gabbro, and hornblende gneiss.

The surface layer is brown, very friable fine sandy loam 5 to 8 inches thick. The subsoil is mottled yellowish-brown and pale-brown, very firm plastic clay. Locally this soil is called blackjack land.

Included in areas mapped as this soil are patches that have a loam or sandy loam surface layer. Also included are a few small areas with slopes ranging from 0 to 2 percent. Other inclusions are small areas of Mecklenburg soils, small areas of Enon soils, and small areas of Wilkes soils. The included areas make up less than 9 percent of this mapping unit.

The plow layer is not easily kept in good tilth, and it can be worked without clodding only through a narrow range of moisture content. This soil is low in organic-matter content and natural fertility, but crops on it respond well to added fertilizer, especially potassium. Water enters this soil at a moderate rate and passes through it at a very slow rate. The available water capacity is high.

Most of this soil is in cultivated crops or pasture. Corn, oats, and pasture plants grow well. In managing this soil the main concerns are improving tilth and controlling erosion. (Capability unit IIe–4; woodland suitability group 8; wildlife suitability group 4)

Local Alluvial Land

This land consists of deep, moderately well drained to well drained materials that washed or sloughed from adjacent uplands and was deposited in nearly level depressions and along shallow drainageways. This material contains a moderate amount of organic matter and plant nutrients. Infiltration is moderate to rapid, and permeability is moderate. The moisture content is favorable for crops throughout the growing season, and good tilth is easily maintained. The original cover of this land was chiefly hardwoods, and the understory consisted of native grasses, briers, and vines.

Local alluvial land (La).—This land has slopes of 0 to 2 percent. It consists of deep, moderately well drained to well drained soil materials that washed or sloughed from adjacent uplands and were deposited in depressions and

along poorly defined drainageways. It occurs throughout the county mainly in areas of 2 acres or less. Patches of the adjacent soils were included in mapping, but they make up less than 10 percent of the unit.

This land has a dark grayish-brown to red, very friable to friable loamy sand to clay loam surface layer 12 to 36 inches thick. The subsurface material ranges from gray to red and from yellow to brown in color and from gravelly loamy sand to clay in texture. Quartz gravel, cobblestones, and rock fragments are common. Depth to hard rock is more than 15 feet.

The plow layer is easily kept in good tilth, but clodding or crusting occurs where water puddles and stands. This land has a moderate amount of organic matter and moderate natural fertility. Crops respond to added lime and fertilizer. Water penetrates the surface at a moderately rapid rate and passes through the soil material at a moderate rate. The available water capacity is medium.

Most of this land is used for crops, but small areas near homes are used for gardens. Under good management, cultivated crops produce above-average yields. Good tilth and moisture capacity make this land suitable for intensive use. Yields of truck crops, corn, and small grain are favorable. Flooding and siltation caused by runoff from surrounding higher areas are the chief hazards to management. (Capability unit I–1; woodland suitability group 1; wildlife suitability group 6)

Lockhart Series

The soils of the Lockhart series are moderately deep and well drained. They formed in material that weathered from porphyritic granite. Depth to hard rock is more than 10 feet.

Typical profile in an improved pasture, 5 miles southwest of Pauline, on a slope of 4 percent facing southeast:

Ap—0 to 8 inches, yellowish-brown (10YR 5/6) sandy loam; weak, fine, granular structure; very friable; few fragments of feldspar; common coarse grains of sand or fine clear crystals of quartz; common fine roots; pH 5.9; abrupt, smooth boundary.

A2—8 to 11 inches, yellow (10YR 7/8) sandy loam; weak, fine, granular structure; very friable; few to common fragments of feldspar; few coarse grains of sand; common fine roots; pH 5.8; clear, smooth boundary.

B1—11 to 16 inches, red (2.5YR 5/8) sandy clay loam; weak, medium, subangular blocky structure; very friable; common fragments of feldspar; few coarse grains of sand; common quartz pebbles; pH 5.6; clear, smooth boundary.

B2t—16 to 27 inches, red (2.5YR 4/8) clay; moderate, fine, subangular blocky structure; friable to firm; common fragments of feldspar; few coarse grains of sand; patchy clay films; pH 6.0; clear, smooth boundary.

B3—27 to 39 inches, red (2.5YR 4/8) sandy clay loam; moderate, medium, subangular blocky structure; friable; many fragments of feldspar; few coarse grains of sand; pH 5.6; clear, wavy boundary.

C—39 to 72 inches, red (2.5YR 5/6) sandy clay loam; common, medium, prominent mottles of pink; structureless; many fragments of feldspar; common fine mica; common coarse grains of sand and fine crystals of quartz; fragments of partly weathered, coarse-grained granite; pH 5.5.

The solum of Lockhart soils ranges from 18 to 42 inches in thickness and is generally thicker on ridge crests than on side slopes. The surface layer is sandy loam. The B2t horizon is red to yellowish-red clay to clay loam 10 to 20 inches thick. In most places patchy clay films are in the B2t horizon. The B1 and B3 horizons are red or yellowish-red sandy clay loam. The C horizon is a thick layer of saprolite, which has thoroughly weathered from granite.

The Lockhart soils occur with the Appling, Cecil, Cataula, and Louisburg soils. They contain more fragments of feldspar than the Appling, Cecil, or Cataula soils. The Lockhart soils are coarser textured than the Cecil soils and have a thinner, less developed subsoil. Their subsoil is not so firm as that of Cataula soils. The Lockhart soils have a thicker solum and more distinct horizons than Louisburg soils.

The Lockhart soils are low in natural fertility and in content of organic matter. Infiltration is moderately rapid and permeability is moderate. The available water capacity is medium to low. The Lockhart soils have a deep root zone.

The Lockhart soils are mainly in the southeastern part of the county. The native trees were mixed oak and pine, and there was an understory of vines, briers, and shrubs. Most of the acreage has been cleared and cultivated, chiefly to cotton, but now it is in pine forest. The Lockhart soils are suitable for cultivation, and crops on them respond to good management. The thick, friable saprolite erodes readily, and deep gullies are likely to form in places where water collects and runoff is rapid.

Lockhart sandy loam, 4 to 10 percent slopes, eroded (LcC2).—This is a moderately deep, well-drained soil that overlies coarse-grained granite. It occurs on gently sloping to sloping ridges and side slopes in the southeastern part of the county.

The surface layer is brown, yellowish-brown, or yellow, very friable sandy loam 3 to 7 inches thick. The subsoil is exposed in many small-sized and a few medium-sized areas. It is red, friable clay. Rills and galled areas are common, and there are a few shallow gullies.

Included in areas mapped as this soil are patches that have a gravelly sandy loam, loamy sand, or sandy clay loam surface layer. Also included are patches of Cecil soils and small areas of Cataula soils. These included areas make up less than 10 percent of this mapping unit.

The plow layer is easily kept in good tilth, and it can be worked without crusting through a medium range of moisture content. Tillage extends into the subsoil. This soil is low in organic-matter content and natural fertility. Water enters and passes through it at a moderate to moderately rapid rate, and its available water capacity is medium to low.

Most of this soil is in pine forest. All crops common in the county produce only fair yields. In managing this soil the main concerns are controlling erosion, raising the low fertility, reducing the leaching of plant nutrients, and increasing the water available to plants. (Capability unit IIIe–2; woodland suitability group 4; wildlife suitability group 1)

Louisa Series

The Louisa series consists of well-drained soils that contain many flakes of mica throughout the profile. These soils formed in material that weathered from mica gneiss and mica schist. Depth to hard rock is more than 15 feet in most places.

Typical profile in a cultivated field, 4 miles south of Moore, on an east-facing slope of 8 percent:

Ap—0 to 6 inches, dark-brown (10YR 4/3) sandy loam; weak, fine, granular structure; very friable; common flakes of mica; pH 5.7; abrupt, smooth boundary.

Bt—6 to 14 inches, red (2.5YR 4/6) sandy clay; weak, medium, subangular blocky structure; friable; many flakes of mica; thin, patchy clay films; pH 5.5; clear, wavy boundary.

C—14 to 24 inches +, yellowish-red (5YR 5/8) sandy clay loam and weathered micaceous gneiss; few, fine, distinct mottles of red; massive; many fine flakes of mica; few fragments of partly weathered rock and few small quartz pebbles; pH 5.6.

The solum of the Louisa soils ranges from 10 to 20 inches in thickness. The surface layer is sandy loam. The B2t horizon ranges from 0 to 10 inches in thickness and is weakly developed and discontinuous. It is generally sandy clay loam in texture and red to yellowish red in color. The C horizon is a thick layer of saprolite.

The Louisa soils occur with the Cecil, Madison, and Pacolet soils and contain more mica throughout their profile. Also, Louisa soils are not so well developed as the Cecil, Madison, and Pacolet soils.

The Louisa soils are low in natural fertility and in content of organic matter. Infiltration and permeability are moderately rapid. The available moisture capacity is low. The root zone is shallow because roots do not penetrate the C horizon readily.

In this county most of the acreage of Louisa soils is in the southern part. The native trees were oak and pine, and there was an understory of vines, briers, and shrubs. Under good management, these soils produce only fair yields. Most of the acreage is now in pine forest. The thick saprolite erodes readily, and deep gullies are likely to form in places where water collects and runoff is rapid.

Louisa sandy loam, 6 to 10 percent slopes, eroded (LoC2).—This well-drained soil overlies weathered mica gneiss and mica schist and has a shallow root zone.

The surface layer is dark-brown to brown, very friable sandy loam 2 to 5 inches thick. The subsoil is red, friable sandy clay and has been exposed by erosion in small- and medium-sized areas. Rills, galled areas, and shallow gullies are common.

Included in areas mapped as this soil are patches that have a sandy clay loam or clay loam surface layer. Also included are a few small areas with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Madison soils and small areas of Cecil soils. These included areas make up less than 7 percent of this mapping unit.

In most places the plow layer is fairly easily kept in good tilth and it can be worked without clodding through a medium range of moisture content. Tilth is generally poor in areas where the subsoil is exposed. Tillage extends into the subsoil. The content of organic matter and natural fertility are low. Water enters and passes through this soil at a moderately rapid rate. The available water capacity is low.

Most of this soil is in pine forest. Crops commonly grown in the county produce only fair yields. In managing this soil the main concerns are controlling erosion, raising the low fertility, and compensating for the leaching of plant nutrients. (Capability unit IVe–3; woodland suitability group 11; wildlife suitability group 5)

Louisa sandy loam, 10 to 15 percent slopes, eroded (LoD2).—This well-drained soil overlies weathered mica gneiss and mica schist and has a shallow root zone.

The surface layer is red, very friable sandy loam 2 to 5 inches thick. The subsoil, which is exposed in most places, is red, friable sandy clay. Rills and shallow gullies are common, and there are a few moderately deep gullies.

Included in areas mapped as this soil are patches that have a sandy clay loam or clay loam surface layer. Also included are a few small areas with slopes ranging from 6 to 10 percent and a few with slopes ranging from 15 to 25 percent. Other inclusions are small areas of Madison soils and of Cecil soils. These included areas make up less than 10 percent of this mapping unit.

Because this soil is strongly sloping and erosion is likely, cultivation is not practical. The organic-matter content and natural fertility are low. Water enters and passes through this soil at a moderately rapid rate. The available water capacity is low.

Most of this soil is in pine forest. Cleared areas are gullied readily. In managing this soil the main concerns are controlling erosion, increasing the water available to plants, and raising the low fertility. (Capability unit VIe–2; woodland suitability group 11; wildlife suitability group 5)

Louisa sandy loam, 15 to 25 percent slopes, eroded (LoE2).—This well-drained soil overlies weathered mica gneiss and mica schist and has a shallow root zone.

The surface layer is red, very friable sandy loam 2 to 5 inches thick. The subsoil is red, friable sandy clay. Erosion has exposed the subsoil in small- and medium-sized areas. Rills, galled areas, and shallow gullies are common.

Included in areas mapped as this soil are patches that have a sandy clay loam or clay loam surface layer. Also included are a few small areas with slopes ranging from 10 to 15 percent and a few with slopes of more than 25 percent. Other inclusions are small areas of Madison soils. These included areas make up less than 6 percent of this mapping unit.

Because this soil is moderately steep and the hazard of erosion is great, cultivation is not practical. The content of organic matter and natural fertility are very low. Water enters and passes through this soil at a moderately rapid rate. The available water capacity is low.

Most of this soil is in forest consisting of mixed hardwoods and pines. Erosion is the main hazard to management. (Capability unit VIIe–2; woodland suitability group 11; wildlife suitability group 5)

Louisburg Series

The soils of the Louisburg series are shallow and well drained to excessively drained. They have formed in material that weathered from granite and gneiss. In most places depth to hard rock is more than 4 feet.

Typical profile in a pasture, 1 mile south of Pacolet, on an east-facing slope of 8 percent:

Ap—0 to 8 inches, olive (5Y 5/3) loamy sand; weak, fine, granular structure; very friable; abundant small roots; few quartz pebbles and coarse grains of sand; pH 5.9; abrupt, smooth boundary.

BC—8 to 11 inches, light yellowish-brown (2.5Y 6/4) loamy sand; common, fine, distinct mottles of pale yellow; weak, fine, subangular blocky structure; very friable; many small roots; pH 5.8; clear, wavy boundary.

C—11 to 40 inches, pale-olive (5Y 6/3) fine sandy loam; few, fine, faint mottles of pale yellow; massive; fragments of weathered granite; pH 5.3.

The A horizon is loamy sand and ranges from dark grayish brown to pale olive. The B horizon is absent in most places, and the BC horizon is discontinuous. Rock

crops out on the steeper slopes. The C horizon, or saprolite, ranges in thickness from about 18 to 60 inches or more.

The Louisburg soils occur with the Cecil, Madison, and Pacolet soils. In contrast to those soils, the Louisburg soils do not have a thick solum nor distinct horizons.

The Louisburg soils are low in natural fertility and in content of organic matter. Infiltration and permeability are moderately high. The available water capacity is low. Crops on these soils respond to liberal fertilization. The root zone is shallow because roots do not penetrate the C horizon readily.

The native trees were mainly oaks, but there was an understory of vines, briers, shrubs, and native grasses.

The Louisburg soils are suited to shallow-rooted crops, and these crops respond to good management. Most of the acreage is in hardwoods of low grade.

Louisburg loamy sand, 6 to 10 percent slopes (LuC).—This excessively drained soil overlies weathered granite and gneiss and has a shallow root zone.

The surface layer is dark grayish-brown to olive, very friable loamy sand 6 to 16 inches thick. The subsoil, which is discontinuous in places, is light yellowish-brown to yellowish-red, friable loamy sand to sandy clay. The C horizon, or saprolite, varies in thickness and contains fragments of partly weathered granite or gneiss. Boulders and outcrops of rock are on the surface in a few places. In areas where the saprolite is thick, gullies form readily.

Included in areas mapped as this soil are small areas that have a sandy loam surface layer. Also included are small areas with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Cecil soils, of Madison soils, and of Appling soils. These included areas make up less than 12 percent of this mapping unit.

The plow layer easily can be kept in good tilth and can be worked without clodding through a wide range of moisture content. This soil is low in natural fertility and content of organic matter. Water enters and passes through this soil at a moderately rapid rate. The available water capacity is low.

Most of this soil is in hardwoods of low grade. Under good management, shallow-rooted grasses and legumes grow fairly well. In managing this soil practices are needed to lessen the effects of droughtiness, a shallow root zone, leaching of plant nutrients, low fertility, and erosion. (Capability unit IVe–3; woodland suitability group 11; wildlife suitability group 5)

Louisburg loamy sand, 10 to 15 percent slopes (LuD).—This excessively drained soil overlies weathered granite or gneiss and has a shallow root zone.

The surface layer is olive to dark grayish-brown, very friable loamy sand 6 to 16 inches thick. The subsoil, which is discontinuous in places, is weakly developed and is light yellowish-brown to yellowish-red sandy loam. The C horizon, or saprolite, varies in thickness and contains fragments of partly weathered granite or gneiss. Boulders and outcrops of rock are on the surface in many places.

Included in areas mapped as this soil are a few small areas that have a sandy loam surface layer. Also included are a few small areas with slopes ranging from 6 to 10 percent and a few with slopes ranging from 15 to 25 percent. Other inclusions are small areas of Cecil soils and of Madison soils. These included areas make up less than 8 percent of this mapping unit.

Because of steepness and the hazard of erosion, cultivation is not practical. The content of organic matter and natural fertility are low. Water enters and passes through this soil at a moderately rapid rate, and the available water capacity is low.

Most of this soil is in hardwoods of low grade. In managing this soil practices are needed to lessen the effects of droughtiness, a shallow root zone, leaching of plant nutrients, low fertility, and erosion. (Capability unit VIe–2; woodland suitability group 11; wildlife suitability group 5)

Louisburg loamy sand, 15 to 25 percent slopes (LuE).—This excessively drained soil overlies weathered granite and gneiss and has a shallow root zone.

The surface layer is olive to dark grayish-brown, very friable loamy sand 7 to 11 inches thick. The subsoil consists mainly of light yellowish-brown, weathered rock. A few shallow gullies and rills occur. Outcrops of rock and boulders are on the surface in many places. Depth to hard rock is more than 2 feet.

Included in areas mapped as this soil are a few patches that have slopes of less than 15 percent. Also included are small areas of Pacolet soils. These included areas make up less than 7 percent of this mapping unit.

Because slopes are steep, cultivation of this soil is not practical. Natural fertility and organic-matter content are low. Water enters and passes through this soil at a moderately rapid rate, and the available water capacity is low.

Most of this soil is in hardwoods of low grade. In managing this soil practices are needed to lessen the effects of a shallow root zone, droughtiness, and erosion. (Capability unit VIIe–2; woodland suitability group 11; wildlife suitability group 5)

Made Land

Made land consists of areas where the soil material has been so mixed by excavation, filling, or other disturbances that the original soil horizons have been destroyed. Most of these areas are along interstate highways, at airports, and at landfills near Spartanburg. They consist mainly of landfills for road construction or sanitary purposes and of borrow pits, where soil material has been excavated. Because the soil material in Made land is highly variable, sampling and testing at each site is needed so that properties significant for specified uses can be determined.

Made land (Ma).—This land type is mostly on slopes of 0 to 15 percent and is made up of areas that have recently been excavated, filled, or otherwise disturbed by man. This land consists of variable amounts of sand, silt, and clay. In this county the surface layer of Made land is grayish-brown to red, very friable sandy loam to clay loam. The subsurface material varies in color, texture, and thickness. It contains quartz pebbles, cobbles, stones, and other fragments of rock.

Included in this mapping unit are small areas of Appling, Cecil, and Davidson soils that have not been disturbed. These included areas make up less than 5 percent of this mapping unit.

This land type varies widely in organic-matter content and is low in fertility, but plants on it respond to added fertilizer and lime. Water penetrates the surface and passes through the soil material at a slow to rapid rate. The available water capacity is medium to low.

Most areas of Made land are along the interstate highways and at the Greenville-Spartanburg Regional Airport. Because soil characteristics are extremely variable and behavior is difficult to predict, investigations are needed at individual sites for determining uses. Also variable is the capability for grasses, shrubs, and trees and as wildlife habitat. Conditions to be considered in managing this land are low available water capacity, low fertility, and erosion. (Capability unit VIIe–2; woodland suitability group 14; wildlife suitability group not assigned)

Madison Series

The Madison series consists of moderately deep to deep, well-drained soils that formed in material weathered from mica schist or mica gneiss. In most places depth to hard rock is more than 10 feet.

Typical profile in an improved pasture, 3 miles northwest of Chesnee, on a slope of 5 percent on a high ridge facing northeast:

Ap—0 to 7 inches, dark-brown (10YR 4/3) sandy loam; about 10 percent is gravel consisting of pebbles ¼ to 1½ inches across; weak, fine, granular structure; very friable; pH 5.7; abrupt, smooth boundary.

B21t—7 to 11 inches, red (2.5YR 4/8) clay; moderate, medium, subangular blocky structure; friable; few fine flakes of mica; patchy clay films; pH 5.1; clear, smooth boundary.

B22t—11 to 28 inches, red (2.5YR 4/8) clay; moderate, medium, subangular blocky structure; friable to firm; discontinuous clay films on ped faces; many flakes of mica; pH 5.4; clear, smooth boundary.

B23t—28 to 36 inches, red (2.5YR 4/8) clay; moderate, medium, subangular blocky structure; friable; many fine flakes of mica and fragments of partly weathered mica schist; pH 5.6; clear, wavy boundary.

C—36 to 76 inches, red (2.5YR 4/8) sandy clay loam and partly weathered mica schist; common, medium, distinct mottles of reddish yellow and few, fine, faint mottles of light red; massive; pH 5.4

The surface layer is sandy loam or clay loam. It is clay loam where accelerated erosion has removed the original surface soil. In most places small fragments of schist and quartz are on the surface. The surface layer is dark brown to red and ranges from 1 to 8 inches in thickness. The B2t horizon is red, friable to firm clay 15 to 34 inches thick. The C horizon is variable in color and contains much fine mica.

The Madison soils occur with the Appling, Cecil, Cataula, and Louisburg soils. The Madison soils contain more mica than the Cecil soils and are not so deep to weathered underlying material. They have a redder, more uniformly colored subsoil and contain more mica than the Appling soils. Madison soils are not firm like Cataula soils, and they contain more mica. In contrast to Louisburg soils, Madison soils are more micaceous, are finer textured, and have more distinct horizons.

The Madison soils are low in natural fertility and in content of organic matter. Infiltration and permeability are moderate, and available water capacity is medium to low. Except for the thin solum variant, the Madison soils have a deep root zone.

The Madison soils are widely distributed throughout the county. The native trees were oak, hickory, and some pine, and the understory consisted of vines, briers, shrubs, and native grasses. Most of the acreage has been cleared and cultivated, except that on moderately steep slopes. All crops common in the county grow well on all the Madison soils except the thin solum variant. Crops respond to liberal applications of lime and fertilizer.

Madison clay loam, 2 to 6 percent slopes, severely eroded (McB3).—This is a moderately deep, well-drained soil that overlies weathered mica schist or mica gneiss.

The surface layer is yellowish-red to red, friable clay loam 1 to 3 inches thick. The subsoil is exposed in most places and consists of red, friable to firm clay. Shallow gullies and rills are common.

Included with this soil in mapping were small areas that have a sandy loam, gravelly sandy loam, and sandy clay loam surface layer. Also included are a few small areas that have slopes ranging from 6 to 10 percent. Other inclusions are small areas of Cecil soils and of Appling soils. These included areas make up less than 10 percent of this mapping unit.

Maintaining good tilth is difficult because the fine-textured plow layer contains much subsoil material. The content of organic matter and natural fertility are low. Water enters this soil at a slow rate and passes through it at a moderate rate. Runoff is rapid, and the available water capacity is low.

Most of the acreage has been cleared and planted to cultivated crops, chiefly cotton, but now it is mostly in pines. Crop yields are only fair. In managing this soil the main concerns are controlling erosion, improving fertility, and increasing the moisture available. (Capability unit IIIe-1; woodland suitability group 6; wildlife suitability group 3)

Madison clay loam, 6 to 10 percent slopes, severely eroded (McC3).—This is a moderately deep, well-drained soil that overlies weathered mica schist or mica gneiss.

The surface layer is yellowish-red to red, friable clay loam 1 to 3 inches thick. The subsoil is exposed in most places and is red, friable clay. Shallow gullies and rills are common.

Included in areas mapped as this soil are small areas that have a sandy loam or sandy clay loam surface layer. Also included are a few small areas with slopes ranging from 2 to 6 percent and a few with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Cecil and of Louisburg soils. These included areas make up less than 10 percent of this mapping unit.

Maintaining good tilth is difficult because the fine-textured plow layer contains much subsoil material. This soil is low in content of organic matter and in natural fertility. Water enters this soil at a slow rate and passes through it at a moderate rate. Runoff is rapid, and the available water capacity is low.

Most of the acreage has been cleared for cultivated crops, chiefly cotton, but now it is mostly in pines. Crop yields are only fair. The main concerns in managing these soils are controlling erosion, improving fertility, and increasing the amount of water available. (Capability unit IVe-1; woodland suitability group 6; wildlife suitability group 3)

Madison clay loam, 10 to 15 percent slopes, severely eroded (McD3).—This is a moderately deep, well-drained soil that overlies weathered mica schist or mica gneiss.

The surface layer is yellowish-red, friable clay loam 1 to 3 inches thick. The subsoil, which is exposed in most places, is red, friable clay. Shallow gullies and rills are common.

Included in areas mapped as this soil are small areas that have a sandy loam or sandy clay loam surface layer. Also included are a few small areas with slopes ranging from 6 to 10 percent and a few with slopes ranging from 15 to 25 percent. Other inclusions are small areas of Louisburg, of Louisa, and of Cecil soils. These included areas make up less than 11 percent of this mapping unit.

The fine-textured plow layer is not easily kept in good tilth. Tillage extends into the subsoil. The content of organic matter and natural fertility are low. Water enters this soil at a slow rate and passes through it at a moderate rate. Runoff is rapid, and the available water capacity is low.

Much of the acreage has been cleared for cultivated crops, but now it is mostly in pines. Because of the erosion hazard, rapid runoff, low fertility, and strong slopes, cultivating this soil is not practical. Erosion is the chief hazard to management, but low available water capacity and a moderately deep root zone are also important. (Capability unit VIe–1; woodland suitability group 6; wildlife suitability group 3)

Madison clay loam, 15 to 40 percent slopes, severely eroded (McF3).—This is a moderately deep, well-drained soil that overlies weathered mica schist or mica gneiss.

The surface layer is yellowish-red to red, friable clay loam 1 to 3 inches thick. The subsoil is red, friable clay.

Included in areas mapped as this soil are small areas that have a sandy loam or sandy clay loam surface layer. Also included are a few small areas with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Pacolet and of Louisburg soils. These included areas make up less than 8 percent of this mapping unit.

This moderately steep to steep, fine-textured soil is not suitable for cultivation. Organic-matter content and natural fertility are low. Runoff is rapid, and erosion is likely. Water enters this soil at a slow rate and passes through it at a moderate rate. The available water capacity is low.

Most of the acreage is in pines. Because of steepness and a severe hazard of erosion, use of this soil for crops or pasture is not practical. Erosion is the main hazard but low fertility, a shallow root zone, and droughtiness are also important. (Capability unit VIIe–1; woodland suitability group 7; wildlife suitability group 3)

Madison sandy loam, 2 to 6 percent slopes, eroded (MdB2).—This is a moderately deep to deep, well-drained soil that overlies weathered mica schist or mica gneiss. It occurs on gently sloping, narrow ridgetops, chiefly in the northeastern and eastern parts of the county.

The surface layer of this soil is dark-brown to brown, very friable sandy loam 3 to 7 inches thick. In many places this layer is a mixture of the surface soil and subsoil. The subsoil is red, friable clay, which is exposed in small- and medium-sized areas. Small rills and a few shallow gullies are common.

Included in areas mapped as this soil are small areas that have a gravelly sandy loam, loamy sand, or sandy clay loam surface layer. Also included are small areas with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Appling and of Cecil soils. These included areas make up less than 12 percent of this mapping unit.

The plow layer is easily kept in good tilth, and it can be worked without clodding through a medium range of moisture content. Tilth is poor in areas where the subsoil is exposed. Tillage extends into the subsoil in most areas. Organic-matter content and natural fertility are low. Water enters and passes through this soil at a moderate rate, and the available water capacity is medium.

Most of the acreage is in cultivated crops, peach orchards, or pasture. All crops commonly grown in the county produce good yields. Erosion is the chief hazard to management. (Capability unit IIe–1; woodland suitability group 3; wildlife suitability group 1)

Madison sandy loam, 6 to 10 percent slopes, eroded (MdC2).—This is a moderately deep to deep, well-drained soil that overlies weathered mica schist or mica gneiss. It occurs mainly on sloping, narrow ridges in the eastern part of the county.

The surface layer is dark-brown to brown, very friable sandy loam 3 to 7 inches thick. In many places this layer is a mixture of the surface soil and subsoil. The subsoil consists of red, friable clay and is exposed in small- and medium-sized areas. Small rills and a few shallow gullies occur.

Included in areas mapped as this soil are small areas that have a gravelly sandy loam or sandy clay loam surface layer. Also included are small areas with slopes ranging from 2 to 6 percent and some with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Appling, of Cecil, and of Louisburg soils. These included areas make up less than 12 percent of this mapping unit.

The plow layer is fairly easy to keep in good tilth, and it can be worked without clodding or crusting through a medium range of moisture content. Tillage extends into the subsoil. Organic-matter content and natural fertility are low. Water enters and passes through this soil at a moderate rate, and the available water capacity is medium.

Most of the acreage is used for cultivated crops, peach orchards, or pastures. All crops commonly grown in the county produce average yields. Erosion is the chief hazard to management. (Capability unit IIIe–1; woodland suitability group 4; wildlife suitability group 1)

Madison sandy loam, 10 to 15 percent slopes, eroded (MdD2).—This is a moderately deep, well-drained soil that overlies weathered mica schist or mica gneiss. It occurs on side slopes adjacent to small streams in the eastern part of the county.

The surface layer is dark-brown to brown, very friable sandy loam 3 to 7 inches thick. In many places this layer is a mixture of the surface soil and subsoil The subsoil consists of red, friable clay and is exposed in small- and medium-sized areas. Small rills and a few shallow gullies occur.

Included in areas mapped as this soil are small areas that have a gravelly sandy loam, sandy clay loam, or fine sandy loam surface layer. Also included are small areas with slopes ranging from 6 to 10 percent and some with slopes ranging from 15 to 25 percent. Other inclusions are small areas of Cecil and of Louisburg soils.

Cultivating this soil is not practical. Organic-matter content and natural fertility are low. Water enters and passes through this soil at a moderate rate, and the available water capacity is medium to low.

Most of the acreage is in hardwoods and pines. Unless management is good, crop yields are below average. In managing this soil the main concerns are controlling erosion, improving fertility, and increasing the water

available. (Capability unit IVe–1; woodland suitability group 4; wildlife suitability group 2)

Madison sandy loam, 15 to 25 percent slopes, eroded (MdE2).—This is a moderately deep, well-drained soil that overlies weathered mica schist or mica gneiss. It occurs on moderately steep side slopes adjacent to streams mainly in the northeastern part of the county.

The surface layer is dark-brown, very friable sandy loam 3 to 7 inches thick. In many places subsoil material is mixed with the surface soil. The subsoil consists of red, friable clay and is exposed in small- and medium-sized areas. Rills and a few shallow gullies occur.

Included in areas mapped as this soil are small areas that have a gravelly sandy loam or sandy clay loam surface layer. Also included are small areas with slopes ranging from 10 to 15 percent and some with slopes of more than 25 percent. Other inclusions are small areas of Pacolet and of Louisburg soils. These included areas make up less than 12 percent of this mapping unit.

Cultivating this soil is not practical, mainly because slopes are steep. In addition content of organic matter and natural fertility are low. Water enters and passes through this soil at a moderate rate, and the available water capacity is medium to low.

Most of the acreage is in hardwoods and pines. Kudzu and sericea lespedeza can be grown to supplement pasture. In managing this soil the main concerns are controlling erosion, improving fertility, and compensating for the moderately deep root zone and low available water capacity. (Capability unit VIe–1; woodland suitability group 5; wildlife suitability group 2)

Madison sandy loam, 25 to 40 percent slopes, eroded (MdF2).—This is a moderately deep, well-drained soil that overlies weathered mica schist or mica gneiss. It occurs in steep areas adjacent to the larger streams.

The surface layer is exposed in small- and medium-sized areas and consists of brown to yellowish-red, very friable sandy loam 2 to 5 inches thick. A few rills and shallow gullies occur.

Included in areas mapped as this soil are small areas that have a sandy clay loam or clay loam surface layer. Also included are a few small areas that have slopes of less than 25 percent. Other inclusions are small areas of Pacolet soils. These included areas make up less than 9 percent of this mapping unit.

Cultivating this soil is not practical, because slopes are too steep. In addition, organic-matter content and natural fertility are low. Water enters and passes through this soil at a moderate rate, and the available water capacity is low.

Most of the acreage is in mixed hardwoods and pines. Under good management, kudzu and sericea lespedeza produce fair yields for supplemental grazing. In managing this soil the main concerns are controlling erosion, compensating for the moderately deep root zone, and increasing fertility. (Capability unit VIIe–1; woodland suitability group 5; wildlife suitability group 3)

Madison sandy loam, thin solum variant, 2 to 6 percent slopes, eroded (MeB2).—This soil occupies only a small acreage in Spartanburg County. It is a shallow, well-drained soil on small hilltops and narrow, short ridges. It formed in material weathered from mica schist and mica gneiss.

The surface layer is dark-brown to yellowish-red sandy loam 2 to 5 inches thick. In places small fragments of mica schist or fine quartz pebbles are on the surface. The subsoil consists of red, friable clay and is exposed in small- and medium-sized areas. Small areas of this soil, especially where it is underlain by gneiss, contain only a few flakes of mica. A few rills and shallow gullies occur.

Included in areas mapped as this soil are small areas that have a gravelly sandy loam or sandy clay loam surface layer. Also included are a few small areas with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Cecil and of Louisburg soils. These included areas make up less than 10 percent of this mapping unit.

The plow layer is not easily kept in good tilth, but it can be worked without clodding through a medium range of moisture content. Tillage extends into the subsoil in most places. Organic-matter content and natural fertility are low. Water enters and passes through this soil at a moderately rapid rate, and the available water capacity is low. This soil has a shallow root zone.

Most of the acreage is in cultivated crops. This soil is fairly well suited to all crops commonly grown in the county except peaches. In managing this soil the main concerns are controlling erosion, increasing fertility, compensating for the shallow root zone, and droughtiness. (Capability unit IVe–1; woodland suitability group 11; wildlife suitability group 5)

Madison sandy loam, thin solum variant, 6 to 10 percent slopes, eroded (MeC2).—This soil occupies a small acreage in the county. It is a shallow, well-drained soil on small, strongly sloping ridgetops and sloping hillsides. It formed in material weathered from mica schist and mica gneiss.

The surface layer is dark-brown to yellowish-red sandy loam 2 to 5 inches thick. In places small fragments of mica schist or fine quartz pebbles are on the surface. The subsoil consists of red, friable clay and is exposed in small- and medium-sized areas. A few rills and shallow gullies occur.

Included in areas mapped as this soil are small areas that have a gravelly sandy loam or sandy clay loam surface layer. Also included are a few small areas with slopes ranging from 2 to 6 percent and a few with slopes of more than 10 percent. Other inclusions are small areas of Cecil and of Louisburg soils. These included areas make up less than 12 percent of this mapping unit.

The plow layer is not easily kept in good tilth, but it can be worked without clodding through a medium range of moisture content. Tillage extends into the subsoil. Natural fertility and the content of organic matter are low. Water enters and passes through this soil at a moderately rapid rate, and the available water capacity is low. This soil has a shallow root zone.

Most of the acreage is in pines, but windthrow is a hazard. In managing this soil the main concerns are improving fertility, compensating for a shallow root zone and low available water capacity, and controlling erosion. (Capability unit VIe–1; woodland suitability group 11; wildlife suitability group 5)

Mecklenburg Series

The soils of the Mecklenburg series are deep and moderately well drained to well drained. They formed in material that weathered from hornblende gneiss, gabbro, or diorite. Depth to hard rock is more than 5 feet.

Typical profile in a pasture, 1 mile north of the Union County line near State Route 215, on a south-facing slope of 3 percent:

Ap—0 to 6 inches, dark-brown (10YR 4/3) fine sandy loam; weak, fine, granular structure; very friable; abundant fine and many medium roots; few dark-colored concretions; pH 6.1; abrupt, smooth boundary.

B1—6 to 10 inches, dark yellowish-brown (10YR 4/4) sandy clay loam; friable; few fine and medium roots; few dark-colored concretions; pH 6.0; clear, smooth boundary.

B21—10 to 20 inches, yellowish-red (5YR 4/6) clay with many, medium, distinct mottles of yellowish brown; moderate, coarse, blocky structure; firm; few dark-colored concretions; continuous clay films; pH 5.9; clear, smooth boundary.

B22t—20 to 30 inches, brownish-yellow (10YR 6/8) clay with common, fine, faint mottles of yellowish red; moderate, fine, blocky structure; firm; many dark-colored concretions; continuous clay films; pH 5.8; clear, smooth boundary.

B3—30 to 37 inches, brownish-yellow (10YR 6/6) clay loam with common, medium, distinct mottles of strong brown and reddish brown; weak, fine, blocky structure; friable to firm; many dark-colored concretions; pH 6.0; clear, wavy boundary.

C—37 to 50 inches, red (2.5YR 4/8) clay loam with few, medium, distinct mottles of yellow and few, medium, faint mottles of reddish yellow; massive; weathered rock; pH 5.6.

The B1 horizon is absent in some places. The B2t horizon ranges from 16 to 24 inches in thickness and has moderate to strong structure. The clay films in the B2t horizon are prominent. The solum ranges from 32 to 44 inches in thickness. In some places the dark-colored concretions are absent, and where they occur, they vary in amount.

The Mecklenburg soils occur with the Davidson, Cecil, Enon, Iredell, and Wilkes soils. They are not so red as Davidson soils and have slower internal drainage. They are not so sticky as the Enon soils and have been influenced more by basic rocks. Mecklenburg soils have better internal drainage than Iredell soils, and they are browner, deeper, and not so plastic. They have a thicker solum and stronger, more distinct horizons than the Wilkes soils.

The Mecklenburg soils are moderate to low in natural fertility and low in content of organic matter. Infiltration is moderate, permeability is moderately slow to slow, and available water capacity is medium. The root zone is moderately thin.

The Mecklenburg soils are in the southeastern part of the county. The native trees were oak, hickory, and redcedar, and the understory consisted of shrubs, vines, briers, and native grasses. Most of the acreage remains in forest or is in pasture. Many areas of this soil are suitable for cultivation, and crops on them respond to good management.

Mecklenburg fine sandy loam, 2 to 6 percent slopes, eroded (MfB2).—This is a deep, moderately well drained to well drained soil that overlies weathered hornblende schist, hornblende gneiss, or diorite.

The surface layer is dark-brown, very friable fine sandy loam 3 to 7 inches thick. The subsoil is mottled yellowish-red, yellowish-brown, brownish-yellow, and strong-brown, firm clay. A few rills and galled spots occur.

Included in areas mapped as this soil are patches that have a sandy clay loam or gravelly sandy loam surface layer. Also included are a few small areas that have slopes ranging from 6 to 10 percent. Other inclusions are small areas of Davidson, of Cecil, and of Iredell soils. These included areas make up less than 8 percent of this mapping unit.

The plow layer is fairly easily kept in good tilth, and it can be worked without clodding through a medium to narrow range of moisture content. Tillage extends into the subsoil. Natural fertility is moderate to low and content of organic matter is low. Water enters this soil at a moderate rate and passes through it at a moderately slow rate. The available water capacity is medium.

Most of this soil is in hardwood forest or pasture. Yields of corn, small grain, soybeans, cotton, and some truck crops are good. In managing this soil the main concerns are controlling erosion, improving fertility, and avoiding plowing when the soil is too wet. (Capability unit IIe–3; woodland suitability group 12; wildlife suitability group 1)

Mecklenburg fine sandy loam, 6 to 10 percent slopes, eroded (MfC2).—This is a moderately deep, moderately well drained to well drained soil that overlies weathered hornblende schist, diorite, or hornblende gneiss.

The surface layer is dark-brown, very friable fine sandy loam 2 to 7 inches thick. The subsoil is mottled yellowish-red, yellowish-brown, brownish-yellow, and strong-brown, firm clay. A few rills and galled spots occur.

Included in areas mapped as this soil are patches that have a sandy clay loam surface layer. Also included are a few small areas with slopes ranging from 2 to 6 percent and a few with slopes of more than 10 percent. Other inclusions are small areas of Davidson soils and of Cecil soils. These included areas make up less than 12 percent of this mapping unit.

Except in galled areas, the plow layer is fairly easily kept in good tilth and can be worked without clodding through a medium to narrow range of moisture content. Tillage extends into the subsoil. Natural fertility is moderate to low and content of organic matter is low. Water enters this soil at a moderate rate and passes through it at a moderately slow rate. The available water capacity is medium.

Most of this soil is in hardwood forest. Yields of pasture plants, small grain, and corn are fair. The main concerns in managing this soil are controlling erosion, improving fertility, and avoiding plowing when the soil is too wet. (Capability unit IIIe–3; woodland suitability group 12; wildlife suitability group 1)

Mine Pits and Dumps

Mine pits and dumps consists of areas that have been excavated in strip mining of vermiculite and in quarrying and of areas nearby on which spoil from these operations has been dumped.

Mine pits and dumps (Mh).—This mapping unit occupies a small acreage in the county mostly on slopes of 0 to 25 percent. It consists of areas where, through mining and quarrying, the soil and underlying material have been removed and deposited nearby. These operations have left many pits, channels, and spoil banks.

The surface layer and underlying material are variable both in color and in texture. Rock fragments, cobblestones, and quartz pebbles are common throughout.

Included in areas mapped as this unit are small, undisturbed areas of Cecil, of Madison, of Cataula, and of Louis-

burg soils. These included areas make up less than 2 percent of this mapping unit.

Good tilth is difficult to maintain. Organic-matter content and natural fertility are low. Water enters the surface and passes through the soil material at a rapid rate, and the available water capacity is low.

This mapping unit has little or no value for farming, for it is not suited to cultivated crops or pasture. Some areas could be reclaimed as wildlife habitat. Because the soil materials are variable and their behavior is difficult to predict, investigation at each site is needed for determining all uses. The erosion of spoil banks and siltation of lower lying areas are hazards to management. (Capability unit VIIe–2; woodland suitability group 14; wildlife suitability group not assigned)

Mixed Alluvial Land, Wet

This land type consists of deep, poorly drained recent alluvium derived from all kinds of rocks in the county. It occurs in long strips along small- and medium-sized streams and is frequently flooded. This land is widely distributed throughout the county.

Mixed alluvial land, wet (Mk).—This mapping unit consists of deep, poorly drained soil material that washed or sloughed from higher lying soils and was deposited in long, narrow strips on first bottoms.

The surface layer is black to light-brown, very friable gravelly loamy sand to sandy clay loam 6 to 24 inches thick. The subsurface layer ranges from gray to mottled light yellowish brown in color and from gravel or coarse sand to clay in texture. This layer is stratified in places and contains pockets of mixed material in other places. Quartz pebbles, cobblestones, and rock fragments are common in this layer. The water table is below a depth of 1 foot in most places.

Included in areas mapped as this land are small areas of Congaree soils and of Worsham soils. These included areas make up less than 8 percent of this mapping unit.

This land is moderate in organic-matter content and low in natural fertility. It is flooded frequently. V-ditches are effective in removing surface water. Water enters the surface and passes through this soil material at a rapid rate. The available water capacity is low, even though the water table is high.

Most of the acreage is in forest, but the trees mainly are undesirable hardwoods. Crops requiring tillage are not grown, but a small acreage of native grasses is used for pasture. Flooding and siltation are hazards to management, and maintaining a good drainage system is important. (Capability unit IVw–1; woodland suitability group 2; wildlife suitability group 7)

Moderately Gullied Land

Moderately gullied land consists mainly of small, severely eroded areas throughout the county, but a few areas in the southern part are fairly large. The gullies are moderately deep. Small patches or narrow strips of soil occur between the gullies. In these patches the texture of the surface soil ranges from gravelly sandy loam to clay. The thickness of the subsoil varies. This land is on slopes that range from 4 to 40 percent. Most of the gullies have been stabilized by trees and honeysuckle.

This land is mostly in forest. It is not suited to crops or pasture, and reclaiming it for farming is not economically feasible.

Moderately gullied land, firm materials (Mm).—This land consists of severely eroded areas on slopes that range from 4 to 40 percent. More than one-fourth of each area is made up of shallow to moderately deep gullies.

The surface layer of the patches between gullies is brown to red, very friable loam to clay loam 1 to 7 inches thick. The surface layer in the gullies is brown to red, firm clay 1 to 2 inches thick.

Included in areas mapped as this land are a few patches of well-developed soils that have a plastic and sticky, firm to very firm subsoil. These included areas make up less than 12 percent of this mapping unit.

The soil between the gullies is easily kept in good tilth, but in the gullies and severely eroded areas, maintaining good tilth is difficult. This land is low in content of organic matter and natural fertility. Runoff is rapid, and the available water capacity is low.

Most of the acreage is in trees. Establishing vegetation to stabilize this land is slow. Because the soil materials are variable and their behavior is difficult to predict, investigation at each site is needed for determining all uses. The suitability of this land for trees and other plants and for wildlife varies widely. Erosion and siltation of lower lying areas are hazards to management. (Capability unit VIIe–2; woodland suitability group 14; wildlife suitability group not assigned)

Moderately gullied land, friable materials, 2 to 10 percent slopes (MnC).—This land consists of severely eroded areas in which shallow to moderately deep gullies make up more than one-fourth of each area.

In most places the surface layer between the gullies is reddish-brown to yellowish-brown, clayey material that made up the original soils. In many places gullies have cut into the underlying material.

Included in areas mapped as this land are patches of well-developed soils that have a friable to firm subsoil. These included areas make up less than 12 percent of this mapping unit.

This land is low in content of organic matter and natural fertility. Runoff is rapid and of large quantity, and the available water capacity is low.

Most of the acreage is in trees. Establishing vegetation to stabilize this land is difficult. Because the soil materials are variable and their behavior is difficult to predict, investigation at each site is needed for determining all uses. The suitability of this land for trees and other plants and for wildlife varies widely, but some areas can be reclaimed for recreation and as wildlife habitat. Erosion and siltation of lower lying areas are hazards to management. (Capability unit VIIe–2; woodland suitability group 14; wildlife suitability group not assigned)

Moderately gullied land, friable materials, 10 to 40 percent slopes (MnF).—This land consists of severely eroded areas in which shallow to moderately deep gullies make up more than one-third of each area.

In most places the surface layer between the gullies is reddish-brown to yellowish-brown, clayey material that made up the original soils. In many places gullies have cut into the underlying material.

Included in areas mapped as this land are patches of well-developed soils. These included areas make up less than 12 percent of this mapping unit.

This land is low in content of organic matter and natural fertility. Water enters and passes through the soil material at a slow rate. Runoff is rapid and of large quantity, and the available water capacity is low.

Most of this land is in trees, but establishing plants on this land is slow. Because the soil materials are variable and their behavior is difficult to predict, investigation at each site is needed for determining all uses. The suitability of this land for trees and other plants and for wildlife varies widely. Erosion and siltation of lower lying areas are hazards to management. (Capability unit VIIe–2; woodland suitability group 14; wildlife suitability group not assigned)

Musella Series

The Musella series consists of shallow, well-drained soils that formed in material weathered from hornblende gneiss and hornblende schist. In most places depth to hard rock ranges from 16 to 30 inches.

Typical profile in a field, 2 miles east of New Prospect and 0.5 mile east of Fingerville on State Route 11, on a west-facing slope of 9 percent:

Ap—0 to 4 inches, dark reddish-brown (2.5YR 3/4) fine sandy loam; friable; many small and medium roots; few small pebbles on surface; pH 5.8; abrupt, smooth boundary.

B21t—4 to 10 inches, red (10R 4/8) clay; moderate, medium, subangular blocky structure; firm; few medium roots; patchy clay films; pH 5.5; clear, smooth boundary.

B22t—10 to 18 inches, red (10R 4/8) clay; moderate, coarse, subangular blocky structure; very firm; continuous clay films; many fine flakes of mica; pH 5.7; abrupt, wavy boundary.

C—18 to 22 inches, red (10R 4/8) clay and weathered micaceous schist; massive; abundant fine flakes of mica; pH 5.6; abrupt, irregular boundary.

R—22 inches +, hard, mixed, acidic and basic rock.

The surface layer is fine sandy loam or clay loam. Many rock fragments are on the surface. Typically, the surface layer of Musella soils in eroded, cultivated areas ranges from dark reddish brown to brown; but in wooded areas it is dark grayish brown; and in severely eroded areas it is red. The B2t horizon is red, firm to very firm clay loam to clay 10 to 18 inches thick. In places there is no C horizon.

The Musella soils occur with the Cecil, Davidson, Madison, and Louisburg soils. Unlike the Cecil, Davidson, and Madison soils, Musella soils do not have a thick B horizon. Except in the C horizon, Musella soils lack mica that is characteristic of Madison soils. In contrast to Louisburg soils, the Musella soils have a thicker, finer textured, and more strongly developed B horizon.

The Musella soils are low in natural fertility and content of organic matter. Infiltration and permeability are moderate, and the available water capacity is low. These soils have a shallow root zone.

The native trees were oak, hickory, and Virginia pine, and the understory consisted of shrubs, vines, and briers. Except for the steep slopes, most of the acreage has been cleared and cultivated. Now it is mostly in mixed hardwoods and pines, but some areas are in pure stands of Virginia pine.

Musella clay loam, 6 to 10 percent slopes, severely eroded (MsC3).—This is a shallow, well-drained soil on breaks from broad ridges along the North Pacolet and South Tyger Rivers. It formed in material that weathered from schist.

The surface layer is red, friable clay loam 1 to 3 inches thick. The subsoil is red, firm clay. Rills and large galled spots occur.

Included in areas mapped as this soil are patches that have a fine sandy clay loam surface layer. Also included are a few small areas with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Cecil and of Madison soils. These included areas make up less than 13 percent of this mapping unit.

Keeping the plow layer in good tilth is difficult. Clods commonly form in the fine-textured surface layer. Content of organic matter and natural fertility are low. Runoff is rapid, and erosion is likely. Water enters this soil at a slow rate and passes through it at a moderate rate. The available water capacity is low.

Most of this soil is in pine forest. Kudzu and sericea lespedeza produce fair grazing. Erosion is a hazard to management, but poor workability and a thin solum are also important. (Capability unit IVe–1; woodland suitability group 6; wildlife suitability group 3)

Musella clay loam, 10 to 25 percent slopes, severely eroded (MsE3).—This is a shallow, well-drained soil on the breaks sloping down from broad ridges along the North Pacolet and South Tyger Rivers. It formed in material that weathered from schist.

The surface layer is red, friable clay loam 1 to 3 inches thick. The subsoil is red, firm clay. Rills and shallow gullies are common.

Included in areas mapped as this soil are patches that have a fine sandy clay loam surface layer. Also included are a few small areas with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Cecil, of Madison, and of Louisburg soils. These included areas make up less than 12 percent of this mapping unit.

This soil is low in organic-matter content and natural fertility. Runoff is rapid, and erosion is likely. Water enters this soil at a slow rate and passes through it at a moderate rate. The available water capacity is low.

Most of this soil is in forest, predominantly Virginia pine. Clearing this soil for crops is not practical. Erosion is a hazard to management, but low fertility and a shallow root zone are also important. (Capability unit VIe–1; woodland suitability group 7; wildlife suitability group 3)

Musella fine sandy loam, 6 to 10 percent slopes, eroded (MuC2).—This is a shallow, well-drained soil on breaks that slope down from the broad ridges along the North Pacolet and South Tyger Rivers. It formed in material that weathered from schist.

The surface layer is yellowish-red, very friable fine sandy loam 2 to 6 inches thick. The subsoil is exposed in small- and medium-sized areas and consists of red, firm clay.

Included in areas mapped as this soil are patches that have a clay loam surface layer. Also included are small areas with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Cecil, of Madison, and of Louisburg soils. These included areas make up less than 12 percent of this mapping unit.

This soil is not easily kept in good tilth. It can be worked without clodding through a medium range of moisture content. This soil is low in organic-matter content and natural fertility, and crops on it respond to added fertilizer and lime. Water enters and passes through this soil at a moderate rate, and the available water capacity is low.

Most of this soil is in cultivated crops and peach orchards. All crops commonly grown in the county produce fair yields. Management is needed to control erosion and to compensate for the shallow root zone. (Capability unit IIIe–1; woodland suitability group 4; wildlife suitability group 1)

Musella fine sandy loam, 10 to 15 percent slopes, eroded (MuD2).—This is a shallow, well-drained soil on breaks down from the broad ridges along the North Pacolet and South Tyger Rivers. It formed in material that weathered from schist.

The surface layer is yellowish-red, very friable fine sandy loam 2 to 6 inches thick. The subsoil consists of red, firm clay that is exposed in small- and medium-sized areas.

Included in areas mapped as this soil are patches that have a clay loam surface layer. Also included are a few small areas with slopes ranging from 6 to 10 percent and a few with slopes ranging from 15 to 25 percent. Other inclusions are small areas of Cecil and of Louisburg soils. These included areas make up less than 12 percent of this mapping unit.

This soil is low in organic-matter content and natural fertility, and crops on it respond to added fertilizer and lime. Runoff is rapid, and erosion is likely. Water enters and passes through this soil at a moderate rate, and the available water capacity is low.

Most of this soil is in forest. Under good management, pasture produces fair yields. Management is needed that controls erosion and compensates for the shallow root zone. (Capability unit IVe–1; woodland suitability group 4; wildlife suitability group 2)

Musella fine sandy loam, 15 to 40 percent slopes, eroded (MuF2).—This is a shallow, well-drained soil on breaks along the North Pacolet and South Tyger Rivers. It formed in material that weathered from schist.

The surface layer is yellowish-red, very friable sandy clay loam 2 to 6 inches thick. The subsoil is red, firm clay that is exposed in small- and medium-sized areas.

Included in areas mapped as this soil are patches that have a sandy clay loam surface layer. Also included are a few small areas with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Pacolet and of Louisburg soils. These included areas make up less than 12 percent of this mapping unit.

This soil is low in organic-matter content and natural fertility. Runoff is rapid, and erosion is likely. Water enters and passes through this soil at a moderate rate, and the available water capacity is low.

Most of this soil is in forest consisting of hardwoods. Kudzu and sericea lespedeza produce only fair yields. Erosion is a hazard to management, and the shallow root zone is also detrimental. (Capability unit VIIe–1; woodland suitability group 5; wildlife suitability group 2)

Pacolet Series

The soils of the Pacolet series are moderately deep and well drained. They occupy moderately steep to steep areas that have slopes of short to medium length and are adjacent to streams and deep drainageways. These soils formed in material that weathered from gneiss, schist, and granite. In most places depth to hard rock is more than 8 feet.

Typical profile in a forest of mixed pines and hardwoods, 1.25 miles east of Bethesda Church and west of Lawson Fork Bridge along a county road, on a slope of 18 percent facing northeast:

AO—¼ inch to 0, black (10YR 2/1) decayed organic matter that contains abundant small roots.

A1—0 to 2 inches, very dark gray (10YR 3/1) sandy loam; weak, fine, subangular blocky structure that breaks to weak, fine, granular structure; very friable; abundant small roots; few pores; few, small, quartz pebbles; pH 4.9; clear, smooth boundary.

A2—2 to 6 inches, brownish-yellow (10YR 6/6) sandy loam; weak, fine, subangular blocky structure that breaks to weak, fine, granular structure; very friable; abundant small roots; few small pores; few, small, quartz pebbles and very coarse grains of sand; pH 5.3; abrupt, smooth boundary.

B1—6 to 10 inches, yellowish-red (5YR 5/8) clay loam; weak, fine, subangular blocky structure; friable; few small roots; few small pores or wormholes; few coarse grains of sand; pH 5.2; clear, smooth boundary.

B2t—10 to 23 inches, red (2.5YR 5/8) clay; moderate, medium, subangular blocky structure; firm; few small and medium roots; few small pores; few fine flakes of mica; thin continuous clay films on ped faces; pH 4.7; gradual, smooth boundary.

B3—23 to 27 inches, red (2.5YR 5/8) sandy clay with few, fine, faint mottles of reddish yellow; moderate, coarse and medium, subangular blocky structure; friable to firm; few medium roots; few, small, quartz pebbles; few fine flakes of mica; pH 4.6; clear, wavy boundary.

C—27 to 42 inches, red (2.5YR 5/8) fine sandy loam with many, fine, distinct mottles of light yellowish brown; massive; few, small, quartz pebbles; few fine flakes of mica; pH 4.5.

The mineral part of the A horizon ranges from sandy loam to clay loam in texture and from 1 to 10 inches in thickness. In color, it ranges from dark grayish brown to red. Rock crops out in places. The upper part of the B horizon ranges from yellowish red to red in color and from sandy clay loam to clay in texture. The lower part of the B horizon is red clay loam to clay. The B horizon contains few to common flakes of mica and, in places, few to common crystals of feldspar. In some places B21t and B22t horizons occur. The total thickness of the B horizon ranges from 10 to 24 inches. The saprolite, or C horizon, ranges from about 10 to 42 inches in thickness.

The Pacolet soils occur with the Cecil, Cataula, Madison, Lockhart, and Louisburg soils. They have a thinner and less firm solum than the Cecil and Cataula soils. Unlike Madison soils, Pacolet soils do not contain fine mica throughout their solum, and they do not contain so much feldspar as Lockhart soils. The Pacolet soils are finer textured in the B horizon than Louisburg soils.

The Pacolet soils are low in organic-matter content and natural fertility. Infiltration and permeability are moderate, and the available water capacity is medium to low. The root zone of these soils is moderately deep, and crops on them respond to liberal fertilization.

Pacolet soils are widely distributed throughout the county. The native trees were oak, hickory, and pine, and the understory consisted of vines, shrubs, and native grasses. Because Pacolet soils are steep and subject to both sheet and gully erosion, it is not practical to cultivate these soils. Sericea lespedeza produces only a fair amount of supplemental grazing, even under good management. Most of the acreage is in mixed pines and hardwoods.

Pacolet clay loam, 15 to 25 percent slopes, severely eroded (PaE3).—This is a moderately deep, well-drained soil on short breaks to medium- and large-sized streams. It formed in material that weathered from granite, gneiss, or schist.

The surface layer is reddish-yellow to yellowish-red, friable clay loam 1 to 3 inches thick. The subsoil is red, friable to firm clay. Rills and shallow gullies are common.

Included in areas mapped as this soil are small areas with slopes ranging from 10 to 15 percent and some with slopes ranging from 25 to 40 percent. Also included are small areas of Madison soils and of Louisburg soils. These included areas make up less than 11 percent of this mapping unit.

The surface layer is fine textured, and maintaining good tilth is difficult. Runoff is rapid, and erosion is likely. Organic-matter content and natural fertility are low. Water enters this soil at a slow rate and passes through it at a moderate rate. The available water capacity is low. This soil has a moderately deep root zone.

Most of this soil is in pine forest. Sericea lespedeza and kudzu produce only fair yields. Management is needed to control erosion and to compensate for the moderately deep root zone and low available water capacity. (Capability unit VIIe–1; woodland suitability group 7; wildlife suitability group 3)

Pacolet sandy loam, 15 to 25 percent slopes (PcE).—This is a moderately deep, well-drained soil on moderately steep, short slopes. It formed in material that weathered from granite, gneiss, or schist.

The surface layer is dark grayish-brown, very friable sandy loam 4 to 9 inches thick. The subsoil is red, friable to firm clay loam to clay. It is exposed in small- and medium-sized areas.

Included in areas mapped as this soil are small areas that have a sandy clay loam or clay loam surface layer. Also included are small areas with slopes of less than 15 percent and some with slopes of more than 25 percent. Other inclusions are small areas of Madison soils and of Louisburg soils. These included areas make up less than 11 percent of this mapping unit.

The surface layer generally is in good tilth. Organic-matter content and natural fertility are low. Water enters this soil at a moderately rapid rate and passes through it at a moderate rate. The available water capacity is medium to low. This soil has a moderately deep root zone.

Most of this soil is in hardwood forest. Kudzu and sericea lespedeza produce only fair yields. Management is affected by erosion, a moderately deep root zone, and short slopes. (Capability unit VIe–1; woodland suitability group 5; wildlife suitability group 2)

Pacolet sandy loam, 15 to 25 percent slopes, eroded (PcE2).—This is a moderately deep, well-drained soil in moderately steep areas. It formed in material that weathered from granite, gneiss, or schist.

The surface layer is brown to yellowish-red, very friable sandy loam 2 to 5 inches thick. The subsoil is red, firm clay. A few small- and medium-sized galled spots and a few rills occur.

Included in areas mapped as this soil are small areas with slopes of less than 15 percent and some with slopes of more than 25 percent. Also included are small areas of Madison soils and of Louisburg soils. These included areas make up less than 8 percent of this mapping unit.

This soil is low in organic-matter content and natural fertility. Water enters the surface and passes through the soil at a moderate rate, and the available water capacity is medium to low. The root zone is moderately deep.

Most of this soil is in pine forest. Sericea lespedeza and kudzu produce a fair amount of supplemental grazing. The moderately steep slopes and erosion are hazards to management. (Capability unit VIe–1; woodland suitability group 5; wildlife suitability group 2)

Pacolet sandy loam, 25 to 40 percent slopes (PcF).—This is a moderately deep, well-drained soil on short, steep slopes along streams. It formed in material weathered from granite, gneiss, or schist.

The surface layer is grayish-brown to dark-brown, very friable sandy loam 4 to 9 inches thick. The subsoil is red, friable clay loam to clay. A few rills and small galled spots occur, and a few large boulders are on the surface.

Included in areas mapped as this soil are small areas with slopes ranging from 15 to 25 percent. Also included are small areas of Madison soils and of Louisburg soils. These included areas make up less than 7 percent of this mapping unit.

This soil is low in organic-matter content and natural fertility. Water enters the surface at a moderately rapid rate and passes through the soil at a moderate rate. The available water capacity is low. Runoff is rapid. The root zone of this soil is moderately deep.

Most of this soil is in hardwood forest, for which it is well suited. Erosion, steepness, and a root zone only moderately deep are hazards to management. (Capability unit VIIe–1; woodland suitability group 5; wildlife suitability group 2)

Severely Gullied Land

This land type consists of small, severely eroded areas in which there are many gullies. Slopes range from 4 to 40 percent. Some areas are still eroding, and some have been stabilized. The soil material in these areas is variable, depending on the original soil and the depth to which it has been eroded.

Severely gullied land (Se).—The gullies in this land are deep and moderately deep (fig. 4). The surface layer ranges from gravelly loamy sand to clayey, weathered parent material, which is exposed in places. The subsoil material ranges from yellow to red in color and from friable to firm in consistency. The underlying material ranges from friable to firm.

This land is low in organic-matter content and natural fertility. Runoff is rapid and of large amount. Water enters the surface at a slow rate and passes through the

247–756—68——3

Figure 4.—Severely gullied land (capability unit VIIe–2).

soil material at a moderate rate. The available water capacity is low.

This land is in forest. It is not suitable for crops, pasture, or recreation. Erosion is the chief hazard and will continue unless it is checked by plants or engineering structures. (Capability unit VIIe–2; woodland suitability group 14; wildlife suitability group not assigned)

Stony Land, Moderately Steep

This land consists of areas that are so stony that farm machinery cannot be used. The soil may belong to many series. The stones are of schist, gneiss, quartz, or dark-colored rock and range from 6 to 24 inches across.

Stony land, moderately steep (StE).—This land consists of hills that rise about 20 to 50 feet above the adjacent land. Slopes range from 10 to 30 percent. Stones cover between 25 and 50 percent of the surface.

The soil material of this land is similar to that of the adjacent soils, and the stones are of the same kind as the underlying rocks. The stones range from about 6 inches to 24 inches across.

This land is low in natural fertility and in content of organic matter. Water enters the surface and passes through the soil material at a rapid rate, and the available water capacity is low.

Except for a few places where stony material has been hauled away to be used as road foundation, this land is chiefly in undesirable hardwoods. Machinery cannot be used on this land, and any work must be done with hand tools. This land is suitable for trees, wildlife habitat, and recreational uses. In managing these soils the main concerns are fire, windthrow, a shallow root zone, low avail-

able water capacity, leaching of nutrients, low fertility, and poor workability. (Capability unit VIs–1; woodland suitability group 14; wildlife suitability group 5)

Vance Series [2]

The soils of the Vance series are deep and moderately well drained. They formed from weathered granite and gneiss that, in most places, have been slightly influenced by basic rock. Depth to hard rock is more than 10 feet.

Typical profile in a pine forest, 1 mile southeast of Cherokee Springs, on a west-facing slope of 3 percent:

Ap—0 to 6 inches, grayish-brown (10YR 5/2) sandy loam; weak, fine, granular structure; very friable; many small roots; pH 5.6; abrupt, smooth boundary.

B21t—6 to 12 inches, yellowish-brown (10YR 5/8) clay; moderate, medium, angular blocky structure; very firm when moist, hard when dry; patchy clay films on vertical faces of peds; few small and medium roots; pH 5.1; gradual, smooth boundary.

B22t—12 to 26 inches, brownish-yellow (10YR 6/8) clay with few, fine, distinct mottles of light red and few, fine, faint mottles of yellowish brown; strong, medium, blocky structure; sticky when wet, hard when dry, very firm when moist; continuous clay films on ped faces; pH 5.2; clear, smooth boundary.

B23t—26 to 31 inches, yellow (10YR 7/8) clay with common, medium, prominent mottles of light red and a few, fine, faint mottles of pale yellow; thin platy structure; very firm to extremely firm when moist, sticky when wet, and hard when dry; clay films on horizontal and vertical faces of peds; pH 5.1; clear, smooth boundary.

B3—31 to 38 inches, reddish-yellow (5YR 6/8) clay loam with common, medium, prominent mottles of brownish yellow; few, medium, distinct mottles of yellow and few, fine, faint mottles of light gray; weak, thin, platy structure; firm to very firm; pH 5.3; clear, wavy boundary.

C—38 to 73 inches, yellow (10YR 7/8) material weathered to a loam texture with common, medium, distinct mottles of yellowish brown and few, medium, distinct mottles of light red; massive; few fine mica flakes and pieces of weathered gneiss.

The surface layer of Vance soils is sandy loam in most places but is sandy clay loam in small areas where erosion has been active and tillage equipment reaches into the subsoil. The surface layer ranges from grayish brown to light gray in color and from 2 to 10 inches in thickness. The upper subsoil is a Bt layer in most places and is a yellowish-brown very firm clay 3 to 8 inches thick. The B22t horizon is mottled brownish-yellow, light-red, yellowish-brown, and yellow, very firm clay.

The Vance soils occur among the Cecil, Cataula, Appling, Durham, and Worsham soils. Vance soils have a finer textured subsoil than the Appling soils and are not so well drained. They are better drained than the Worsham soils and have a less red, firmer subsoil than the Cecil soils. The subsoil of Vance soils is firmer and more clayey than that of the Durham soils and less red than that of the Cataula soils.

The Vance soils are low in natural fertility and in content of organic matter. Infiltration is moderate, and permeability is moderately slow to slow. The root zone is deep and available water capacity is medium. The Vance soils do not warm in spring so early as surrounding soils.

The native trees on this soil were oak, elm, hickory, and some pine, and the understory was vines, shrubs, briers, and native grasses. Most of the acreage, however, is now cultivated or in improved pasture. Crops respond well to good management.

Vance sandy loam, 2 to 6 percent slopes, eroded (VaB2).—This is a deep, moderately well drained soil on relatively short slopes. It formed in weathered hornblende gneiss.

The surface layer of this soil is yellowish-brown, very friable sandy loam 2 to 5 inches thick. The subsoil is clay. It is firm and yellowish brown in the upper part and very firm and brownish yellow to yellow, mottled with yellowish brown and light red, in the lower part. Rills and medium-sized galled areas are common.

Included in areas mapped as this soil are a few small areas that have a loamy sand or sandy clay loam surface layer and a few small areas that have slopes ranging from 6 to 10 percent. Also included are small areas of Appling soils and of Cecil soils. These included areas make up less than 9 percent of the mapping unit.

The plow layer of this Vance soil is easily kept in good tilth, except in the galled areas. Tillage, however, extends into the subsoil in most places. This soil clods unless it is cultivated when the moisture content is favorable. Natural fertility and the content of organic matter are low. Water enters this soil at a moderate rate and passes through it at a moderately slow rate. The available water capacity is medium. The root zone is deep.

A large acreage of this soil is cultivated or in pasture. Suitable crops are corn, small grain, soybeans, cotton, and truck crops. Peaches do not grow well. Management of this soil is affected by erosion, moderately slow permeability, lateness of warming in spring, and low fertility. (Capability unit IIe–3; woodland suitability group 10; wildlife suitability group 4)

Vance sandy loam, 6 to 10 percent slopes, eroded (VaC2).—This is a moderately deep, moderately well drained soil on short slopes adjoining drainageways. It formed in weathered hornblende gneiss.

The surface layer is yellowish-brown, friable sandy loam 2 to 5 inches thick. The subsoil is yellowish-brown, very firm clay with mottles of brownish yellow, yellow, light red, and gray. Galled spots and rills are common.

Included in areas mapped as this soil are small areas that have a loamy sand or sandy clay loam surface layer. Also included are small areas of Appling soils, of Cecil soils, and of Louisburg soils. These included areas make up less than 8 percent of this mapping unit.

The plow layer is not easily kept in good tilth. It can be worked without clodding only through a narrow range of moisture content.

Tillage extends into the subsoil in most places. Natural fertility and content of organic matter are low. Water enters this soil at a moderate rate and passes through it at a moderately slow rate. The available water capacity is medium. The root zone of this soil is deep.

Most of the acreage of this soil is in pasture. Small grain, soybeans, and some truck crops produce fair yields. Erosion, poor workability, and lateness of warming in spring affect the management of this soil. (Capability unit IIIe–3; woodland suitability group 10; wildlife suitability group 4)

[2] The Vance soils in Spartanburg County are not typical of the Vance series.

Wickham Series

The soils of the Wickham series are deep and well drained. They formed on river terraces in alluvium that washed from areas underlain in most places by granite, gneiss, or schist and in some places by basic rock. Depth to hard rock is more than 10 feet.

Typical profile in an improved pasture, 3.5 miles northeast of Landrum, on an east-facing slope of 5 percent:

Ap—0 to 4 inches, yellowish-brown (10YR 5/4) sandy loam; weak, fine, granular structure; very friable; abundant fine roots; few small quartz pebbles; pH 5.8; abrupt, smooth boundary.

B1—4 to 12 inches, strong-brown (7.5YR 5/8) sandy clay loam; weak, medium, subangular blocky structure; very friable; few fine roots; few fine flakes of mica; pH 5.3; clear, smooth boundary.

B21t—12 to 23 inches, red (2.5YR 4/8) sandy clay; moderate to weak, medium, subangular blocky structure; firm; few fine flakes of mica; patchy clay films on ped faces; pH 5.2; clear, smooth boundary.

B22t—23 to 34 inches, red (10R 4/8) sandy clay; few, fine, distinct mottles of reddish yellow; moderate, medium, subangular blocky structure; friable to firm; few fine flakes of mica; discontinuous clay films on ped faces; pH 5.3; clear, smooth boundary.

B3—34 to 40 inches, red (2.5YR 5/6) sandy clay or sandy clay loam; few, fine, distinct mottles of yellow; weak, fine, subangular blocky structure; friable; few fine flakes of mica; pH 5.1; abrupt, wavy boundary.

C—40 to 42 inches +, yellowish-red (5YR 5/8) sandy loam; common, fine, distinct mottles of reddish yellow and few, fine, distinct mottles of brownish yellow; massive; common fine mica flakes; pH 5.0.

The surface layer of Wickham soils is sandy loam. This layer ranges from dark brown to yellowish brown in color and from 2 to 10 inches in thickness. The upper part of the subsoil is a B1 layer and is strong-brown to yellowish-red sandy loam to sandy clay loam 1 to 12 inches thick. The Bt layer (B21t and B22t) is red, friable to firm sandy clay mottled with reddish yellow and yellow. This layer is 18 to 36 inches thick and has moderate to weak structure and thin, patchy clay films.

The Wickham soils occur with the Hiwassee and Cecil soils. They are coarser textured throughout than Hiwassee soils and are not so dark red. Wickham soils are not so red as the Cecil soils and contain less clay.

The Wickham soils are low in organic-matter content and natural fertility. Infiltration and permeability are moderate, and the available water capacity is medium. These soils have a deep root zone, and crops on them respond to good management, including fertilization.

The native trees were oak, gum, elm, and some pine, and the understory consisted of shrubs, briers, and native grasses. Most of the acreage has been cleared and cultivated. These soils are suited to cultivated crops.

Wickham sandy loam, 2 to 6 percent slopes, eroded (WcB2).—This is a deep, well-drained soil on stream terraces. It formed in general alluvium.

The surface layer is dark-brown to yellowish-brown, very friable sandy loam 2 to 5 inches thick. The subsoil, which is exposed in a few small- and medium-sized areas, is strong-brown to red, friable to firm sandy clay.

Included in areas mapped as this soil are patches that have a sandy clay loam surface layer. Also included are patches with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Cecil soils and of Davidson soils. These included areas make up less than 9 percent of this mapping unit.

The plow layer can be worked without clodding through a medium range of moisture content, and maintaining good tilth is easy. In many places tillage extends into the subsoil. Organic-matter content and natural fertility are low. Water enters and passes through this soil at a moderate rate, and the available water capacity is medium.

Most of this soil is in pasture or cultivated crops. Corn, small grain, and pasture plants grow well. Erosion is the chief hazard to management. (Capability unit IIe-1; woodland suitability group 3; wildlife suitability group 1)

Wickham sandy loam, 6 to 10 percent slopes, eroded (WcC2).—This is a deep, well-drained soil on stream terraces. It formed in general alluvium.

The surface layer is dark-brown to yellowish-brown, very friable sandy loam 2 to 5 inches thick. The subsoil is yellowish-brown to red, friable to firm sandy clay. It is exposed in a few small- and medium-sized areas.

Included in areas mapped as this soil are patches that have a sandy clay loam surface layer. Also included are small areas with slopes ranging from 2 to 6 percent. Other inclusions are small areas of Cecil soils and of Davidson soils. These included areas make up less than 9 percent of this mapping unit.

Maintaining good tilth is fairly easy. The plow layer can be worked without clodding through a medium to narrow range of moisture content. In many places tillage extends into the subsoil. Organic-matter content and natural fertility are low. Water enters this soil and passes through it at a moderate rate, and the available water capacity is medium.

Most of this soil is in pasture or cultivated crops. Corn, small grain, and pasture plants grow well. Erosion and short slopes are the chief concerns in managing this soil. (Capability unit IIIe–1; woodland suitability group 4; wildlife suitability group 1)

Wilkes Series

The soils of the Wilkes series are shallow and well drained to excessively drained. They formed from weathered gneiss and schist that contained dikes of gabbro or diorite. Depth to hard rock is more than 2 feet.

Typical profile in a wooded area, 4 miles south of Pacolet and west of Fairforest Creek, on a west-facing slope of 5 percent near the crest of a hill:

A1—0 to 2 inches, very dark gray (10YR 3/1) fine sandy loam; weak, fine, granular structure; friable; abundant fine roots; few quartz pebbles; pH 6.4; clear, smooth boundary.

A2—2 to 7 inches, light yellowish-brown (10YR 6/4) fine sandy loam; weak, medium, subangular blocky structure; friable; many fine and medium roots; few quartz pebbles and mica flakes; pH 5.6; clear, smooth boundary.

B—7 to 10 inches, strong-brown (7.5YR 5/6) sandy clay loam; few, medium, faint mottles of brownish yellow; moderate, coarse, subangular blocky structure; firm; few medium roots; few fragments of partly weathered gneiss; many fine mica flakes; pH 5.5; abrupt, wavy boundary.

C—10 to 23 inches, yellowish-brown (10YR 5/4) material weathered to sandy clay loam (saprolite); few, medium, distinct mottles of brownish yellow and few, fine, faint mottles of yellowish red and pale olive; massive; weathered parent rock.

The surface layer of Wilkes soils is fine sandy loam that ranges from dark brown to grayish brown. The B ho-

rizon has variable colors of red, brown, and yellow or is mottled. This horizon is discontinuous in places, especially in soils that have stronger slopes. It ranges from nonplastic to plastic. In some places a considerable amount of gravel or fragments of weathered rock occur throughout the solum.

The Wilkes soils occur with the Cecil, Cataula, Enon, Iredell, and Mecklenburg soils but unlike them have a thin or discontinuous B horizon and more weakly developed horizons.

The Wilkes soils are low in natural fertility and content of organic matter. Infiltration is moderately rapid, and permeability is moderately rapid to moderately slow. The available water capacity is low. The root zone of Wilkes soils is restricted by bedrock near the surface.

The native trees were oak, gum, elm, and some pine, and the understory consisted of shrubs, briers, vines, and native grasses. Most areas of Wilkes soils are in hardwood forest.

Wilkes fine sandy loam, 2 to 6 percent slopes, eroded (WkB2).—This is a shallow, well-drained to excessively drained soil that formed from weathered acidic rocks intruded by dikes of basic rocks.

The surface layer is very dark gray, very friable fine sandy loam 3 to 8 inches thick. The subsoil is mottled strong-brown, brownish-yellow, reddish-yellow, and yellowish-brown, firm sandy clay loam to clay.

Included in areas mapped as this soil are patches that have a sandy loam surface layer. Also included are small areas with slopes ranging from 6 to 10 percent. Other inclusions are small areas of Enon soils, of Cataula soils, of Davidson soils, and of Cecil soils. These included areas make up less than 12 percent of this mapping unit.

The plow layer of this soil is difficult to keep in good tilth. Tillage extends into the subsoil in most places. Organic-matter content and natural fertility are low. Water enters this soil at a moderate rate and passes through it at a moderately rapid rate. The available water capacity is low.

Most of the acreage is in hardwood forest. Tall fescue, white clover, and small grain produce fair yields. In managing this soil the main concerns are controlling erosion and compensating for the shallow root zone, poor workability, and droughtiness. (Capability unit IIIe–5; woodland suitability group 11; wildlife suitability group 5)

Wilkes fine sandy loam, 6 to 10 percent slopes, eroded (WkC2).—This is a shallow, well-drained to excessively drained soil that formed from weathered acidic rocks that were intruded by dikes of basic rocks.

The surface layer is very dark gray to brown, very friable fine sandy loam 3 to 8 inches thick. The subsoil is mottled strong-brown, brownish-yellow, reddish-yellow, and yellowish-brown, firm sandy clay loam to clay.

Included in areas mapped as this soil are patches that have a sandy loam surface layer. Also included are a few small areas with slopes ranging from 2 to 6 percent and some with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Enon soils, of Cataula soils, of Davidson soils, and of Cecil soils. These included areas make up less than 11 percent of this mapping unit.

This soil is low in content of organic matter and in natural fertility. Water enters this soil at a moderate rate and passes through it at a moderately slow rate. The available water capacity is low.

Most of the acreage is in hardwood forest. Tall fescue and white clover are grown but produce below-average yields. In managing these soils the main concerns are controlling erosion and compensating for a shallow root zone, poor workability, and droughtiness. (Capability unit IVe–3; woodland suitability group 11; wildlife suitability group 5)

Wilkes fine sandy loam, 10 to 15 percent slopes, eroded (WkD2).—This is a shallow, excessively drained soil that formed from weathered acidic rocks intruded by dikes of basic rocks.

The surface layer is very dark gray to brown, very friable fine sandy loam 2 to 5 inches thick. The subsoil is friable to firm sandy clay loam that is mottled strong brown, brownish yellow, reddish yellow, yellowish red, yellowish brown, and pale brown. The B horizon is discontinuous or nonexistent in places.

Included in areas mapped as this soil are patches that have a sandy loam surface layer. Also included are a few small areas with slopes ranging from 6 to 10 percent and a few with slopes ranging from 15 to 25 percent. Other inclusions are small areas of Enon soils, of Davidson soils, of Cataula soils, and of Cecil soils. These included areas make up less than 8 percent of this mapping unit.

This soil is low in content of organic matter and in natural fertility. Water enters this soil at a moderate rate and passes through it at a moderately rapid rate. The available water capacity is low.

All of this soil is in hardwood forest. Cultivation is not practical. Management is affected by erosion, a shallow root zone, poor workability, and droughtiness. (Capability unit VIe–2; woodland suitability group 11; wildlife suitability group 5)

Wilkes fine sandy loam, 15 to 40 percent slopes, eroded (WkF2).—This is a shallow, excessively drained soil that formed from weathered acidic rocks intruded by dikes of basic rocks.

The surface layer is very dark gray to brown, very friable fine sandy loam 2 to 5 inches thick. The subsoil is friable sandy clay loam that is mottled strong brown, brownish yellow, reddish yellow, yellowish red, yellowish brown, and pale brown. The B horizon is discontinuous or nonexistent in places.

Included in areas mapped as this soil are patches that have a sandy loam or gravelly sandy loam surface layer. Also included are a few small areas with slopes ranging from 10 to 15 percent. Other inclusions are small areas of Madison soils and of Pacolet soils. These included areas make up less than 10 percent of this mapping unit.

This soil is low in content of organic matter and in natural fertility. Water enters and passes through this soil at a moderately rapid rate, and the available water capacity is low.

All of this soil is in hardwood forest. Erosion, a shallow root zone, and droughtiness affect management. (Capability unit VIIe–2; woodland suitability group 11; wildlife suitablity group 5)

Worsham Series

The soils of the Worsham series are deep and poorly drained. These soils occur in small drainageways and

upland depressions. They formed from weathered granite, gneiss, and schist. Depth to hard rock is more than 15 feet.

Typical profile in an idle field, 0.25 mile east of Greenville-Spartanburg Regional Airport, on a slope of 3 percent facing southeast:

Ap—0 to 7 inches, very dark gray (10YR 3/1) fine sandy loam; weak, fine, granular structure; very friable; many small roots; few fine flakes of mica; pH 5.1; abrupt, smooth boundary.

Blg—7 to 11 inches, light brownish-gray (2.5Y 6/2) sandy clay; few, fine, distinct mottles of brownish yellow; moderate, medium, subangular blocky structure; friable to firm; few small roots; few fine flakes of mica; thin, patchy clay films; pH 4.7; clear, smooth boundary.

B21g—11 to 16 inches, light brownish-gray (2.5Y 6/2) sandy clay; common, fine, distinct mottles of yellow; moderate, fine, angular blocky structure; firm; few fine flakes of mica; patchy clay films; pH 4.6; clear, smooth boundary.

B22g—16 to 22 inches, light brownish-gray (2.5Y 6/2) sandy clay; few, medium, distinct mottles of brownish yellow and few, fine, distinct mottles of red; strong, medium, blocky structure; firm to very firm; common fine flakes of mica; patchy clay films; clear, wavy boundary.

B3g—22 to 40 inches, light olive-gray (5Y 6/2) sandy clay; many, medium, distinct mottles of yellowish brown, few, medium, distinct mottles of yellow, and few, fine, faint mottles of olive yellow; weak, fine, blocky structure; firm; many fine flakes of mica; pH 4.8.

The surface layer of Worsham soils is fine sandy loam. The surface layer normally ranges from dark gray to black, but locally overwash of different color and as much as 18 inches thick may be on the surface. The subsoil ranges from gray to brown with variable mottling. The solum ranges from 24 to 40 inches in thickness.

The Worsham soils occur with the Durham, Enon, Appling, Madison, Vance, and Cecil soils, but they are in a lower position and are more poorly drained than those soils.

The Worsham soils are low in content of organic matter and in natural fertility. Infiltration is moderate and permeability is slow. Except in periods of extreme drought, the available water capacity is adequate for most crops. These soils are medium acid to strongly acid.

The native trees were hardwoods, mainly oak, ash, elm, beech, birch, and cottonwood, and the undergrowth was native grasses. The undrained areas of Worsham soils are now in hardwood forest; drained areas are in improved pasture.

Worsham fine sandy loam, 0 to 6 percent slopes (WoB).—This is a deep, poorly drained soil in narrow strips along drainageways, at the head of streams, and in upland depressions.

In most places the surface layer is dark-gray to black fine sandy loam 3 to 8 inches thick. The subsoil is mottled light brownish-gray, firm clay loam. In some places, the deposits of recent alluvium, 3 to 18 inches thick, cover the surface.

Included in areas mapped as this soil are small areas that have a surface layer ranging from clay loam to coarse sandy loam. Also included are small areas of Durham soils, of Cecil soils, of Cataula soils, and of Appling soils. These included areas make up less than 8 percent of this mapping unit.

Water enters this soil at a moderate rate and passes through it at a moderately slow to slow rate. This soil normally stays wet for long periods. Except in periods of extreme drought, the available water capacity is adequate.

Most of this soil is in hardwood forest. Poor drainage limits suitability for crops. If management is good, tall fescue, dallisgrass, bermudagrass, annual lespedeza, and white clover produce average yields. Wetness and overwash affect management. (Capability unit Vw–1; woodland suitability group 13; wildlife suitability group 7)

Use and Management of Soils [3]

The soils of Spartanburg County are used extensively for row crops, close-growing crops, orchard fruits, and pasture. This section explains how the soils may be used for these main purposes and also as woodland, as wildlife habitat, and in the building of highways, farm ponds, and other engineering structures. Also given are predicted yields of the principal crops under two levels of management.

The management of crops and pasture, of woodland, and of wildlife habitat is discussed by groups of soils. To determine the soils in each of these groups, refer to the "Guide to Mapping Units" at the back of this survey.

Capability Groups of Soils

Capability classification is the grouping of soils to show, in a general way their suitability for most kinds of farming. It is a practical classification based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils; and without consideration of possible but unlikely major reclamation projects.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

Capability Classes, the broadest grouping, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. Classes are defined as follows:

Class I. Soils have few limitations that restrict their use.

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

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

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

Class V. Soils subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover.

[3] By W. R. Culp, work unit conservationist, and L. D. Eagles, conservation agronomist, Soil Conservation Service.

Class VI. Soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.

Class VII. Soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII. Soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. (No class VIII soils were mapped in Spartanburg County.)

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 limitation is risk of erosion unless 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 some parts of the United States but not in Spartanburg County, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only subclasses indicated by *w*, *s*, and *c*, because the soils in it are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–2 or IIIe–1. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic numeral specifically identifies the capability unit within each subclass. In the following pages the capability units in Spartanburg County are described and suggestions for the use and management of the soils are given.

Management by capability units

In this subsection each capability unit is described, and some suggestions for use and management of the soils in each unit are given. To find the soils in each capability unit, refer to the "Guide to Mapping Units" at the back of this survey.

CAPABILITY UNIT I-1

Only Local alluvial land is in this capability unit. It occurs in nearly level upland depressions and along drainageways. The soil material washed or sloughed from adjoining higher soils and is deep and moderately well drained or well drained. The surface layer is very friable and friable loamy sand to clay loam 12 to 36 inches thick. It is underlain by a friable subsoil that has variable texture. The root zone is deep.

Both infiltration and permeability are moderately rapid, and the capacity to hold available water is medium. Acidity is slight or meduim, and natural fertility is low.

This land is suited to intensive use, for there is no hazard of erosion or of flooding. Truck crops and corn are the main crops, but most crops commonly grown in the county are well suited. Tree fruits are not suited because air drainage is unfavorable and frost damage is more likely than on higher soils.

The content of organic matter and good tilth can be maintained by using green-manure crops and mixing crop residue into the soil.

CAPABILITY UNIT IIe-1

In this unit are gently sloping, deep, well-drained soils that have a friable and very friable sandy loam to loam surface layer 1 to 10 inches thick. The subsoil is friable to firm, red clay, but the root zone is deep.

These soils have moderate to moderately rapid infiltration and moderate permeability. Their available water capacity is medium. They are slightly acid to medium acid and have low natural fertility.

The soils of this unit are well suited to cotton, corn, small grain, and other field crops commonly grown in the county, and to pasture grasses (fig. 5). In higher lying areas where air drainage is adequate, these soils are well suited to orchards. Crops in low-lying areas tend to be damaged in spring by a late frost.

Erosion is the chief hazard to soils in this unit. Contour tillage, used with terraces and crop rotations, controls erosion on most fields, but in some areas terraces are not needed if the crop rotations include sod crops. Crop residue kept on or near the surface increases infiltration and prevents washing. The content of organic matter is increased and tilth is improved if crop residue is mixed into the soil. Cover crops are needed in orchards (fig. 6).

CAPABILITY UNIT IIe-2

In this unit are gently sloping, deep, moderately well drained to well drained soils that have a very friable loamy sand to sandy loam surface layer 3 to 14 inches thick. The subsoil is friable to firm, brown to yellow sandy clay to clay. The root zone is deep.

These soils have moderately rapid infiltration and moderate to moderately slow permeability. Their available water capacity is medium. Acidity is medium, and natural fertility is low.

The soils of this unit are well suited to cotton, corn, small grain, and other field crops. They are well suited to bermudagrass and are fairly well suited to fescue. Because these soils warm slowly in spring, they are not well suited to orchards.

Management is needed to control erosion, to improve drainage in places, and to lessen the leaching of plant nutrients. Crop rotations that include perennial grasses are sufficient to control erosion on some fields, but on other fields, terraces and contour tillage are needed in addition to suitable crop rotations. Crop residue left on or near the surface increases infiltration and prevents washing. Cover crops are effective in controlling both leaching and erosion.

Figure 5.—**Fescue mixed with clover makes good pasture on Cecil sandy loam, 2 to 6 percent slopes, eroded. The soil is in capability unit IIe–1.**

CAPABILITY UNIT IIe-3

In this unit are gently sloping, moderately deep to deep, moderately well drained soils. These soils have a friable or very friable loamy sand, fine sandy loam, or sandy loam surface layer 1 to 10 inches thick. Their subsoil is firm or very firm, yellowish-brown to red clay. The root zone is moderately deep to deep.

The soils of this unit have moderate to moderately rapid infiltration and moderately slow permeability. The available water capacity is medium. Acidity is medium, and natural fertility is low.

These soils are suited to cotton, corn, small grain, bermudagrass, and fescue. They are not well suited to orchards. Most of the acreage is now in small grain, pasture, and meadow.

Erosion and a restricted root zone are the chief hazards, and the firm plastic subsoil resists tillage.

CAPABILITY UNIT IIe-4

Only Iredell fine sandy loam, 2 to 6 percent slopes, is in this capability unit. This gently sloping soil is shallow to moderately deep and moderately well drained to somewhat poorly drained. It has a very friable fine sandy loam surface layer 5 to 8 inches thick. The subsoil is very firm, yellowish-brown plastic clay. The root zone is shallow to moderately deep.

This soil has moderate infiltration and very slow permeability, and the available water capacity is high. Acidity is slight, and natural fertility is low.

This soil is suited to corn, cotton, small grain, grasses, and white clover. It is not suited to sericea lespedeza and other deep-rooted crops.

Tilling this soil is difficult because the surface layer is sticky when wet and very hard when dry. In addition, the firm, plastic subsoil restricts the growth of roots. Erosion is a hazard, but building and maintaining terraces for erosion control are difficult.

CAPABILITY UNIT IIw-2

Only Congaree soils, a single mapping unit, are in this capability unit. These soils are on first bottoms and are nearly level, deep, and well drained. They have a very friable sandy loam to clay loam surface layer 6 to 14 inches thick. It is underlain by friable clay loam to loamy sand that washed from higher lying soils. The root zone is deep.

Figure 6.—**Cover crop of clover prevents washing in this peach orchard. The soil is Cecil sandy loam and is in capability unit IIe–1.**

These soils have moderately rapid infiltration and permeability and medium to high available water capacity. They are medium acid and are high in natural fertility.

These soils are well suited to corn, truck crops, and small grain. Suitable pasture plants are bermudagrass, fescue, dallisgrass, bahiagrass, white clover, and annual lespedeza.

The chief hazards are flooding and siltation. These hazards can be offset by using measures to protect the watershed and by installing reservoirs to hold floodwater.

CAPABILITY UNIT IIIe–1

In this unit are gently sloping, severely eroded soils and sloping, eroded and uneroded soils. These soils have a friable or very friable sandy loam, sandy clay loam, or loam surface layer 1 to 10 inches thick. The subsoil is friable to firm, red clay. The root zone is moderately deep to deep in all soils except the Musella, which has a shallow root zone.

The soils in this unit have moderate to moderately rapid infiltration and moderate permeability. The available water capacity is medium. Acidity is slight or medium, and natural fertility is low.

These soils are well suited to cotton, corn, small grain, and other field crops commonly grown in the county. Pasture grasses and legumes also grow well. In higher lying areas where air drainage is good, these soils are well suited to orchards and are widely used for them.

Because erosion is a severe hazard, intensive management is needed that controls erosion and maintains productivity. Grassing the waterways is essential for erosion control, but contour cultivation, stripcropping, and crop rotation are also needed.

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CAPABILITY UNIT IIIe-2

In this unit are sloping, deep, well-drained soils that have a very friable sandy loam surface layer 2 to 10 inches thick. The subsoil is friable to firm, brown to red clay loam. The root zone is deep.

The soils of this unit have moderate to moderately rapid infiltration and moderate permeability. The available water capacity is medium. Acidity is strong to medium, and natural fertility is low.

The soils in this unit are suited to cotton, corn, small grain, sericea lespedeza, and bermudagrass.

Because erosion is a severe hazard, intensive management is needed for its control and for maintaining productivity. Management is effective if it provides an improved crop rotation that is used with grassed waterways, terraces, contour tillage, crop residue, or stripcropping, whichever of these, alone or in combination, are most suitable for controlling erosion.

CAPABILITY UNIT IIIe-3

In this unit are gently sloping, severely eroded soils and sloping, eroded and uneroded soils that are moderately deep to deep, are moderately well drained to well drained, and have a moderately plastic subsoil. These soils have a very friable or friable loamy sand to clay loam surface layer 1 to 8 inches thick. The subsoil is firm or very firm, yellowish-brown to red clay. The root zone is moderately deep to deep.

The soils of this unit have moderately slow to moderately rapid infiltration and moderately slow permeability. The available water capacity is medium. Acidity is medium to strong, and natural fertility is low.

If adequate amounts of lime and fertilizer are added these soils are suited to corn, cotton, small grain, annua lespedeza, dallisgrass, tall fescue, and bermudagrass.

Erosion is probably the chief hazard, but management is also affected by the plastic subsoil and a restricted root zone. Grassing the waterways is essential for erosion control, and contour farming, terraces, or stripcropping and an improved crop rotation are also needed. Because terraces are difficult to construct and maintain, using them is less feasible than using an improved rotation and stripcropping.

CAPABILITY UNIT IIIe-5

Only Wilkes fine sandy loam, 2 to 6 percent slopes, eroded, is in this capability unit. This gently sloping soil is well drained and shallow to hard rock. It has a very friable fine sandy loam surface layer 3 to 8 inches thick. The subsoil is friable to firm sandy clay loam to clay. The root zone is shallow.

This soil has moderately rapid infiltration and moderately rapid to moderately slow permeability. The available water capacity is very low. Acidity is slight to strong, and natural fertility is very low.

This soil is only fairly well suited to crops and pasture. Part of the acreage is cropped, but most of it is wooded. Suitable crops are cotton, corn, sorghum, small grain, bermudagrass, and annual lespedeza.

Erosion is the chief hazard, but management is also affected by a restricted root zone. Effective practices for controlling erosion are contour tillage and using a water-disposal system that provides meadow strips on grade and a grassed waterway.

CAPABILITY UNIT IVe-1

In this unit are shallow to deep, well-drained soils. The shallow soils are gently sloping to sloping and are eroded; the moderately deep to deep soils are sloping to strongly sloping and are uneroded, eroded, or severely eroded. All these soils have a friable or very friable sandy loam to clay loam surface layer 1 to 12 inches thick. The subsoil is friable to firm, red clay loam to clay. The root zone is shallow to deep.

The soils of this unit have moderate to moderately rapid infiltration and moderate permeability. The available water capacity is medium to low. These soils are medium acid and have low natural fertility.

The soils of this unit are suitable for occasional cultivation. In this county, however, they generally are not used for row crops, because grasses grow well and protect against erosion. Suitable plants are fescue, dallisgrass, bermudagrass, sericea lespedeza, and white clover.

The chief hazard to use of these soils is erosion. Because the soils are sloping and erosion is generally moderate or severe, both tillage and the control of erosion are difficult. If cultivated crops are grown, perennial grasses and legumes are needed in the rotation to help control erosion. If these soils are used for peach orchards, the trees should be set on the contour. On slopes of 10 to 15 percent, the trees should be cultivated so that the soil along the rows becomes benchlike. The benches, together with cover crops, help to control erosion. For apple and pear orchards, no cultivation is needed and erosion can be controlled by a good cover crop. Grassing the waterways is essential, but contour farming is also needed.

CAPABILITY UNIT IVe-2

In this unit are moderately deep to deep, sloping, severely eroded soils and strongly sloping, eroded soils. The surface layer is friable or very friable sandy loam to clay loam 1 to 5 inches thick. It is underlain by firm to very firm, moderately plastic clay. The root zone is moderately deep.

The soils of this unit have moderate to slow infiltration and moderately slow permeability. The available water capacity is medium to low. Acidity is medium and natural fertility is low.

These soils are suited to corn and small grain, but their use for row crops is limited by strong slopes and erosion and by the moderately deep root zone and limited available moisture. If row crops are grown, perennial grasses are needed in the rotation most of the time. Suitable for this purpose are fescue, sericea lespedeza, bermudagrass, and dallisgrass.

Erosion is the chief hazard and is difficult to control. Keeping waterways in close-growing, vigorous plants is essential but difficult.

CAPABILITY UNIT IVe-3

In this unit are sloping, well-drained to excessively drained soils. The surface layer is friable or very friable loamy sand to fine sandy loam 2 to 16 inches thick. It is underlain by very friable to firm loamy sand to sandy clay. The root zone is shallow.

These soils have moderately rapid to moderate infiltration and permeability. The available water capacity is low. Acidity is medium, and natural fertility is low.

Most of the acreage of these soils is forested, though corn, small grain, bermudagrass, and sericea lespedeza

are suitable crops. Response to added lime and fertilizer is good, but yields are only fair.

Only limited cultivation is suitable on these soils, because they are shallow and difficult to till. Also difficult is controlling runoff. Management is needed that provides a long-term rotation in which close-growing crops are grown three-fourths of the time. All tillage should be on the contour, and stripcropping is beneficial where it is feasible. Constructing terraces for controlling runoff is not practical, but permanent sod is needed in all natural draws.

CAPABILITY UNIT IVw-1

Only Mixed alluvial land, wet, is in this capability unit. This land is gently sloping, moderately deep to deep, and poorly drained. Its surface layer is 4 to 18 inches thick and consists of friable fine sandy loam to clay loam. The surface layer is underlain by friable to firm sandy clay to clay loam that washed from higher soils. Because the water table is high, the root zone is shallow to moderately deep.

This land has moderate to moderately rapid infiltration and moderate to slow permeability. Natural fertility and the available water capacity are low. Acidity is medium to strong.

Wetness restricts use for cultivated crops, but corn grows fairly well on fields drained by open ditches. This land can be used as range or pasture without drainage, but it is greatly improved if drained. Tall fescue, dallisgrass, white clover, and annual lespedeza grow well on fields that are drained, limed, and adequately fertilized.

CAPABILITY UNIT Vw-1

Only Worsham fine sandy loam, 0 to 6 percent slopes, is in this capability unit. This gently sloping soil is poorly drained. It occurs along small streams in long, narrow areas called crawfish land. It also occurs along intermittent streams, along drainageways, in upland depressions, and around the head of streams and draws. The surface layer is very dark gray fine sandy loam 8 to 24 inches thick. The subsoil is gray, firm clay that is hard when dry and sticky when wet. Material that washed or sloughed from adjacent higher lying soils is on the surface in many places.

This soil has slow permeability. Acidity is strong, and natural fertility is low. Partly because of slow permeability and partly because of its low position, this soil is excessively wet during the first part of the growing season. Flooding is frequent.

Because of excessive wetness, this soil is not suited to cultivated crops and is suited only to limited grazing. Managing this soil for pasture is difficult. Drainage is not practical, because outlets are not adequate.

CAPABILITY UNIT VIe-1

In this unit are sloping to moderately steep, shallow to deep, well-drained soils that are uneroded, eroded, or severely eroded. The surface layer is friable or very friable sandy loam to clay loam 1 to 12 inches thick. It is underlain by friable to firm, red clay. The root zone is shallow to deep.

The soils of this unit have slow to moderately rapid infiltration and moderate permeability. The available water capacity is medium to low. Acidity is medium to strong, and natural fertility is low.

The less eroded soils in this unit are suited to permanent pasture, but careful management, including large applications of fertilizer, is needed. Pasture plants respond to added lime and fertilizer, but trees are better suited to these soils than pasture.

CAPABILITY UNIT VIe-2

In this unit are moderately steep, shallow, weakly developed soils that have a surface layer that is only 2 to 6 inches thick and consists of friable or very friable loamy sand to sandy loam. This layer is underlain chiefly by partly weathered rock that contains pockets of sandy clay or clay. The root zone is shallow.

These soils have moderately rapid to moderate infiltration. Their available water capacity is low. Acidity is medium, and natural fertility is low.

The soils of this unit are not suited to cultivated crops. If they are fertilized heavily and limed, they produce fair yields of tall fescue, bermudagrass, white clover, annual lespedeza, and sericea lespedeza. Controlled grazing helps to keep good cover on these soils.

CAPABILITY UNIT VIe-3

Only Cataula clay loam, 10 to 15 percent slopes, severely eroded, is in this unit. This soil is moderately deep and moderately well drained. It has a surface layer of very friable sandy clay loam 1 to 3 inches thick. The subsoil is very firm, moderately plastic clay. The root zone is moderately deep.

This soil has slow infiltration and moderate to moderately slow permeability. The available water capacity is medium to low. Acidity is medium to strong, and natural fertility is low.

This soil is not suited to cultivated crops. If it is fertilized heavily and limed, it produces fair yields of bermudagrass, sericea lespedeza, and annual lespedeza. Controlled grazing is needed to keep a good cover on this soil. Perennial plants that provide food for wildlife are better adapted than annual plants.

CAPABILITY UNIT VIs-1

Only Stony land, moderately steep, is in this capability unit. This land occurs in the northern part of the county in small areas that rise 20 to 50 feet above the surrounding land. The soil material in the surface layer is similar to that of the adjacent soils, and the subsoil material is partially weathered rock. Stones 6 to 24 inches across cover from 25 to 50 percent of the surface.

This land has very rapid infiltration and permeability. The available water capacity is medium to low. Natural fertility and organic-matter content are low.

This land is not suited to cultivated crops or hay. The stones prevent the use of farm machines for harvesting hay. This land can be used for grazing, but a better use is for woodland, wildlife habitat, or recreational areas.

CAPABILITY UNIT VIIe-1

In this unit are moderately steep soils that are severely eroded and steep soils that are eroded and uneroded. These soils are shallow to moderately deep and well drained. The surface layer ranges from 2 to 12 inches in thickness and consists of very friable sandy loam to clay loam. It is underlain by friable to firm, red clay. The root zone is shallow to moderately deep.

These soils have moderately rapid to moderately slow infiltration and moderate permeability. The available water capacity is medium to low. Acidity is medium, and natural fertility is low.

The soils of this unit are too steep or too severely eroded to be used for cultivated crops or pasture. They are suited to forest and as habitat for wildlife.

CAPABILITY UNIT VIIe-2

This unit consists of moderately steep and steep, well-drained to excessively drained soils, of pits and mounds, of made areas, and of severely eroded and gullied areas. The surface layer is friable to very friable loamy sand to clay loam 1 to 11 inches thick. It is underlain mainly by weathered parent material. The root zone is very shallow or shallow.

The soils and land types in this unit have slow to moderately rapid infiltration and permeability and low available water capacity. Acidity is variable, and natural fertility is low.

The soils and soil material of this unit are not suited to cultivated crops or pasture. They are suited to trees, but growth may be spotty because the root zone varies in thickness. Wildlife habitat can be developed.

Suitability of Soils for Crops

In table 2 the suitability of soils in capability classes I through IV is rated for stated crops. A rating of 1 indicates that the soil is well suited for the stated crop. Hazards are few, intensive management is not needed, and favorable yields are likely. A rating of 2 indicates that the soil is fairly well suited. Use of the soil is limited by excessive moisture, too little moisture, a shallow root zone, low fertility, or some other limitation. A rating of 3 indicates that the soil is not well suited. Favorable yields are not likely unless intensive management is practiced. Generally this management is not economically feasible. A rating of 4 indicates that the soil is poorly suited to the stated crop, and that growing the crop on that soil is not practical.

Estimated Yields

The estimated average acre yields of the principal crops grown under two levels of management for the soils of Spartanburg County are given in table 3. The yields in columns A are average yields obtained through the management prevalent in the county. Those in columns B are yields to be expected under improved management.

The yields in columns A are based largely on observations by members of the soil survey party, on information obtained by interviewing farmers and other agricultural workers who have had experience with the soils and crops of the county, and on comparison with crop yields obtained from similar soils in other counties in South Carolina.

The practices used in improved management vary according to the soils. The following practices are necessary for obtaining the yields in columns B: (1) proper choice and rotation of crops; (2) correct use of commercial fertilizer, lime, and manure; (3) correct methods of tillage; (4) return of organic matter to the soils; (5) adequate control of water; (6) maintenance or improvement of workability of the soil; and (7) conservation of soil material, plant nutrients, and soil moisture.

The response of a soil to management can be measured in part by comparing yields in columns B with those in columns A. Higher yields can be obtained from nearly all soils in the county through improved management.

Use of Soils as Woodland [4]

The forest on uplands in Spartanburg County originally consisted primarily of loblolly pine, Virginia pine, shortleaf pine, oak, hickory, and yellow-poplar. Commonly growing along the streams were cottonwood, sweetgum, sycamore, birch, willow, beech, ash, yellow-poplar, and other bottom-land trees. Mountain hardwoods occupied the northwestern part of the county.

The same kinds of trees grow in the county today as grew originally, but existing stands differ greatly from the original in composition. In many areas second-growth hardwoods are scrubby and have little or no commercial value. Mountain hardwoods and pines dominate in the western part of the county, and Virginia pines grow in many places in the northern part. In the central and southern parts, shortleaf pine is dominant, oak-hickory stands are in fingers, and bottom-land hardwoods grow adjacent to rivers and other streams. Seedlings of loblolly pine have been used extensively to reforest large areas in the county, and yellow-poplar and white pine also have been planted on selected sites.

Woodland suitability groups of soils

Management of woodland can be planned more easily if soils are grouped according to those characteristics that affect growth of trees and management of stands. For this reason, the soils of Spartanburg County have been placed in 14 woodland suitability groups, which are described in this subsection. Each group consists of soils that have about the same suitability for wood crops, require about the same management, and have about the same potential productivity. The woodland suitability group to which each mapping unit has been assigned is listed in the "Guide to Mapping Units" at the back of this survey.

The descriptions of woodland suitability groups include estimates of potential productivity and ratings of limitations that affect use and management. Potential productivity and these limitations are defined in the following paragraphs.

Potential productivity is expressed as average *site index*. The site index for a given soil is the average height, in feet, that the dominant and codominant trees of a given species will attain in 50 years in an even-aged, well-stocked stand.

The site index is obtained by measuring the height of trees, by determining their age by counting the rings, and by determining the kind of soil at the site. Then from height-age curves for each species, the height of a specified tree at 50 years of age can be determined. This height is determined for six or more trees at a site, and the average height of these trees is the site index.

[4] GEORGE E. SMITH, JR., woodland conservationist, Soil Conservation Service, assisted in writing this subsection.

TABLE 2.—*Suitability of soils in capability classes I through IV*[1] *for stated crops*

[Soils rated 1 are well suited; 2, fairly well suited; 3, not well suited; and 4, poorly suited]

Soil	Cotton	Corn	Grain sorghum	Oats	Peaches	Pasture	
						Winter	Summer
						Tall fescue and white clover	Common bermudagrass
Appling sandy loam, 2 to 6 percent slopes	1	1	2	1	2	1	1
Appling and Cecil sandy loams, 2 to 6 percent slopes	1	1	2	1	2	1	1
Appling and Cecil sandy loams, 6 to 10 percent slopes, eroded	1	1	2	1	2	1	1
Cataula clay loam, 2 to 6 percent slopes, severely eroded	3	3	3	3	3	3	3
Cataula clay loam, 6 to 10 percent slopes, severely eroded	3	3	3	3	3	3	3
Cataula sandy loam, 2 to 6 percent slopes, eroded	2	2	2	2	2	1	1
Cataula sandy loam, 6 to 10 percent slopes, eroded	2	2	2	2	2	1	1
Cataula sandy loam, 10 to 15 percent slopes, eroded	2	2	2	2	2	1	1
Cecil clay loam, 2 to 6 percent slopes, severely eroded	2	2	2	2	2	2	2
Cecil clay loam, 6 to 10 percent slopes, severely eroded	2	2	2	2	2	2	2
Cecil sandy loam, 2 to 6 percent slopes, eroded	1	1	1	1	1	1	1
Cecil sandy loam, 6 to 10 percent slopes, eroded	1	1	1	1	1	1	1
Cecil sandy loam, 10 to 15 percent slopes, eroded	1	1	1	1	1	1	1
Congaree soils	4	1	1	1	4	1	1
Davidson clay loam, 2 to 6 percent slopes, severely eroded	2	2	2	2	2	2	2
Davidson clay loam, 6 to 10 percent slopes, severely eroded	2	2	2	2	2	2	2
Davidson clay loam, 10 to 15 percent slopes, severely eroded	2	2	2	2	2	2	2
Davidson loam, 2 to 6 percent slopes, eroded	2	1	1	1	1	1	1
Davidson loam, 6 to 10 percent slopes, eroded	2	1	1	1	1	1	1
Davidson sandy clay loam, 2 to 6 percent slopes, eroded	2	1	1	1	1	1	1
Davidson sandy clay loam, 6 to 10 percent slopes, eroded	2	1	1	1	1	1	1
Davidson sandy clay loam, 10 to 15 percent slopes, eroded	2	1	1	1	1	1	1
Durham loamy sand, 2 to 6 percent slopes	2	1	2	2	2	2	2
Enon sandy loam, 2 to 6 percent slopes, eroded	2	2	2	2	3	2	2
Enon sandy loam, 6 to 10 percent slopes, eroded	2	2	2	2	3	2	2
Enon sandy loam, 10 to 15 percent slopes, eroded	2	2	2	2	3	2	2
Hayesville sandy loam, 6 to 15 percent slopes	3	2	3	2	3	2	2
Hiwassee sandy loam, 2 to 8 percent slopes, eroded	2	1	1	1	4	1	1
Iredell fine sandy loam, 2 to 6 percent slopes	2	2	2	2	4	2	2
Local alluvial land	1	1	1	1	4	1	1
Lockhart sandy loam, 4 to 10 percent slopes, eroded	2	2	2	2	2	2	2
Louisa sandy loam, 6 to 10 percent slopes, eroded	3	4	4	3	4	3	3
Louisburg loamy sand, 6 to 10 percent slopes	3	3	4	3	4	3	3
Madison clay loam, 2 to 6 percent slopes, severely eroded	2	2	2	2	2	3	3
Madison clay loam, 6 to 10 percent slopes, severely eroded	2	2	2	2	2	3	3
Madison sandy loam, 2 to 6 percent slopes, eroded	1	2	2	1	2	1	1
Madison sandy loam, 6 to 10 percent slopes, eroded	1	2	2	1	2	1	1
Madison sandy loam, 10 to 15 percent slopes, eroded	1	2	2	1	2	1	1
Madison sandy loam, thin solum variant, 2 to 6 percent slopes, eroded	1	2	2	1	2	1	1
Mecklenburg fine sandy loam, 2 to 6 percent slopes, eroded	2	2	2	1	3	1	1
Mecklenburg fine sandy loam, 6 to 10 percent slopes, eroded	2	2	2	1	3	1	1
Musella clay loam, 6 to 10 percent slopes, severely eroded	3	4	4	4	4	3	3
Musella fine sandy loam, 6 to 10 percent slopes, eroded	2	3	3	2	3	3	3
Musella fine sandy loam, 10 to 15 percent slopes, eroded	2	3	3	2	3	3	3
Vance sandy loam, 2 to 6 percent slopes, eroded	2	2	2	2	3	2	2
Vance sandy loam, 6 to 10 percent slopes, eroded	2	2	2	2	3	2	2
Wickham sandy loam, 2 to 6 percent slopes, eroded	1	1	2	1	4	1	1
Wickham sandy loam, 6 to 10 percent slopes, eroded	1	1	2	1	4	1	1
Wilkes fine sandy loam, 2 to 6 percent slopes, eroded	3	3	3	2	4	2	2
Wilkes fine sandy loam, 6 to 10 percent slopes, eroded	3	3	3	2	4	2	2

[1] Mixed alluvial land, wet, is in capability class IVw–1, but its suitability varies and is not rated in this table.

TABLE 3.—*Estimated average acre yields of principal crops under two levels of management*

[Yields in columns A are those obtained under common management; those in columns B are to be expected under highest feasible management. Absence of data indicates crop is not commonly grown or soil is not suited to it]

Soils [1]	Cotton		Corn		Grain sorghum		Oats		Peaches		Fescue and white clover for pasture		Bermudagrass for pasture	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Lb. (lint)	*Lb. (lint)*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [2]	*Cow-acre-days* [2]	*Cow-acre-days* [2]	*Cow-acre-days* [2]
Appling sandy loam, 2 to 6 percent slopes	400	700	40	68	33	50	50	75	300	415	135	170	135	170
Appling and Cecil sandy loams, 2 to 6 percent slopes	400	700	40	65	33	50	50	70	315	425	140	170	140	175
Appling and Cecil sandy loams, 6 to 10 percent slopes, eroded	250	475	40	55	25	40	30	50	300	415	100	150	100	150
Cataula clay loam, 2 to 6 percent slopes, severely eroded	150	300	15	20	20	25	20	33	100	200	100	130	100	120
Cataula clay loam, 6 to 10 percent slopes, severely eroded	------	------	----	----	----	----	15	25	100	200	85	115	90	110
Cataula clay loam, 10 to 15 percent slopes, severely eroded	------	------	----	----	----	----	----	----	------	------	75	110	75	110
Cataula sandy loam, 2 to 6 percent slopes, eroded	300	500	20	40	20	40	20	45	150	325	100	170	100	170
Cataula sandy loam, 6 to 10 percent slopes, eroded	250	450	20	35	20	35	20	35	100	275	85	150	90	140
Cataula sandy loam, 10 to 15 percent slopes, eroded	125	250	10	18	15	22	15	25	------	------	80	130	80	130
Cecil clay loam, 2 to 6 percent slopes, severely eroded	250	450	30	42	30	40	35	48	300	450	90	130	90	130
Cecil clay loam, 6 to 10 percent slopes, severely eroded	200	350	25	40	20	38	25	40	100	200	80	120	80	120
Cecil clay loam, 10 to 15 percent slopes, severely eroded	------	------	----	----	----	----	----	----	100	175	70	100	70	100
Cecil sandy loam, 2 to 6 percent slopes, eroded	400	700	45	65	40	60	50	75	300	475	135	185	135	185
Cecil sandy loam, 6 to 10 percent slopes, eroded	400	615	35	50	20	40	40	60	250	425	110	160	110	160
Cecil sandy loam, 10 to 15 percent slopes, eroded	410	425	25	45	35	30	45	200	400	80	140	140	80	140
Congaree soils	------	------	50	80	50	65	45	65	------	------	140	200	150	200
Davidson clay loam, 2 to 6 percent slopes, severely eroded	250	375	28	48	18	38	25	50	200	390	100	140	100	140
Davidson clay loam, 6 to 10 percent slopes, severely eroded	125	300	20	38	20	30	24	40	175	350	80	135	80	135
Davidson clay loam, 10 to 15 percent slopes, severely eroded	100	290	16	33	15	25	20	32	150	300	75	120	65	120
Davidson loam, 2 to 6 percent slopes, eroded	300	500	50	70	40	60	50	70	300	450	150	180	150	180
Davidson loam, 6 to 10 percent slopes, eroded	275	475	35	55	30	55	40	65	200	390	140	175	140	175
Davidson sandy clay loam, 2 to 6 percent slopes, eroded	300	500	50	70	40	60	50	75	300	475	120	200	120	200
Davidson sandy clay loam, 6 to 10 percent slopes, eroded	275	475	35	55	30	55	40	65	250	425	140	175	140	175
Davidson sandy clay loam, 10 to 15 percent slopes, eroded	190	390	25	52	20	35	20	48	200	350	80	150	80	150
Durham loamy sand, 2 to 6 percent slopes	200	465	35	65	27	43	25	55	175	365	100	168	100	168
Enon sandy loam, 2 to 6 percent slopes, eroded	290	425	22	45	22	35	22	45	80	180	100	155	100	155
Enon sandy loam, 6 to 10 percent slopes, eroded	200	350	17	34	18	30	18	38	75	130	90	145	90	145
Enon sandy loam, 10 to 15 percent slopes, eroded	------	------	----	----	----	----	----	----	------	------	80	115	80	115
Hayesville sandy loam, 6 to 15 percent slopes	------	------	25	55	10	20	20	45	90	150	85	150	85	150
Hayesville sandy loam, 15 to 25 percent slopes	------	------	20	46	----	----	15	36	------	------	80	135	80	135
Hayesville sandy loam, 25 to 40 percent slopes	------	------	----	----	----	----	----	----	------	------	50	90	50	90
Hiwassee fine sandy loam, 2 to 8 percent slopes, eroded	300	500	50	70	40	60	50	70	------	------	150	190	150	190
Iredell fine sandy loam, 2 to 6 percent slopes	200	475	20	45	20	40	30	50	------	------	110	160	110	160
Local alluvial land	450	750	50	70	40	65	50	70	------	------	150	180	150	170
Lockhart sandy loam, 4 to 10 percent slopes, eroded	350	500	25	45	25	38	30	50	200	350	100	150	100	150
Louisa sandy loam, 6 to 10 percent slopes, eroded	130	260	11	22	----	----	10	30	------	------	50	90	60	100
Louisa sandy loam, 10 to 15 percent slopes, eroded	------	------	----	----	----	----	----	----	------	------	------	------	------	------
Louisa sandy loam, 15 to 25 percent slopes, eroded	------	------	----	----	----	----	----	----	------	------	------	------	------	------
Louisburg loamy sand, 6 to 10 percent slopes	100	295	18	30	----	----	20	35	------	------	50	90	60	100

See footnotes at end of table.

TABLE 3.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soils [1]	Cotton		Corn		Grain sorghum		Oats		Peaches		Fescue and white clover for pasture		Bermudagrass for pasture	
	A	B	A	B	A	B	A	B	A	B	A	B	A	B
	Lb. (lint)	*Lb. (lint)*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Cow-acre-days* [2]	*Cow-acre-days* [2]	*Cow-acre-days* [2]	*Cow-acre-days* [2]
Louisburg loamy sand, 10 to 15 percent slopes											40	85	50	90
Louisburg loamy sand, 15 to 25 percent slopes														
Madison clay loam, 2 to 6 percent slopes, severely eroded	150	380	22	45	22	38	25	50	200	400	85	135	85	135
Madison clay loam, 6 to 10 percent slopes, severely eroded	125	350	18	40	18	35	20	38	90	150	75	125	75	125
Madison clay loam, 10 to 15 percent slopes, severely eroded											60	110	60	110
Madison clay loam, 15 to 40 percent slopes, severely eroded														
Madison sandy loam, 2 to 6 percent slopes, eroded	300	550	30	58	20	45	35	65	225	435	125	175	125	175
Madison sandy loam, 6 to 10 percent slopes, eroded	250	475	25	50	22	38	35	55	200	400	85	140	85	140
Madison sandy loam, 10 to 15 percent slopes, eroded	125	375	28	45	20	35	30	50	190	425	75	140	75	140
Madison sandy loam, 15 to 25 percent slopes, eroded											65	120	65	120
Madison sandy loam, 25 to 40 percent slopes, eroded											50	85	50	85
Madison sandy loam, thin solum variant, 2 to 6 percent slopes, eroded	100	250	8	15	10	20	12	25			70	130	70	130
Madison sandy loam, thin solum variant, 6 to 10 percent slopes, eroded											40	90	50	100
Mecklenburg fine sandy loam, 2 to 6 percent slopes, eroded	280	500	25	50	20	40	30	60	100	200	115	175	105	175
Mecklenburg fine sandy loam, 6 to 10 percent slopes, eroded	250	400	20	40	20	35	25	50	90	150	95	145	85	145
Musella clay loam, 6 to 10 percent slopes, severely eroded	100	150	8	15	8	18	10	20	60	100	60	90	60	100
Musella clay loam, 10 to 25 percent slopes, severely eroded											40	85	40	85
Musella fine sandy loam, 6 to 10 percent slopes, eroded	225	375	22	35	15	25	20	45	100	200	85	125	85	127
Musella fine sandy loam, 10 to 15 percent slopes, eroded							10	20	70	100	50	100	50	100
Musella fine sandy loam, 15 to 40 percent slopes, eroded											40	90	40	95
Pacolet clay loam, 15 to 25 percent slopes, severely eroded											50	90	65	90
Pacolet sandy loam, 15 to 25 percent slopes											70	100	70	100
Pacolet sandy loam, 15 to 25 percent slopes, eroded									90	170	65	110	65	110
Pacolet sandy loam, 25 to 40 percent slopes														
Vance sandy loam, 2 to 6 percent slopes, eroded	250	450	20	45	20	35	35	50	100	180	110	160	110	160
Vance sandy loam, 6 to 10 percent slopes, eroded	175	325	18	38	15	30	20	38			75	190	75	130
Wickham sandy loam, 2 to 6 percent slopes, eroded	250	575	35	60	35	48	40	65			135	180	135	180
Wickham sandy loam, 6 to 10 percent slopes, eroded	200	450	30	55	20	40	25	50			115	155	115	155
Wilkes fine sandy loam, 2 to 6 percent slopes, eroded	125	300	20	40	21	31	32	48			100	145	110	145
Wilkes fine sandy loam, 6 to 10 percent slopes, eroded	100	265	18	35	12	26	20	42			75	120	75	120
Wilkes fine sandy loam, 10 to 15 percent slopes, eroded											65	100	65	100
Wilkes fine sandy loam, 15 to 40 percent slopes, eroded														
Worsham fine sandy loam, 0 to 6 percent slopes											90	140	100	140

[1] Because Made land, Mine pits and dumps, Mixed alluvial land, wet, Severely gullied land, Stony land, moderately steep, and units of Moderately gullied land are not used for crops, yields for these mapping units were not estimated.

[2] Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a single grazing season without injury to the sod. An acre of pasture that provides 30 days of grazing for two cows has a carrying capacity of 60 cow-acre-days.

Because normal growth should be reflected by the site index, sites are chosen that have not been damaged by fire, insects, grazing, or other adverse factors. As a rule, there is a close relationship between the site index and the volume produced per acre, as expressed in cubic feet or board feet (figs. 7 and 8).

Seedling mortality refers to the expected loss of seedlings as a result of unfavorable soil characteristics or topographic features, not as a result of plant competition. *Slight* mortality is the loss of less than 25 percent of the seedlings; *moderate*, between 25 and 50 percent; and *severe*, more than 50 percent.

Equipment limitation depends on soil characteristics and topographic features that restrict or prevent the use of conventional equipment for planting and harvesting trees, for constructing roads, for controlling unwanted vegetation, and for controlling fires. The limitation is *slight* if there is little or no restriction on the type of equipment that can be used or the time of the year that equipment can be used. The limitation is *moderate* if the use of equipment is restricted by one or more unfavorable characteristics, such as slope, stones or other obstructions, seasonal wetness, instability, or risk of injury to roots of trees. The limitation is *severe* if special equipment is needed, or the use of such equipment is restricted by more than one unfavorable soil characteristic.

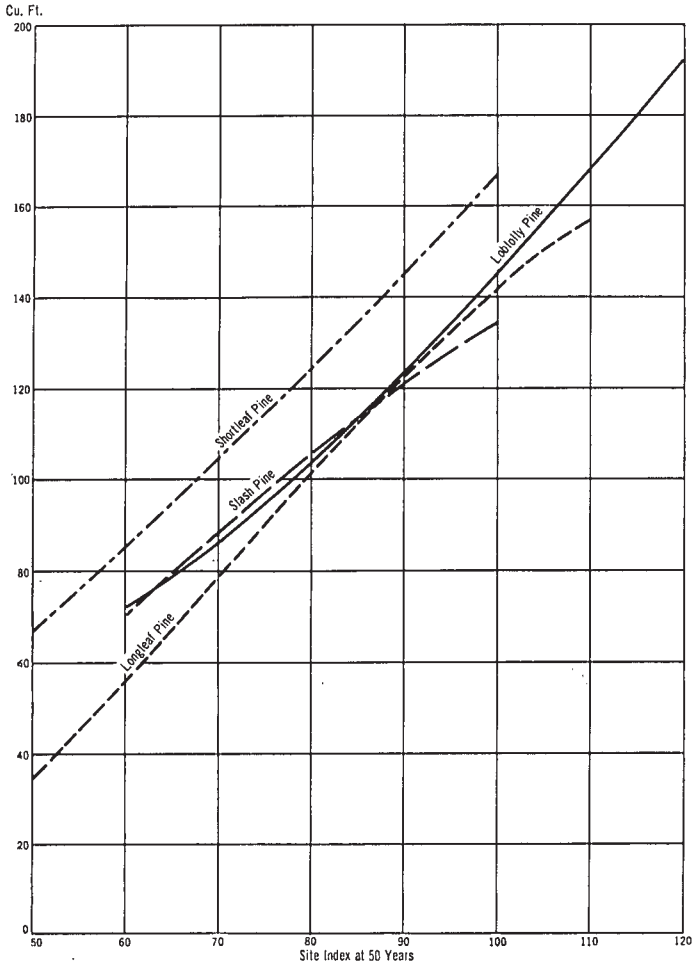

***Figure 7.*—Average annual growth per acre of loblolly, shortleaf, longleaf. and slash pines in stands consisting of trees 2 inches or more in diameter at breast height (*15*).**

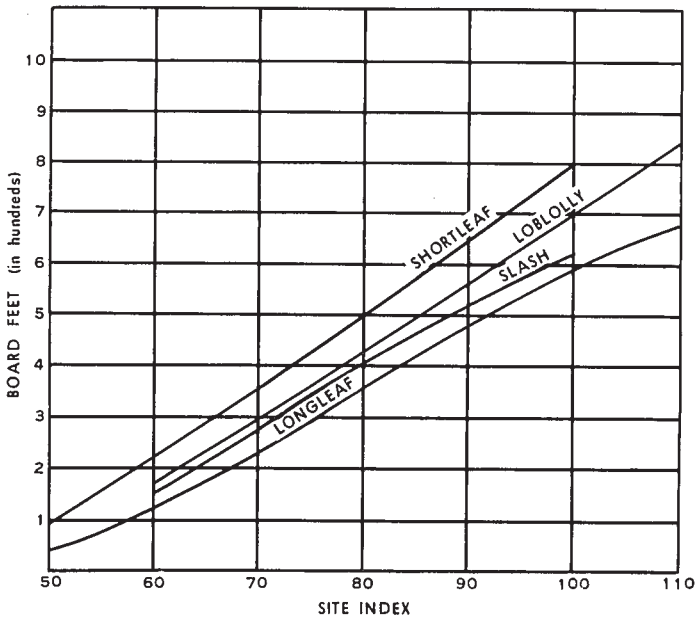

***Figure 8.*—Average annual growth per acre (Scribner, all stems 8 inches or more in diameter) for 50-year-old, well-stocked, unmanaged stands of shortleaf, loblolly, slash, and longleaf pines (*15*).**

Windthrow hazard refers to the risk of trees being blown over by strong winds. The major soil characteristics that affect the anchorage of trees in the soil are shallowness, stoniness, droughtiness, and wetness. The limitation is *slight* if few or no trees are blown down; it is *moderate* if several trees are blown down during periods of excessive wetness and high winds; and it is *severe* if many trees are blown down during periods of excessive wetness and moderate or high winds.

Erosion hazard refers to erosion that is likely to occur after the thinning or logging of stands and in places where the soil is exposed along roads, in fire lanes, and in landings. Soil characteristics that affect the erosion hazard are steepness, stability of soil aggregates, infiltration, permeability, and amount of coarse fragments. The limitation is *slight* if erosion is no problem. It is *moderate* or *severe* depending on the expected degree of erosion or on the practices needed to minimize erosion.

WOODLAND SUITABILITY GROUP 1

This group consists of deep, nearly level, moderately well drained and well drained soils in alluvium. These soils have a sandy loam to clay loam surface layer and subsoil. They are subject to occasional flooding. Infiltration and permeability are moderately rapid, and moisture-supplying capacity is medium to high. The organic-matter content is moderate to high, and natural fertility is moderate.

Trees preferred on these soils are sweetgum, yellow-poplar, blackgum, ash, sycamore, cottonwood, black walnut, red maple, cherrybark oak, Shumard oak, white oak, cow oak, loblolly pine, and slash pine. Also suitable are hackberry, beech, birch, American elm, winged elm, hickory, post oak, willow oak, persimmon, mulberry, dogwood, redcedar, and honeylocust.

The soils in this group are suited to sawtimber or pulpwood rotations and to the production of high-quality veneer logs and long poles or piling. Most of the trees named in the preceeding paragraph are important producers of food for wildlife.

On soils of this group the average site index is 92 for loblolly pine and shortleaf pine. The site index for other suitable species was not determined.

Seedling mortality on this group of soils is slight. Where seed is available and competing vegetation is controlled, natural regeneration of desirable species is generally satisfactory. The regeneration of some trees may be impaired by flooding and siltation, though periods of flooding are generally short.

Equipment limitation is moderate. These soils tend to puddle and pack if worked when wet. Unless trampling by livestock, tillage, and use of forestry equipment are avoided in wet periods, damage to soil structure and to the roots of trees is likely. Floods occasionally restrict access to and use of these soils, but the restriction is generally less than 3 months per year.

During long and continuous periods of drought, sweetgum and other trees may be damaged by dieback.

WOODLAND SUITABILITY GROUP 2

Mixed alluvial land, wet, is the only mapping unit in this group. It consists of deep, very poorly drained silt loam or sandy loam on flood plains. It is generally nearly level and is in depressional areas in places. Infiltration and permeability are rapid, and moisture-supplying capacity is high. The organic-matter content is moderate, and natural fertility is low.

Trees preferred on this land are loblolly pine, sweetgum, blackgum, tupelo-gum, ash, cypress, and red maple. Also suitable are persimmon, hickory, willow oak, hackberry, American elm, winged elm, and beech.

This land is suited to sawtimber or pulpwood rotations and to the production of high-quality veneer logs and of long poles and piling. Most of the trees listed in the preceding paragraph are important sources of food for wildlife.

The average site index is 102 for loblolly pine and 77 for shortleaf pine. Average site indexes for commercial hardwoods have not been determined.

Seedling mortality resulting from unfavorable soil characteristics differs for each kind of tree. Flooding is generally hazardous to the germination of seed and growth of seedlings of both pines and hardwoods. Mortality is severe when flooding and siltation are prolonged. Water management improves the quality of the site and reduces mortality, but in many places this management is not feasible.

The use of equipment is restricted by flooding and poor drainage. Adequate drainage is needed to maintain roads through woodland, but it may not be feasible in all areas. When this land is wet, the use of equipment should be avoided and trampling by livestock prevented, so as to avoid compaction of the soil material and damage to the roots of trees.

Many kinds of trees are suited to this land. Investigation is required at each site to determine the treatment needed and the kinds of trees suited. Putnam, Furnival, and McKnight (7) list approximately 70 important commercial species of the southern bottom lands and describe important characteristics and site requirements for them.

WOODLAND SUITABILITY GROUP 3

This group consists of deep, gently sloping, well drained and moderately well drained soils. These soils have a sandy loam to sandy clay loam surface layer and a friable to firm subsoil. Erosion is slight or moderate. Infiltration and permeability are moderately rapid to moderately slow, and moisture-supplying capacity is medium to high. These soils are moderately high to low in natural fertility and content of organic matter.

Loblolly pine is preferred on this soil, but shortleaf pine and Virginia pine are also suitable. Plantings of longleaf pine and of slash pine have been successful, and at lower elevations these trees are preferred. Yellow-poplar and black walnut are preferred broadleaf trees, but scarlet oak, northern red oak, black oak, and southern red oak are also suitable.

The soils in this group are suited to sawtimber or pulpwood rotations and to the production of medium to long poles and piling. Oak, hickory, persimmon, and black cherry are important sources of food for wildlife. Pine, redcedar, and ligustrum are suitable for windbreaks. Native trees suitable in landscaping are dogwood, redbud, holly, redcedar, sugar maple, basswood, oak, hickory, and pine.

The average site index for loblolly pine is generally 75 but is 94 on moist sites. For shortleaf pine, site index is generally 65 but is 79 on moist sites. It is 55 for longleaf pine and 73 for Virginia pine.

Equipment limitation and erosion hazard are moderate on soils in this group that have a sandy clay loam surface layer and slopes of 2 to 6 percent. Care is needed in locating roads and firebreaks and in tilling and other operations that destroy cover or promote the accumulation of water.

Littleleaf disease may damage loblolly and shortleaf pine, but in most places damage is slight because the root zone is deep. This disease is more serious on the eroded Davidson soils than on the other soils of this group.

WOODLAND SUITABILITY GROUP 4

This group consists of deep and moderately deep, well-drained, sloping and strongly sloping soils. These soils have a sandy loam to sandy clay surface layer and a friable to firm subsoil. Erosion is slight or moderate. Infiltration and permeability are moderate to moderately slow, and moisture-supplying capacity is medium to high. These soils range from moderately high to low in natural fertility and content of organic matter.

Loblolly pine is preferred on these soils, but shortleaf pine and Virginia pine are also suitable. At lower elevations longleaf pine and slash pine are also preferred, and on many of the soils in this group, plantings of these trees have been successful.

The soils of this group are suited to sawtimber or pulpwood rotations and to the production of medium to long poles and piling. Yellow-poplar, sweetgum, upland oak, and black walnut are preferred broadleaf trees, especially on the more favorable, moist slopes. Important sources of food for wildlife are oak, hickory, persimmon, black cherry, beech, black walnut, honeylocust, and many kinds

of shrubs. Pine, redcedar, Arizona cypress, and ligustrum are important for planting in windbreaks. Native trees suitable for use in landscaping are dogwood, redbud, holly, redcedar, black walnut, beech, black locust, pecan, elm, red maple, sugar maple, basswood, oak, hickory, pine, magnolia, and yellow-poplar.

The average site index for loblolly pine is generally 75, but is 96 on moist sites. For shortleaf pine, site index is generally 64 but is 84 on moist sites. It is 64 for longleaf pine and 73 for Virginia pine.

Equipment limitation is severe on soils of this group. Windthrow is a hazard on eroded soils with slopes of 10 to 15 percent and in areas where boulders and dikes of quartz occur. The hazard of erosion is severe on the steeper slopes. Littleleaf disease damages some trees on these soils but not so seriously as on severely eroded soils.

WOODLAND SUITABILITY GROUP 5

This group consists of moderately deep to shallow, well-drained, moderately steep and steep soils. These soils have a sandy loam surface layer and a friable to firm subsoil. Erosion is slight or moderate. Infiltration and permeability are moderately rapid to moderate, and moisture-supplying capacity is medium to high. These soils are low in natural fertility and content of organic matter.

On these soils loblolly pine is preferred for sawlog and pulp rotations but shortleaf pine and Virginia pine are also suitable. Slash pine and longleaf pine are also preferred at lower elevations. On some of these soils, plantings of slash pine have been successful.

The soils of this group are suited to sawtimber or pulpwood rotations and to the production of medium to long poles and piling. Yellow-poplar, sweetgum, black walnut, black cherry, and upland oak are broadleaf trees preferred for sawtimber, veneer logs, and furniture stock. Oak, hickory, beech, black walnut, and persimmon are important sources of food for wildlife. Pine, redcedar, Arizona cypress, and ligustrum are suitable for windbreaks. Trees suitable for use in landscaping are dogwood, redbud, holly, redcedar, black walnut, pecan, elm, yellow-poplar, red maple, sugar maple, basswood, oak, hickory, magnolia, and pine.

The average site index is generally 83 for loblolly pine, but is 65 on dry ridgetops. The site index is 65 for shortleaf pine.

Because of steep slopes, gravel, dikes of quartz, and the hazard of erosion, equipment limitation on soils of this group is severe and access to the area is restricted. Constructing roads or firebreaks or disturbing the ground cover in other ways should be avoided, for the hazard of erosion is severe. Unless these soils are protected from overgrazing, damage to the soils and to trees is severe.

WOODLAND SUITABILITY GROUP 6

This group consists of deep to shallow, well-drained, gently sloping to strongly sloping soils. These soils have a clay loam surface layer and a friable to firm subsoil. They are severely eroded. Infiltration is slow, and permeability is moderate to moderately slow. Moisture-supplying capacity ranges from low to high. These soils are low in natural fertility and content of organic matter.

On the Musella soil, which has a firm subsoil, Virginia pine (fig. 9) is preferred. Loblolly pine is preferred on the other soils in this group, which have a friable subsoil. Shortleaf pine is not well suited, because littleleaf disease is a serious hazard on these severely eroded soils, especially the ones that have a firm subsoil.

The Cecil, Davidson, and Madison soils are suited to sawtimber or pulpwood rotations and to the production of poles and piling of medium length. The Musella soil is suited to pulpwood or rotations of small sawtimber and to production of posts and short poles.

On all the soils of this group except the shallow Musella soil, yellow-poplar, sweetgum, black walnut, black cherry, and upland oak are broadleaf trees preferred for sawtimber, veneer logs, and furniture stock. The shallow Musella soil is not suited to trees grown for these purposes. Oak, hickory, beech, black walnut, black cherry, and persimmon are important sources of food for wildlife. Pine, redcedar, Arizona cypress, and ligustrum are suitable for use in windbreaks on the deeper soils.

On the soils of this group, the average site index is generally 73 for loblolly pine, but it is 91 on moist sites where the subsoil is friable, and it is 60 or less on dry sites where the subsoil is firm. Site index is generally 63 for shortleaf pine, but it is about 70 on moist sites where the subsoil is friable, and it is 50 or less on dry sites where the subsoil is firm. Average site index is 70 for longleaf pine and 66 for Virginia pine.

Seedling mortality is severe on the drier slopes where runoff is rapid and the root zone is restricted by a firm subsoil or by bedrock near the surface. Loss of seedlings exceeds 50 percent of planted stock, and natural regeneration cannot be relied on to establish a well-stocked stand. Establishing plants, fertilizing, mulching, building brush dams, and other practices may be needed to control erosion before seedlings are planted.

Equipment limitations are severe on the stronger slopes and where the solum is thin because of severe erosion or bedrock near the surface. When these soils are wet, severe damage to tree roots and compaction of the soil material are prevented by avoiding the use of equipment and by preventing trampling by livestock.

Windthrow and erosion are severe hazards, especially where the solum is thin. To lessen erosion, constructing roads, and any other operation that disturbs ground cover, should be avoided where feasible. Necessary construction should be on the contour.

WOODLAND SUITABILITY GROUP 7

The soils of this group consist of severely eroded, moderately deep to shallow, well-drained soils. Slopes range from 10 to 40 percent. These soils have a clay loam surface layer and a friable to firm clay subsoil. Infiltration is slow, and permeability is moderate to moderately slow. Moisture-supplying capacity is low to medium. These soils are low in natural fertility and content of organic matter.

Loblolly pine is generally preferred on these soils, but Virginia pine is preferred on the dry slopes of shallow soils. At the lower elevations, longleaf pine and slash pine are suitable. Loblolly pine on the dry slopes is damaged by dieout.

The moderately deep, friable Madison soil is suited to sawtimber and to the production of medium to long poles and piling. The shallow Musella and moderately deep Pacolet soils are suited to rotations of small sawtimber or pulpwood and to the production of posts and short poles. In local areas that are not suitable for

Figure 9.—**Virginia pine reseeding on Musella clay loam, 6 to 10 percent slopes, severely eroded.**

producing commercial trees, control of erosion is the primary objective in managing woodland.

Broadleaf trees preferred for sawtimber, veneer logs, pulpwood, and furniture stock are yellow-poplar, sweetgum, black walnut, and upland oak. Oak, hickory, black cherry, persimmon, and black walnut are primary sources of food for wildlife. Native trees suitable for use in landscaping are dogwood, redbud, redcedar, black locust, beech, black walnut, pecan, elm, yellow-poplar, red maple, sugar maple, oak, hickory, and pine.

The average site index for loblolly pine is generally 72, but it is 90 on moist sites. Site index is 66 for shortleaf pine and 65 for longleaf pine.

Seedling mortality is severe on the drier slopes and in shallow areas where the subsoil is firm. Loss of seedlings exceeds 50 percent of planted stock, and natural regeneration cannot be relied on to establish a well-stocked stand. Establishing plants, mulching, fertilizing, building brush dams, or other practices may be needed to control erosion prior to transplanting the seedlings.

Equipment limitations are severe on the soils of this group because of steep slopes and severe erosion. To prevent further erosion, special care is needed in laying out, constructing, and maintaining logging roads, skid trails, firebreaks, and landings and in operating equipment. Because the root zone is generally shallow, damage of roots by equipment is likely. Trampling by livestock also damages roots and compacts the soil material.

Because slopes are steep, runoff is rapid, and erosion is a severe hazard, careful management is needed to insure adequate protection. Windthrow is moderate or severe. Salvage cutting may be needed in places where windthrow is severe.

WOODLAND SUITABILITY GROUP 8

Iredell fine sandy loam, 2 to 6 percent slopes, is the only soil in this group. It is a moderately deep, moderately well drained soil that has a fine sandy loam surface layer and a very plastic clay subsoil. Infiltration is moderate and permeability is very slow. Internal drainage is very

slow, and moisture-supplying capacity is low. This soil is low in natural fertility and content of organic matter.

Loblolly pine is preferred on this soil. Shortleaf pine is suitable, but on this soil it is subject to severe damage by littleleaf disease. Eastern redcedar is preferred for posts and for Christmas trees.

This soil is suited to small-sized sawtimber or pulpwood rotations and to the production of posts and short poles and piling. Loblolly pine and redcedar are suitable for windbreaks. Oak and hickory are primary sources of food for wildlife but are limited in their production of wood crops. Native trees that are suitable for use in landscaping are oak, hickory, pine, redcedar, sweetgum, dogwood, redbud, holly, and elm.

On this soil the average site index is 65 for loblolly pine and 55 for shortleaf pine.

Seedling mortality is moderate or severe, and natural regeneration cannot be relied on to establish a well-stocked stand of desired pines. Moderate infiltration, very slow permeability, a very plastic subsoil, and a shallow solum restrict the moisture-supplying capacity, aeration, and root development.

The use of equipment is severely restricted by poor internal drainage, soil texture, plasticity of the subsoil, and other unfavorable characteristics. The hazard of erosion is slight, and windthrow is slight or moderate.

WOODLAND SUITABILITY GROUP 9

This group consists of severely eroded, moderately well drained to well drained soils in the uplands. Slopes range from 2 to 15 percent. The surface layer is clay loam, and the subsoil is firm to very firm, plastic clay. Infiltration is slow, and permeability is moderately slow to slow. Moisture-supplying capacity is low.

Loblolly pine, Virginia pine, and redcedar are preferred on these soils, These trees are used mainly for watershed protection and erosion control. These soils, however, are suitable for small-sized sawtimber or pulpwood rotations, but dieout may severely affect loblolly pine.

Oak, hickory, pine, redcedar, and elm are native trees suitable for use in landscaping, and oak and hickory are important sources of food for wildlife.

The average site index is 70 for loblolly pine and 55 for shortleaf pine, but for both trees the range of site index is wide.

Because of many hazards and limitations, the soils of this group are low in production of wood crops. They are generally more suitable for pines than for broadleaf trees. Redcedar may compete with pines on more favorable sites.

Seedling mortality is moderate or severe. In the more severely eroded areas, fertilizing, establishing dams by planting vegetation, building brush dams, mulching, ripping, or other practices for preparing the site are needed to control erosion and protect seedlings. Frequently, the cost of this intensive treatment exceeds the expected returns. Natural regeneration cannot be relied on to adequately restock denuded or cutover areas.

Because slopes are steep, erosion is severe, and the subsoil is plastic, equipment limitations are severe and access to the area is restricted. Runoff is rapid, and the hazard of erosion is severe. Windthrow is severe because the root zone is only moderately deep.

WOODLAND SUITABILITY GROUP 10

This group consists of eroded, moderately deep to deep, moderately well drained to well drained soils in the uplands. The surface layer is sandy loam. The subsoil of most soils is very firm clay, but that of Enon soils is plastic. Infiltration is moderate, and permeability is slow. The moisture-supplying capacity is medium to low.

Loblolly pine is preferred on these soils for sawtimber or pulpwood rotations, but shortleaf pine and Virginia pine are also suitable. These soils are suited to the production of short and medium poles and piling. Pine, oak, and hickory are important sources of food for wildlife, and pine and redcedar are suitable for windbreaks.

The average site index is 74 for loblolly pine and 59 for shortleaf pine.

Seedling mortality of planted pines is moderate to severe, and in most places some replanting is needed to provide adequate stocking. The equipment limitation is severe in areas of Enon soils where the subsoil is plastic and the surface soil is not thick. In other areas the equipment limitation is moderate.

On slopes of 6 percent or more, the erosion hazard is moderate to severe. Windthrow is a moderate hazard on soils that are moderately deep. Littleleaf disease of shortleaf pine and dieout of loblolly pine are more severe on moderately deep soils than they are on deep soils.

WOODLAND SUITABILITY GROUP 11

This group consists of well-drained to excessively drained soils that have a shallow root zone. Slopes range from 6 to 25 percent. The surface layer is sandy loam, loamy sand, or fine sandy loam. The subsoil is thin or discontinuous and varies widely in texture. Infiltration is moderate, and permeability is moderately rapid or rapid. The moisture-supplying capacity is low.

All soils in this group except the Louisburg are moderately eroded. In places where hard rock is at or near the surface, the wood crops obtained may not justify the cost of production. On these sites control of erosion is the primary objective of management. On-site investigations are needed before undertaking intensive management of these sites as woodland. On sites where the root zone and water-supplying capacity are favorable, commercial wood crops can be grown.

On these soils loblolly pine and Virginia pine are preferred, but longleaf pine, shortleaf pine, and slash pine are also suitable on the more favorable sites. Although suitability varies widely, the soils of this group are generally suited to the production of short and medium poles and piling. Pine and redcedar are suitable for windbreaks.

The average site index for loblolly pine is generally 74, but it is 82 on moist sites. Average site index is 68 for shortleaf pine, 73 for longleaf pine, and 82 for Virginia pine. For these trees, the range in site index is wide, and the average may not apply to a specific site.

Because of many hazards and limitations, the soils of this group are difficult to manage as woodland. The equipment limitation is moderate on slopes of less than 10 percent, and it is severe on slopes of more than 10 percent and on very stony sites. A shallow surface soil or a plastic subsoil also limits the use of equipment. Roots of trees may be damaged and the soil material compacted

if equipment is used when the soils are wet. The hazard of erosion is moderate.

Seedling mortality depends on moisture-supplying capacity and is moderate or severe. In places where bedrock is near the surface, windthrow is severe.

WOODLAND SUITABILITY GROUP 12

This group consists of deep, moderately well drained to well drained, moderately eroded soils that have a fine sandy loam surface layer and a firm, slightly plastic clay subsoil. Slopes range from 2 to 10 percent. Infiltration is moderate, and permeability is moderately slow. The moisture-supplying capacity is medium.

Loblolly pine is preferred on these soils for sawtimber or pulpwood rotations, but shortleaf pine, slash pine, and Virginia pine are also suitable. These soils are suited to the production of short and medium poles and piling. Oak and hickory are important sources of food for wildlife.

On these soils the average site index is 80 for loblolly pine and 58 for shortleaf pine.

The erosion hazard is moderate. Roads and firebreaks should be built on the contour, and any other operation that destroys ground cover should be avoided if possible.

Shortleaf pine may be damaged by littleleaf disease and loblolly pine by dieout, but these diseases are not so serious on these soils as they are on severely eroded soils.

WOODLAND SUITABILITY GROUP 13

Worsham fine sandy loam, 0 to 6 percent slopes, is the only soil in this group. It is a deep, poorly drained soil that has a sandy clay loam subsoil. It is in depressions, at the head of streams, and along drainageways. Infiltration is moderate, and permeability is slow. Moisture-supplying capacity is medium to high. Organic-matter content and natural fertility are low.

Loblolly pine is preferred on this soil, but slash pine is suitable in areas where surface drainage is adequate. Sweetgum, blackgum, and other moisture-tolerant hardwoods are suitable where surface drainage is inadequate for pines.

This soil is moderately well suited to sawtimber or pulpwood rotations and to the production of medium and long poles and piling. Most of the trees named in the preceeding paragraph are important producers of food for wildlife.

The average site index is 75 for loblolly pine, 66 for shortleaf pine, and 70 for longleaf pine. The site index for suitable hardwoods was not determined.

The equipment limitation is severe. Because the subsoil of this soil is sticky or plastic when wet and hard when dry, the use of equipment is restricted for long periods after rains and during periods of drought. Adequate drainage of roads is needed, and other management of water can be used to facilitate the use of equipment.

Seedling mortality is moderate to severe because this soil swells when wet and shrinks when dry. Interplanting may be needed to obtain a well-stocked stand.

WOODLAND SUITABILITY GROUP 14

This group consists of Made land, of Mine pits and dumps, and of areas of Moderately gullied land, Severely gullied land, and Stony land. These miscellaneous land types are highly variable in most characteristics. Organic-matter content and fertility are low, and moisture-supplying capacity is variable.

Merchantable trees grow in some areas between gullies where the surface soil remains, but the site index of these mapping units is generally low. Producing sawtimber on these units may not be profitable. Sites should be carefully investigated to determine their suitability before attempting to establish trees.

The use of equipment is severely limited by pits and mounds, gullies, stones, and firm subsoil material. Seedling mortality is severe and generally exceeds 50 percent because the supply of moisture is low. Mulching and other preparation of sites may be needed before planting to establish adequate stands. The hazard of erosion is severe, and ground cover should be established as quickly as possible after planting. Existing ground cover should not be disturbed any more than necessary.

Wildlife and Fish [5]

Most of the soils in Spartanburg County are suited to and support one or more kinds of wildlife. Bobwhite (quail), mourning doves, rabbits, squirrels, and many nongame birds are common throughout the county. Most farms have sites that are suitable for fishponds. In many places nearly level bottom land can be diked and developed as duck fields. Deer were once numerous in the county, but by 1900 they were almost exterminated because hunting had been excessive and suitable habitat destroyed. During the past decade, however, deer have been reintroduced, and they are increasing rapidly. In the southern part of the county, large, steep, eroded areas that were formerly cultivated can be successfully managed for deer. Wild turkeys were also once numerous in the county, but they have disappeared. Restoring turkeys in significant numbers is not likely, because there are no extensive areas of hardwoods to provide the isolation required by these birds.

Kinds of soil and changes in land use or water management favorably or unfavorably affect wildlife and fish, depending on the species. Erosion is particularly harmful because it makes the soils less productive of wildlife food and because it lessens fish production by muddying streams and ponds.

The following paragraphs summarize the needs of the more important kinds of wildlife in Spartanburg County:

Bobwhite (quail).—The choice foods of bobwhite are acorns, beechnuts, pecans, blackberries, dewberries, mulberries, wild black cherries, and seeds from browntop millet, corn, cowpeas, annual lespedeza, bicolor lespedeza, partridgepeas, ragweed, tickclover, flowering dogwood, pine, and sweetgum. Quail also eat many kinds of insects. The food must be close to plant cover that provides shade and protection from predators and bad weather.

Deer.—Choice foods of deer are acorns and the foliage of bahiagrass, clover, cowpeas, greenbrier, honeysuckle, annual lespedeza, bicolor lespedeza, oats, rescuegrass, ryegrass, and wheat. For adequate cover, deer generally require wooded areas of 500 acres or more.

Ducks.—Choice foods for ducks are acorns and beechnuts, and the seeds of browntop millet, corn, Japanese millet, and smartweed. These foods are more readily available if the feeding area is flooded, though ducks occasionally eat acorns and corn on dry land.

[5] By WILLIAM W. NEELY, biologist, Soil Conservation Service.

Mourning doves.—Choice foods of mourning doves are the seeds of browntop millet, corn, Japanese millet, common ragweed, pine, and sweetgum. Doves do not eat insects, green leaves, or fruits. They must have water daily.

Rabbits.—Clover, grass, and other succulent plants are choice foods for rabbits and are available in most places. Protective cover, such as a blackberry patch or a plum thicket, is essential for rabbits.

Squirrels.—Choice foods for squirrels are acorns, beechnuts, hickory nuts, pecans, and the seeds of corn, blackgum, black cherry, flowering dogwood, and pine. Squirrels also eat mulberries.

Nongame birds.—The choice foods of the many kinds of nongame birds vary widely. Many kinds eat only insects; a few eat both insects and seeds; and others eat insects and nuts, acorns, and fruits. For this reason, the rating of plants as food for nongame birds in table 4 is general and allows for many exceptions.

Fish.- The main kinds of game fish in Spartanburg County are bluegills, bass, and channel catfish. The choice foods of bluegills are mostly aquatic worms, insects, and the larvae of insects. Bass and channel catfish feed mainly on small fish. The amount of food available for fish is related to the fertility of the water, to the fertility of the soils that make up the watershed, and somewhat to the fertility of the soil material at the bottom of the pond. Because the soils in the county are generally low in fertility and the soil material at the bottom of ponds is acid, the amount of food available in ponds is low, unless the ponds have been limed and fertilized. Added lime and fertilizer encourages the growth of plankton, which is eaten by animals that are food for fish.

Wildlife suitability groups of soils

Most kinds of wildlife cannot be related directly to the soils of Spartanburg County. Instead, each species is first related to plants that provide its food, as shown in table 4. In table 4 these plants are rated 1 (choice), 2 (fair), and 3 (unimportant), according to their suitability in providing food for specified kinds of wildlife. The food plants, in turn, are related directly to groups of soils according to the suitability of the plants to the soils in each group. This relationship is shown in table 5. In this table the suitability of specified plants to the soils of the seven wildlife suitability groups is rated 1 (good), 2 (fair), and 3 (poor). By studying tables 4 and 5, a farmer or others can determine the suitability of each kind of food plant for a group of soils and therefore the kinds of wildlife that are likely to be found on that group. Cover is not an important consideration in this county because the plants that furnish food provide some cover and other cover is either abundant or can be readily grown.

The soils in each wildlife suitability group can be found by referring to the "Guide to Mapping Units" at the back of this survey. Made land, Mine pits and dumps, and Severely gullied land and units of Moderately gullied land were not assigned to a wildlife group, because their suitability for wildlife varies. In the following pages, the seven wildlife suitability groups of the county are briefly discussed.

WILDLIFE SUITABILITY GROUP 1

This group consists of deep, chiefly well-drained soils in the uplands and on stream terraces. Slopes range from 2 to 15 percent. The surface layer of these soils is sandy loam, fine sandy loam, loam, or loamy sand. The subsoil is moderately permeable clay to sandy clay loam. These soils are easily worked, and their moisture-supplying capacity is moderately high. Erosion is only a moderate hazard if suitable systems of cropping and of water disposal are used.

The soils in this group are well suited to management that provides food and cover for upland wildlife. They are the best soils in the county for management that attracts quail, and their terrain is favorable for hunting quail. A large number of doves inhabit areas of these soils because much of the acreage is cultivated and waste seeds provide abundant choice food. In many drainageways through areas of these soils, sites for fishponds are excellent.

WILDLIFE SUITABILITY GROUP 2

This group consists of deep, well-drained soils in the uplands, where slopes range from 10 to 40 percent. The surface layer is sandy loam, sandy clay loam, fine sandy loam, or loam. The subsoil is moderately permeable clay to clay loam. Because these soils are steep, they are difficult to work and the erosion hazard is severe. The moisture-supplying capacity is moderately high.

These soils are fairly extensive in this county and are distributed throughout. Much of the acreage is wooded. Selected sites can be used for perennial plants that provide food for quail, but the steep soils are only marginal for annual lespedeza and generally are not suited to other annuals. Also the steep slopes are not favorable for hunting.

The number of rabbits is fairly high on these soils because good cover is provided by the treetops that were left after trees were cut for pulpwood. Habitat suitable for deer is in areas of these soils in the southern part of the county. The soils of this group are suited to wild black cherry, flowering dogwood, and hickory trees, all of which produce choice food for squirrels. The many drainageways through the soils of this group provide favorable sites for fishponds.

WILDLIFE SUITABILITY GROUP 3

This group consists of well-drained, steep or severely eroded soils that are gullied in places. Slopes range from 2 to 40 percent. In most places these soils have low to moderate moisture-supplying capacity. Tilth generally is poor, and the erosion hazard is severe.

The soils of this group occur throughout the county. Most of the acreage has been cleared and cultivated, but now it is in forest. Because of poor tilth, severe erosion, or steep slopes, plants that provide food for wildlife are difficult to establish and maintain. These soils are not well suited to any plants that produce food, and even the more gently sloping soils are only marginal for clover, grass, lespedeza, and tickclover. Sites are favorable for fishponds in some drainageways through areas of these soils, but management is needed to reduce siltation and muddiness.

WILDLIFE SUITABILITY GROUP 4

This group consists chiefly of gently sloping soils that are moderately well drained or somewhat poorly drained.

TABLE 4.—*Suitability of plants as food for wildlife*

[Number 1 indicates choice food that is attractive and nutritious; number 2 indicates food eaten only when choice food is unavailable; number 3 indicates food is unimportant in diet but small amount may be eaten]

Plant	Part of plant eaten	Bobwhite	Deer	Doves	Ducks	Rabbits	Squirrels	Nongame birds		
								Fruit eaters [1]	Grain and seed eaters [2]	Nut and acorn eaters [3]
Bahiagrass	Forage	3	1	3	3	3	3	3	3	3
	Seed	3	3	2	3	3	3	3	2	3
Beech	Nut	1	2	3	1	3	1	3	3	1
Blackberry	Fruit	1	3	3	3	3	1	1	3	3
	Forage	3	2	3	3	2	3	3	3	3
Blackgum	Fruit	2	3	3	2	3	2	1	3	3
Browntop millet	Seed	1	3	1	1	3	3	3	1	3
Buttonclover	Forage	3	1	3	3	1	3	3	3	3
Cherry, black (wild)	Fruit	1	3	3	3	2	1	1	3	3
Clover, crimson	Forage	2	1	3	3	1	3	3	3	3
Clover, white	Forage	2	1	3	3	1	3	3	3	3
Corn	Seed	1	1	1	1	1	1	3	1	2
Cowpeas	Seed	1	1	2	3	2	3	3	3	3
Dewberry	Fruit	1	3	3	3	2	1	1	3	3
Dogwood, flowering	Fruit	2	2	3	3	3	1	1	3	3
Fescue, tall	Forage	3	2	3	3	2	3	3	3	3
Grapes, wild	Fruit	2	2	3	3	3	2	1	3	3
Greenbrier	Forage	3	1	3	3	1	3	3	3	3
Hackberry	Fruit	3	2	1	1	1	2	1	3	3
Hickory	Nuts	3	3	3	3	3	1	3	3	1
Honeysuckle	Forage	3	1	3	3	2	3	3	3	3
Japanese millet	Seed	1	3	1	1	1	3	3	1	3
Lespedeza, annual	Forage	3	2	3	3	2	3	3	3	3
	Seed	1	3	2	3	3	3	3	3	3
Lespedeza, bicolor	Forage	3	1	3	3	2	3	3	3	3
	Seed	1	3	3	3	3	3	3	3	3
Lespedeza, sericea	Seed	3	3	3	3	3	3	3	3	3
Mulberry	Fruit	1	2	3	3	3	1	1	3	3
Oak	Acorns	1	1	3	1	3	1	3	3	1
Oats	Forage	3	1	3	3	1	3	3	3	3
	Seed	2	3	2	2	2	1	3	1	3
Pecan	Nut	2	2	3	3	3	1	3	3	1
Pine	Seed	1	3	1	3	2	1	3	1	1
Ragweed, common	Seed	1	2	1	3	3	3	3	1	3
Rescuegrass	Forage	3	1	3	3	2	3	3	3	3
Ryegrass	Forage	3	1	3	3	1	3	3	3	3
Smartweed	Seed	3	3	3	1	3	3	3	3	3
Sorghum, grain [4]	Seed	1	1	1	1	1	1	3	1	3
Soybean	Seed	2	1	2	2	1	3	3	3	3
Sweetgum	Seed	1	3	1	2	3	2	3	1	3
Tickclover (beggarlice)	Seed	1	3	3	3	3	3	3	3	3
Wheat	Forage	3	1	3	3	1	3	3	3	3
	Seed	1	3	1	1	1	1	3	1	3

[1] Bluebirds, catbirds, mockingbirds, and waxwings.
[2] Blackbirds, cardinals, meadowlarks, sparrows, and towhees.
[3] Chickadees, grackles, bluejays, titmice, and woodpeckers.
[4] Grain sorghum is choice food of most birds and animals that feed on grain. Suitability as wildlife food is limited, however, because grain sorghum attracts blackbirds, cowbirds, sparrows, and other unwanted birds, and it rots quickly in humid climate.

Slopes range from 2 to 15 percent. The Enon and Iredell soils of this group have a plastic and sticky subsoil and very slow internal drainage. The Cataula soils are well drained but have a very firm and compact subsoil that restricts root penetration.

The soils of this group generally occur in local areas of the county and are called blackjack land. Much of the acreage is in crops or pasture. These soils are generally suited to many kinds of plants that produce food for wildlife. These soils produce good stands of lespedeza, tickclover, and other legumes that provide food for quail. The number of doves is above average in most places, probably because the supply of drinking water is well distributed and dependable on the soils of this group.

WILDLIFE SUITABILITY GROUP 5

This group consists of nearly level to steep soils that, in many places, are less than 36 inches deep to bedrock. Slopes range from 2 to 40 percent. These soils are well drained to excessively drained and have very low moisture-supplying capacity.

Most of the acreage of the soils in this group that has been cleared and cultivated presently is not farmed. These soils are marginal or poorly suited for annual or perennial plants that provide food for wildlife, but hickory, oak, pine, flowering dogwood, and other trees grow naturally and provide some choice food. Generally, practices that protect the existing vegetation are the only practices

TABLE 5.—*Suitability of plants for wildlife suitability groups of soils*

[Number 1 indicates that the plant is well suited; number 2, fairly well suited; and number 3, poorly suited. To determine the soils in each wildlife suitability group, refer to the "Guide to Mapping Units"]

Plant	Wildlife suitability group						
	1	2	3	4	5	6	7
Bahiagrass	1	2	3	1	2	1	3
Beech	2	2	3	1	3	1	2
Blackberry	1	1	2	1	2	1	1
Blackgum	1	1	3	2	3	1	1
Browntop millet	1	3	2	1	2	1	1
Cherry, black (wild)	1	1	3	2	2	1	2
Clover, crimson	1	2	3	2	2	1	3
Clover, white	1	3	3	1	3	1	1
Corn	1	3	3	2	3	1	2
Cowpeas	1	3	3	1	2	1	2
Dewberry	1	2	2	1	2	2	2
Dogwood, flowering	1	1	2	1	1	2	3
Fescue, tall	1	2	3	1	3	1	1
Grapes, wild	1	1	2	1	2	1	2
Greenbrier	1	2	2	1	2	1	2
Hackberry	1	2	2	2	2	2	3
Hickory	1	1	3	1	2	1	3
Honeysuckle	1	2	3	1	2	1	2
Japanese millet	1	3	3	1	3	1	1
Lespedeza, annual	1	2	2	1	2	1	2
Lespedeza, bicolor	1	2	2	2	2	1	3
Lespedeza, sericea	1	2	2	2	2	1	3
Mulberry	1	3	3	2	3	1	3
Oak	1	2	2	2	2	1	1
Oats (forage)	1	3	3	1	3	1	3
Pecan	1	1	3	1	2	1	3
Pine	1	1	2	2	2	1	2
Ragweed, common	1	3	3	1	3	1	3
Rescuegrass	1	2	3	1	2	1	2
Ryegrass	1	3	3	1	3	1	2
Smartweed	3	3	3	3	3	2	1
Sorghum, grain	1	3	3	1	3	1	3
Sweetgum	1	1	2	2	2	1	1
Tickclover (beggarlice)	1	2	2	1	2	1	3
Wheat (forage)	1	3	3	1	3	1	3

feasible in managing these soils for wildlife. Sites for ponds are poor because bedrock is near the surface.

WILDLIFE SUITABILITY GROUP 6

This group consists of deep, moderately well drained soils around the head of drainageways and on first bottoms along streams. These soils have a high moisture-supplying capacity. Along streams, they are susceptible to infrequent flooding that lasts for short periods.

The soils of this group are in small areas scattered throughout the county. They are easily worked, and many fields are cultivated or pastured. Most plants that provide food for wildlife are suited, but bicolor lespedeza and other perennials are not suitable for planting in the wetter areas. Some of the sites most favorable in the county for duck fields are on these soils. Also favorable are sites for ponds. Most uncleared areas are in hardwoods that provide food and a favorable habitat for squirrels.

WILDLIFE SUITABILITY GROUP 7

This group consists of poorly drained soils that, in places, are frequently flooded. Because of these limitations, these soils are not suited to bicolor lespedeza, tickclover, and other perennial plants that provide food for quail. In some places, fields can be diked, planted, and flooded for use by ducks. Choice food plants suitable for seeding on these fields are browntop millet, Japanese millet, and smartweed.

Planning for wildlife management

Farmers needing more information in planning wildlife management than is given in this subsection can obtain it through the local office of the Soil Conservation Service. This office maintains specific, up-to-date technical guides for managing soils so that they produce plants suitable for the food and cover needed by the important species of wildlife in the county. The office also has plans for practices that help to conserve both soil and water and that are adapted to each soil and area of surface water in the county. Thus, the farmer can obtain practical help in planning and establishing suitable habitats for any specified kind of wildlife.

Engineering Applications [5a]

Soil properties that interest the engineer because they affect design and construction are permeability, shear strength, compaction characteristics, grain size, plasticity, depth to water table, depth to bedrock, and topography. These properties affect the suitability of soils for use in construction of roads, pipelines, foundations, sewage disposal systems, drainage systems, terraces, and farm ponds.

This survey contains information that can be used by engineers to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of the soil for the planning of agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting highway, airport, and pipeline locations and in planning detailed investigations of the selected sites.
4. Determine the suitability of soils for cross-country movements of vehicles and construction equipment.
5. Correlate performance of engineering structures with soil mapping units and thus develop information that will be useful in designing and maintaining the structures.
6. Supplement the information obtained from other published maps and reports and aerial photographs for the purpose of making soil maps and reports that can be used readily by engineers.
7. Develop other preliminary estimates for construction purposes pertinent to the particular area.

With the soil map for identification, the engineering interpretations reported here can be useful for many purposes. It should be emphasized that they may not eliminate the need for sampling and testing at the site of specific

[5a] By R. G. CHRISTOPHER, III, area engineer, Soil Conservation Service.

engineering works that involve heavy loads or where the excavations are deeper than the depth of layers here reported. Even in these situations, however, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

To make the best use of the soil map and the soil survey, the engineer should know the physical properties of the soil materials and the condition of the soil in place.

After testing the soil materials and observing the behavior of each soil when used in engineering structures and foundations, the engineer can develop recommendations for each soil designated on the map.

Some of the terms used by soil scientists and farmers may not be familiar to engineers. Others, though familiar, have special meanings in soil science and farming. Most of the terms used in this section and other special terms used in the survey are defined in the Glossary at the back of the survey. Engineers can find additional information in the sections "How This Survey Was Made," "Descriptions of the Soils," and "Formation and Classification of Soils."

Most highway engineers classify soil materials according to the system approved by the American Association of State Highway Officials (AASHO) (*1*). In this system, soil materials are classified in seven principal groups. The groups range from A–1, consisting of gravelly soils of high bearing capacity, to A–7 consisting of clay soils having low strength when wet. Within each group, the relative engineering value of the soil materials is indicated by a group index number. These numbers range from 0 for the best materials to 20 for the poorest. The group index number is shown in parentheses following the group symbol.

Some engineers prefer to use the Unified soil classification system (*20*). In this system soil materials are identified as coarse grained (8 classes), fine grained (6 classes), or highly organic.

Most of the information in this section is given in tables. Test data on samples of the principal soil types of six extensive series are given in table 6. Properties of the soils significant to engineering are given in table 7. Engineering classifications (AASHO and Unified) of the soils are listed in both tables 6 and 7. Engineering interpretations of the soils are given in table 8.

Engineering test data

Samples of the principal soil types of six extensive soil series were tested according to standard procedures so that the data obtained could be used in evaluating the soils for engineering purposes. The laboratory test data are given in table 6. Because samples for these tests were obtained only to a depth of approximately 6 feet, the data may not be adequate for estimating the characteristics of soil materials in deep cuts.

The engineering soil classifications in table 6 are based on data obtained by mechanical analyses and by tests to determine the liquid limit and the plastic limit. Mechanical analyses were made by the combined sieve and hydrometer methods.

The tests for plastic limit and liquid limit measure the effect of water on the consistence of the soil material. As the moisture of a dry clayey soil increases, the material changes from a semisolid to a plastic state. As the moisture content further increases, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material passes from a semisolid to a plastic state (*6*). The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the plastic limit and the liquid limit. It indicates the range of moisture content within which a soil material is in a plastic condition.

Soil properties significant to engineering

The soils series in the county and estimates of their physical and chemical properties are shown in table 7. Because the estimates were made according to layers that have properties significant to engineering, the depths shown for the layers may not be the same as the depths in the section "Descriptions of the Soils" or "Formation and Classification of Soils." The texture of each layer is listed according to the textural classification of the United States Department of Agriculture (*9*). Also listed for the layers are the estimated percentages of material that will pass a No. 4 sieve, a No. 10 sieve, and a No. 200 sieve.

Permeability is given for each layer and was estimated for material that had not been compacted. Permeability refers to the rate at which water moves through the soil material and depends largely on the texture and structure of the soil (*14*).

Available water capacity is approximately the amount of capillary water in the soil when the downward flow by gravity has practically stopped. In table 7 it is the water held in the range between field capacity and the wilting point and is expressed in inches of water per inch of soil.

Reaction is shown in numerical terms of pH. A pH value of less than 7.0 indicates that the soil is acid. If pH is more than 7.0, the soil is alkaline. Extreme acidity or alkalinity can have an important effect on structures or on the treatment needed to stabilize the soils.

The rating for shrink-swell potential indicates how much a soil changes in volume when its moisture content changes. In general, soils that have a high clay content (CH and A–7) have a high shrink-swell potential.

Dispersion of the soil material does not severely affect engineering practices in this county and therefore was not rated.

Engineering interpretations of the soils

In table 8 the soil series are rated according to their suitability as a source of topsoil and road fill, but not as a source of sand and gravel. Sand is obtained locally along streams, but it generally is poorly graded. The gravel used locally is crushed rock. The rating for topsoil indicates the relative suitability of the soil for establishing and supporting vegetation. The suitability of soil material for road fill depends largely upon the texture of the soil material and its natural content of water. Plastic soils are rated *poor* because they have a high natural content of water and are difficult to work, to dry, and to compact. Soils consisting primarily of silt or fine sand are rated *poor* to *fair* for road fill because they require control of moisture during compaction, and the slopes of the fills cannot be too strong. Also, soils used as fill should be able to stabilize quickly so that they can resist erosion.

Also given for each series in the county are soil features that adversely affect highway location and the construction and maintenance of farm ponds, agricultural drainage, sprinkler irrigation, terraces and diversions, and waterways. In planning the location of highways, the features

TABLE 6.—*Engineering*

[Tests performed by the South Carolina State Highway Department in cooperation with the U.S. Department of Commerce,

Soil name and location	Parent material	South Carolina report No.	Depth	Horizon
			Inches	
Cataula sandy loam:				
1 mile N. of Switzer and 4 miles SW. of Moore. (Modal)	Mica gneiss and some hornblende gneiss.	F30295	0–6	Ap
		F30296	16–27	B2
		F30297	37–72	C
1 mile SW. of Moore and 2 miles NE. of Switzer. (Modal)	Hornblende gneiss.	F30325	0–5	Ap
		F30326	23–37	B2
		F30327	44–72	C
5.5 miles N. of Woodruff and 2.5 miles SW. of Poplar Springs. (Some properties of Vance soils)	Mica gneiss and some hornblende gneiss.	F30298	0–5	Ap
		F30299	5–12	B2
		F30300	47–60	C
1 mile N. of Woodruff and 2 miles SE. of Selma Church. (Some properties of Davidson soils)	Mica gneiss and some hornblende gneiss.	F30301	0–6	Ap
		F30302	8–29	B2
		F30303	59–72	C
Cecil sandy loam:				
2 miles SW. of Carlisle School and 8 miles NE. of Spartanburg. (Modal)	Schist.	F30304	0–7	Ap
		F30305	12–28	B2
		F30306	43–72	C
2 miles SE. of Pauline and 4 miles W. of Walnut Grove Church. (Some properties of Appling soils)	Granitized gneiss.	F30310	0–7	Ap
		F30311	12–26	B2
		F30312	59–72	C
2 miles N. of Pauline and 4 miles E. of Stone Station. (Some properties of Madison soils)	Mica schist.	F30307	0–8	Ap
		F30308	21–35	B2
		F30309	47–60	C
Davidson sandy clay loam:				
1 mile E. of Snoddy and 6 miles W. of Spartanburg. (Modal)	Hornblende gneiss.	F30313	0–7	Ap
		F30314	7–20	B2
		F30315	69–72	C
3 miles N. of Lyman and 6 miles NW. of Wellford. (Modal)	Hornblende gneiss.	F30316	0–7	Ap
		F30317	10–42	B2
		F30318	65–84	C
3 miles NE. of Lyman and 2 miles N. of Wellford. (Some properties of Cecil soils)	Hornblende gneiss and some mica gneiss.	F30322	0–6	Ap
		F30323	11–38	B2
		F30324	55–75	C
3 miles S. of Glenn Springs and 2 miles E. of Friendship Church. (Some properties of Mecklenburg soils)	Hornblende gneiss.	F30319	0–8	Ap
		F30320	25–48	B2
		F30321	66–75	C
2 miles N. of Cross Anchor and 5 miles S. of Friendship Church. (Some properties of Cataula soils)	Hornblende gneiss.	F30328	0–5	Ap
		F30329	13–32	B2
		F30330	60–73	C
1 mile W. of Cedar Spring School and 5 miles S. of Spartanburg. (Some properties of Cataula soils)	Hornblende gneiss.	F30331	0–6	Ap
		F30332	10–24	B2
		F30333	49–60	C
Lockhart sandy loam:				
5 miles SW. of Pauline and 0.5 mile SE. of Friendship Church. (Modal)	Granite.	F30334	0–8	Ap
		F30335	16–27	B2
		F30336	39–72	C

See footnotes at end of table.

test data

Bureau of Public Roads, according to standard procedures of the American Association of State Highway Officials (AASHO) (*1*)]

Mechanical analysis [1]									Liquid limit	Plasticity index	Classification	
Percentage passing sieve—					Percentage smaller than—						AASHO	Unified [2]
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
-------	100	66	50	33	29	24	14	9	[3]	[3]	A-2-4(0)-------	SM.
-------	100	83	78	72	69	66	59	39	59	20	A-7-5(15)------	MH.
-------	100	71	61	50	45	39	28	19	36	1	A-4(3)---------	SM.
-------	100	75	61	48	46	42	37	25	30	9	A-4(3)---------	SM-SC.
-------	100	91	85	78	75	71	64	43	71	28	A-7-5(19)------	MH.
------	100	84	72	60	56	50	40	27	48	3	A-5(6)---------	ML.
[4] 99	96	57	41	28	23	20	12	8	[3]	[3]	A-2-4(0)-------	SM.
-------	100	78	71	62	57	54	46	31	40	13	A-6(7)---------	CL-ML.
-------	100	71	63	57	52	46	34	23	43	2	A-5(5)---------	ML.
-------	100	67	49	29	25	20	11	7	[3]	[3]	A-2-4(0)-------	SM.
-------	100	89	83	76	74	71	67	45	73	30	A-7-5(20)------	MH.
-------	100	80	66	48	44	37	26	17	45	5	A-5(3)---------	SM.
[5] 88	81	62	44	26	23	18	11	7	[3]	[3]	A-2-4(0)-------	SM.
-------	100	90	84	78	76	74	70	47	56	15	A-7-5(13)------	MH.
-------	100	80	64	51	48	43	36	24	47	9	A-5(4)---------	ML.
100	93	63	38	19	17	13	8	5	[3]	[3]	A-2-4(0)-------	SM.
-------	100	85	74	66	65	63	60	40	47	16	A-7-5(10)------	ML.
-------	100	87	71	60	57	53	46	31	46	4	A-5(6)---------	ML.
[6] 95	90	71	51	25	21	16	7	5	[3]	[3]	A-2-4(0)-------	SM.
-------	100	74	57	48	47	45	42	28	49	17	A-7-5(6)-------	SM.
-------	100	83	68	54	50	44	35	23	43	10	A-5(4)---------	ML.
-------	100	53	41	33	32	30	27	18	20	6	A-2-4(0)-------	SM-SC.
-------	100	76	68	61	60	58	55	37	38	12	A-6(6)---------	ML-CL.
-------	100	67	55	45	43	39	34	23	46	8	A-5(2)---------	SM.
-------	100	55	46	34	33	32	31	21	26	8	A-2-4(0)-------	SC.
-------	100	86	82	78	77	75	73	49	57	21	A-7-5(16)------	MH.
-------	100	56	44	32	29	24	17	11	43	4	A-2-5(0)-------	SM.
-------	100	59	48	39	37	33	27	18	28	8	A-4(1)---------	SC.
-------	100	87	83	78	77	74	71	48	54	18	A-7-5(14)------	MH.
-------	100	80	69	58	55	51	44	30	51	12	A-7-5(7)-------	MH.
-------	100	88	78	54	49	41	29	19	27	5	A-4(4)---------	CL-ML.
-------	100	95	90	79	75	70	61	41	51	20	A-7-5(14)------	MH.
100	97	92	89	82	76	66	51	34	54	13	A-7-5(12)------	MH.
-------	100	72	61	50	46	39	29	19	27	5	A-4(3)---------	SM-SC.
-------	100	76	70	63	61	57	52	35	59	18	A-7-5(12)------	MH.
-------	100	70	60	46	40	31	17	12	[3]	[3]	A-4(2)---------	SM.
[4] 99	97	76	59	35	31	25	16	11	[3]	[3]	A-2-4(0)-------	SM.
-------	100	88	82	73	71	67	62	41	53	26	A-7-6(17)------	MH-CH.
100	99	74	69	63	59	53	43	29	50	11	A-7-5(8)-------	ML.
100	96	45	32	20	18	14	8	5	[3]	[3]	A-1-6(0)-------	SM.
-------	100	67	60	54	52	49	45	30	52	16	A-7-5(7)-------	MH.
-------	100	63	49	39	37	33	28	19	41	8	A-5(1)---------	SM.

TABLE 6.—*Engineering*

Soil name and location	Parent material	South Carolina report No.	Depth	Horizon
Lockhart sandy loam:—Continued			*Inches*	
3 miles SW. of Walnut Grove Church. (Some properties of Appling soils)	Granite.	F30343	0–7	Ap
		F30344	13–25	B2
		F30345	49–72	C
1 mile SW. of Walnut Grove Church and 6 miles SW. of Pauline. (Some properties of Cataula soils)	Granite.	F30340	0–3	A1
		F30341	11–22	B2
		F30342	38–47	C
5 miles SW. of Walnut Grove Church. (Some properties of Cecil soils)	Granite.	F30337	0–7	Ap
		F30338	15–30	B2
		F30339	42–72	C
Madison sandy loam:				
0.5 mile E. of Brooklyn Church and 3 miles NW. of Chesnee. (Modal)	Mica schist.	F30356	0–7	Ap
		F30357	11–28	B2
		F30358	36–76	C
Vance sandy loam:				
1 mile SE. of Cherokee Springs and 2 miles NE. of Spartanburg on U.S. Highway No. 221. (Surface layer sandier than in modal profile)	Gneiss.	F30346	0–6	Ap
		F30347	12–26	B21
		F30348	26–31	B22
		F30349	38–73	C
2 miles N. of Pauline. (Some properties of Appling soils)	Gneiss.	F30350	0–7	Ap
		F30351	11–20	B2
		F30352	48–60	C
6 miles N. of Woodruff. (Some properties of Cataula soils)	Gneiss.	F30353	0–7	Ap
		F30354	7–16	B2
		F30355	44–55	C

[1] Mechanical analysis according to AASHO Designation: T 88–57 (*1*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method, and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method, and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

TABLE 7.—*Estimated physical*

[Local alluvial land (La); Made land (Ma); Mine pits and dumps (Mh); Mixed alluvial land, wet (Mk); Moderately gullied land (Mm

Soil series, type, and map symbols	Depth from surface	Classification	
		USDA texture	Unified
	Inches		
Appling (AcB, AcC2, ApB).	0–10	Sandy loam	SM
(For properties of the Cecil soil in mapping units AcB and AcC2, see Cecil sandy loam in this table).	10–26	Sandy clay	CL
	26–62	Clay loam	SC
Cataula:			
Clay loam (CaB3, CaC3, CaD3).	0–2	Clay loam	CL
	2–25	Clay	CL or CH
	25–36	Loam	ML
Sandy loam (CdB2, CdC2, CdD2).	0–6	Sandy loam	SM
	6–27	Clay	CL or CH
	27–50	Sandy clay loam to loam	ML or CL

test data—Continued

Mechanical analysis [1]									Liquid limit	Plasticity index	Classification	
Percentage passing sieve—					Percentage smaller than—						AASHO	Unified [2]
No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 60 (0.25 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
100	85	40	31	21	19	15	9	6	[3]	[3]	A-1-6(0)	SM.
100	89	61	57	53	52	50	47	32	58	25	A-7-5(11)	MH.
100	78	44	37	28	26	22	16	11	38	[3]	A-2-4(0)	SM.
100	86	40	34	27	25	21	15	10	[3]	[3]	A-2-4(0)	SM.
100	82	58	53	50	49	47	45	30	66	36	A-7-5(12)	CH.
100	84	46	39	32	30	28	24	16	49	13	A-2-7(1)	SM.
100	96	50	39	29	26	22	16	11	26	1	A-2-4(0)	SM.
-------	100	63	55	46	44	40	35	23	56	14	A-7-5(4)	SM.
-------	100	53	42	31	28	24	17	12	[3]	[3]	A-2-4(0)	SM.
[5] 87	79	50	37	26	24	20	14	9	26	3	A-2-4(0)	SM.
-------	100	86	80	74	73	71	68	45	63	23	A-7-5(17)	MH.
-------	100	64	51	39	36	32	26	17	36	3	A-4(1)	SM.
[6] 96	94	52	37	21	18	14	8	5	[3]	[3]	A-2-4(0)	SM.
-------	100	88	84	81	79	77	73	49	64	24	A-7-5(18)	MH.
-------	100	79	75	72	70	66	61	41	66	28	A-7-5(18)	MH.
-------	100	81	74	66	61	54	43	29	47	13	A-7-5(8)	ML.
[4] 98	92	70	48	27	24	18	10	7	[3]	[3]	A-2-4(0)	SM.
-------	100	82	70	60	58	54	49	33	48	22	A-7-6(11)	CL-ML.
-------	100	74	59	45	41	36	27	18	39	4	A-4(2)	SM.
-------	95	49	40	31	28	23	16	11	[3]	[3]	A-2-4(0)	SM.
100	95	67	61	56	54	51	46	31	49	22	A-7-6(10)	CL-ML.
-------	100	72	65	57	54	48	39	26	52	11	A-7-5(6)	MH.

[2] Based on the Unified Soil Classification System (*20*). SCS and BPR have agreed to consider that all soils having plasticity indexes within two points from the A-line are to be given a borderline classification. Example of borderline classifications obtained by this use are SM–SC and ML–CL.

[3] Nonplastic.

[4] ⅜-inch sieve passes 100 percent.

[5] ⅜-inch sieve passes 95 percent and ¾-inch sieve passes 100 percent.

[6] ⅜-inch sieve passes 97 percent and ¾-inch sieve passes 100 percent.

and chemical properties of soils

MnC, MnF); Severely gullied land (Se); and Stony land, moderately steep (StE) are variable, and their properties were not estimated]

Classification—Continued	Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
AASHO	No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	*Inches per hour*	*Inches per inch of soil*	*pH*	
A-4	100	100	40–50	2.0–6.3	0.11	5.0–5.5	Low.
A-4, A-6	100	100	70–80	0.63–2.0	.13	5.0–5.1	Moderate.
A-6	100	100	40–50	0.63–2.0	.12	5.0–5.5	Moderate.
A-6	100	100	50–60	0.63–2.0	.12	5.5–6.0	Moderate.
A-7	100	100	70–80	0.20–0.63	.19	5.0–5.5	Moderate.
A-4	100	100	60–70	0.63–2.0	.15	5.4–5.6	Low.
A-2, A-4	100	100	25–50	2.0–6.3	.11	5.5–6.0	Low.
A-7	100	100	70–80	0.20–0.63	.18	5.0–5.5	Moderate.
A-4, A-6	100	100	50–60	0.63–2.0	.15	5.3–5.7	Low.

TABLE 7.—*Estimated physical*

Soil series, type, and map symbols	Depth from surface	Classification	
		USDA texture	Unified
Cecil:	*Inches*		
Clay loam (CeB3, CeC3, CeD3).	0–5	Clay loam	ML
	5–43	Clay	MH
	43–72	Clay loam	ML
Sandy loam (CIB2, CIC2, CID2).	0–7	Sandy loam	SM
	7–43	Clay	MH
	43–72	Clay loam	ML
Congaree (Co).	0–10	Clay loam to sandy clay loam	ML
	10–31	Clay loam	CL
	31–60	Fine sandy loam	ML
Davidson:			
Clay loam (DaB3, DaC3, DaD3).	0–3	Clay loam	CL
	3–20	Clay	MH
	20–61	Clay	MH
Loam (DdB2, DdC2).	0–5	Loam	ML
	5–20	Clay	MH
	20–61	Clay	MH
Sandy clay loam (DsB2, DsC2, DsD2).	0–11	Sandy clay loam	SM
	11–55	Clay	MH
	55–75	Sandy clay loam	CL
Durham (DvB).	0–10	Loamy sand	SM
	10–38	Sandy clay loam to sandy clay	MH
	38–62	Clay	MH or CH
Enon (EnB2, EnC2, EnD2).	0–6	Sandy loam	SM
	6–34	Clay	MH
	34–42	Sandy clay loam	ML or CL
Hayesville (HaD, HaE, HaF).	0–12	Sandy loam	SM
	12–35	Sandy clay loam	ML or CL
	35–44	Sandy clay loam	ML or CL
Hiwassee (HwC2).	0–6	Sandy loam	SM
	6–45	Clay	MH or CL
	45–53	Loam	ML
Iredell (IdB).	0–6	Fine sandy loam	SM
	6–23	Clay	CH
	23–33	Fine sandy loam	SC
Lockhart (LcC2).	0–11	Sandy loam	SM
	11–39	Clay	MH
	39–72	Sandy clay loam	SM
Louisa (LoC2, LoD2, LoE2).	0–6	Sandy loam	SM
	6–14	Sandy clay	CL
	14–24	Sandy clay loam	SM or SC
Louisburg (LuC, LuD, LuE).	0–11	Loamy sand	SM
	11–40	Fine sandy loam	SM
Madison:			
Clay loam (McB3, McC3, McD3, McF3).	0–4	Clay loam	CL
	4–36	Clay	MH
	36–72	Sandy clay loam	SC
Sandy loam (MdB2, MdC2, MdD2, MdE2, MdF2).	0–7	Sandy loam	SM
	7–36	Clay	MH
	36–76	Sandy clay loam	SC

and chemical properties of soils—Continued

Classification—Continued	Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
AASHO	No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
				Inches per hour	*Inches per inch of soil*	*pH*	
A-4	100	100	50-60	0.63-2.0	0.11	5.8-6.2	Low.
A-7	100	100	70-80	0.63-2.0	.13	5.3-5.5	Moderate.
A-5	100	100	50-60	0.63-2.0	.12	5.0-5.2	Low.
A-2	85-100	80-95	20-30	2.0-6.3	.10	5.8-6.2	Low.
A-7	100	100	70-80	0.63-2.0	.13	5.3-5.7	Moderate.
A-5	100	100	50-60	0.63-2.0	.12	5.0-5.3	Low.
A-4	100	100	60-70	2.0-6.3	.13	5.7-5.8	Low.
A-5	100	100	65-75	2.0-6.3	.13	5.7-5.9	Low.
A-4	100	100	50-60	2.0-6.3	.09	5.8-6.1	Low.
A-5	100	100	60-70	0.63-2.0	.13	6.5-6.8	Low.
A-7	100	100	60-90	0.63-2.0	.15	5.6-5.8	Moderate.
A-7	100	100	85-95	0.63-2.0	.15	5.3-5.5	Moderate.
A-4	100	100	50-60	0.63-2.0	.12	6.3-7.2	Low.
A-7	100	100	60-90	0.63-2.0	.14	5.7-5.8	Moderate.
A-7	100	100	85-95	0.63-2.0	.15	5.0-5.7	Moderate.
A-4	100	95-100	40-50	2.0-6.3	.10	6.0-5.7	Low.
A-7	100	100	75-90	0.63-2.0	.14	5.4-5.9	Moderate.
A-6, A-7	100	100	50-65	0.63-2.0	.13	5.3-5.9	Low.
A-2	100	100	20-25	2.0-6.3	.08	4.9-5.3	Low.
A-7	100	100	50-60	0.63-2.0	.17	5.2-5.3	Moderate.
A-7	100	100	55-65	0.2-0.63	.19	4.9-5.1	Moderate.
A-2	100	100	25-35	2.0-6.3	.09	5.2-5.5	Low.
A-7	100	100	70-80	0.2-0.63	.14	5.1-5.4	Moderate.
A-4, A-6	100	90	50-60	0.63-2.0	.12	5.4-5.7	Low.
A-2	100	100	30-35	2.0-6.3	.12	5.5-5.7	Low.
A-6	100	100	50-60	0.63-2.0	.15	5.1-5.7	Moderate.
A-6	100	100	50-60	0.63-2.0	.14	5.1-5.4	Low.
A-2	100	90-100	25-35	2.0-6.3	.12	6.3-6.6	Low.
A-7	100	100	60-70	0.63-2.0	.19	5.6-5.7	Moderate.
A-4	100	100	60-70	0.63-2.0	.17	5.4-5.6	Low.
A-4	100	95-100	35-45	2.0-6.3	.12	5.8-5.0	Low.
A-7	100	100	80-90	<.063	.25	5.8-5.9	Very high.
A-6, A-7	100	100	40-50	0.63-0.2	.20	5.8-6.0	Moderate.
A-2	100	95-100	25-30	2.0-6.3	.09	5.3-5.5	Low.
A-7	100	100	50-60	0.63-2.0	.16	5.4-5.7	Moderate.
A-5	100	100	35-45	0.63-2.0	.10	5.3-5.4	Low.
A-2	100	80-84	25-35	2.0-6.3	.10	5.5-5.8	Low.
A-7	100	100	50-60	2.0-6.3	.15	5.4-5.6	Low.
A-4	100	100	40-50	>6.3	.05	5.5-5.7	Low.
A-2	100	70-80	20-25	>6.3	.08	5.7-6.0	Low.
A-2	90-100	72-75	20-35	>6.3	.05	5.2-5.4	Low.
A-6	100	100	50-60	0.63-2.0	.12	5.5-5.8	Moderate.
A-7	100	100	70-80	0.63-2.0	.12	5.0-5.2	Moderate.
A-6	100	100	20-25	2.0-6.3	.10	5.3-5.5	Low.
A-2	100	75-85	25-30	>6.3	.09	5.5-6.0	Low.
A-7	100	100	70-80	0.63-2.0	.12	5.0-5.2	Moderate.
A-6	100	100	20-25	2.0-6.3	.10	5.3-5.5	Low.

TABLE 7.—*Estimated physical*

Soil series, type, and map symbols	Depth from surface	Classification	
		USDA texture	Unified
Madison:—Continued			
	Inches		
Sandy loam, thin solum variant (MeB2, MeC2).	0–6	Sandy loam	SM
	6–12	Clay	CL
	12–20	Clay	CL
Mecklenburg (MfB2, MfC2).	0–6	Fine sandy loam	SM
	6–37	Clay to clay loam	MH
	37–50	Clay loam	CL
Musella:			
Clay loam (MsC3, MsE3).	0–3	Clay loam	CL
	3–12	Clay	CL
	12–16	Clay	CL
Fine sandy loam (MuC2, MuD2, MuF2).	0–4	Fine sandy loam	SM
	4–18	Clay	CL
	18–22	Clay	CL
Pacolet:			
Clay loam (PaE3).	0–3	Clay loam	ML
	3–18	Clay	MH
	18–36	Fine sandy loam	ML
Sandy loam (PcE, PcE2, PcF).	0–6	Sandy loam	SM
	6–27	Clay loam	MH
	27–42	Fine sandy loam	ML
Vance (VaB2, VaC2).	0–5	Sandy loam	SM
	5–35	Clay	MH
	35–43	Loam	CL
Wickham (WcB2, WcC2).	0–7	Sandy loam	SM
	7–36	Sandy clay	CL
	36–48	Sandy clay loam	SC
Wilkes (WkB2, WkC2, WkD2, WkF2).	0–7	Fine sandy loam	ML
	7–10	Sandy clay loam	CL or CH
	10–23	Sandy clay loam	CL
Worsham (WoB).	0–7	Fine sandy loam	ML or CL
	7–22	Sandy clay loam	SC
	22–40	Sandy clay loam	SC

considered are percentage of slope, height of the water table, flooding, erodibility, depth to bedrock, and the shrink-swell behavior of the soil. The degree of limitation for septic tank filter fields is also given in table 8.

The resistance to seepage affects the use of soil material in reservoir areas of farm ponds. The amount of seepage that can be tolerated depends on the amount of water flowing into the reservoir. Permeability, strength, and stability determine the suitability of a soil in embankments of farm ponds. Well-graded sand and gravel are stable but are very permeable. Highly plastic soils have slow permeability and moderate strength and stability, but they are very difficult to work. Soils containing much silt have low strength and stability.

Agricultural drainage is not needed on most of the soils in the county, but on some soils drainage is affected by a seasonally high water table, frequent flooding, or slow permeability. The features affecting sprinkler irrigation include the water-holding capacity of the soil and the infiltration rate.

Terracing is difficult on plastic soils and is hazardous on highly erodible soils. On slopes of more than 10 percent, terracing generally is not feasible. Highly erodible soils, even if terraced, require a cover of close-growing vegetation where practical. Also, waterways require a cover of close-growing plants, which should be established before the terraces are made.

Sanitary, highway, and conservation engineering

In this subsection the suitability of the soils for sanitary, highway, and conservation engineering is discussed in relation to the properties of the soils that affect this suitability.

SANITARY ENGINEERING

The suitability of a soil for septic tanks and sewage disposal fields depends on the permeability of the soil, the depth to the water table, the hazard of flooding, and the depth to hard rock. Soils that have a high water table or are likely to be flooded have severe limitations for sewage disposal fields (table 8). Examples in this county are the Congaree and Worsham soils. Disposal fields on these soils overflow in a comparatively short time. The Cataula, Iredell, Mecklenburg, and Vance soils have slow permeability and have severe limitations if used for dis-

and chemical properties of soils—Continued

Classification—Continued	Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
AASHO	No. 4 (4.76 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)				
				Inches per hour	*Inches per inch of soil*	*pH*	
A–4	100	100	35–45	2. 0–6. 3	0. 10	5. 1–5. 4	Low.
A–7	100	100	60–70	0. 63–2. 0	. 12	5. 1–5. 3	Moderate.
A–7	100	100	65–75	>6. 3	. 05	5. 2–5. 4	Low.
A–4	100	100	40–50	0. 63–2. 0	. 12	6. 0–6. 2	Low.
A–7	100	100	75–85	. 063–0. 2	. 15	5. 8–6. 0	Moderate.
A–6	100	100	70–80	. 20–0. 63	. 13	5. 4–5. 7	Moderate.
A–6	100	100	55–65	0. 63–2. 0	. 13	5. 6–6. 0	Moderate.
A–7	100	100	60–70	0. 63–2. 0	. 14	5. 5–5. 7	Moderate.
A–7	100	100	50–60	0. 63–2. 0	. 13	5. 5–5. 7	Moderate.
A–2	100	100	25–35	2. 0–6. 3	. 10	5. 6–6. 0	Low.
A–7	100	100	60–70	0. 63–2. 0	. 14	5. 5–5. 7	Moderate.
A–7	100	100	50–65	0. 63–2. 0	. 13	5. 5–5. 7	Moderate.
A–5	100	100	50–60	0. 63–2. 0	. 11	5. 2–5. 6	Moderate.
A–7	100	100	75–85	0. 63–2. 0	. 13	5. 3–5. 5	Moderate.
A–5	100	100	50–60	0. 63–2. 0	. 10	5. 0–5. 3	Low.
A–2	100	100	25–35	2. 0–6. 3	. 10	5. 8–6. 2	Low.
A–6	100	100	70–80	0. 63–2. 0	. 13	5. 3–5. 5	Moderate.
A–5	100	100	50–60	0. 63–2. 0	. 12	5. 0–5. 3	Low.
A–2	100	90–100	25–35	2. 0–6. 3	. 11	5. 4–5. 8	Low.
A–7	100	100	70–80	0. 20–0. 63	. 15	5. 1–5. 3	Moderate.
A–6	100	100	60–70	0. 63–2. 0	. 12	4. 9–5. 2	Moderate.
A–2	90–100	90–100	25–35	2. 0–6. 3	. 10	4. 9–5. 7	Low.
A–7	100	100	50–60	0. 63–2. 0	. 14	5. 1–5. 3	Moderate.
A–6	100	100	35–45	0. 63–2. 0	. 14	5. 1–5. 3	Moderate.
A–4, A–6	90–100	90–100	50–60	0. 63–2. 0	. 12	5. 6–6. 4	Low.
A–6, A–7	100	100	50–60	0. 63–0. 20	. 18	5. 4–5. 6	Moderate.
A–6	100	100	50–60	2. 0–6. 3	. 12	5. 6–5. 8	Moderate.
A–4, A–6	100	90–100	50–60	2. 0–6. 3	. 12	5. 0–5. 3	Low.
A–6, A–7	100	90–100	40–50	0. 20–0. 63	. 14	4. 7–4. 9	Moderate.
A–6	100	90–100	35–50	0. 63–2. 0	. 13	4. 5–4. 7	Moderate.

posal fields. The Louisburg, Musella, and Wilkes soils have severe limitations because they are shallow to bedrock. Hayesville and Pacolet soils have severe limitations because their slopes are steep. On the contrary, the Appling, Cecil, Davidson, and Hiwassee soils are permeable and have but slight limitations for sewage disposal fields on slopes of less than 10 percent.

Between these extremes in suitability are the rest of the soils in the county. On them an investigation is necessary at the site to determine whether or not it is feasible to use the soil for disposal fields. In many places the size of field needed also can be determined.

HIGHWAY ENGINEERING

Because the Iredell and Worsham soils have poor internal drainage, slow permeability, and a plastic subsoil, they are not suitable for use as surface material on unpaved roads or as material for subgrade. The Louisburg and Wilkes soils are shallow and are not desirable for road construction. The Congaree soil and Mixed alluvial land, wet, have a high water table, and provide a poor foundation for roads.

Slopes on cuts and fills should be as nearly flat as needed to allow for proper stabilization and maintenance. All cuts and fills should be seeded to suitable plants as soon after construction as practical. If parent material is exposed in cuts, a layer of topsoil should be spread over and bonded to it so that good plant cover is insured on the slope.

CONSERVATION ENGINEERING

Conservation engineering in Spartanburg County includes the construction of farm ponds and terraces, land smoothing, and the establishment of drainage and irrigation systems. Many sites in the county are suitable for farm ponds. More than eight hundred ponds have been built, and they are a major source of water for irrigation and livestock. Nearly all ponds are stocked with fish.

Necessary in constructing a farm pond are (1) selecting a site where a maximum amount of water can be improved at a minimum cost; (2) preventing excessive seepage under or through the dam or along the abutments; (3) providing spillways adequate to carry off stormwater;

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TABLE 8.—*Engineering*

[Local alluvial land (La); Made land (Ma); Mine pits and dumps (Mh); Mixed alluvial land, wet (Mk); Moderately gullied land (Mm, MnC

Soil series and symbol	Suitability as a source of—		Soil features adversely affecting—		
	Topsoil	Road fill	Highway location	Sewage lagoons	Farm ponds: Reservoir area
Appling (AcB, AcC2, ApB) (For interpretations of Cecil soils in mapping units AcB and AcC2, refer to the Cecil series).	Fair to good.	Fair	Severe erodibility; moderate shrink-swell potential; slopes.	Moderate permeability; slopes of more than 6 percent.	Moderate permeability.
Cataula (CaB3, CaC3, CaD3, CdB2, CdC2, CdD2).	Poor	Poor	Very severe erodibility; moderate shrink-swell potential; slopes of more than 10 percent; poor traffic-supporting capacity.	Slopes of more than 6 percent.	None
Cecil (CeB3, CeC3, CeD3, ClB2, ClC2, ClD2).	Fair	Fair	Severe erodibility; moderate shrink-swell potential; slopes of more than 10 percent.	Moderate permeability; slopes of more than 6 percent.	Moderate permeability.
Congaree soils (Co)	Good	Poor	High water table; frequent flooding.	Rapid permeability; frequent flooding.	Rapid permeability.
Davidson (DaB3, DaC3, DaD3, DdB2, DdC2, DsB2, DsC2, DsD2).	Fair	Poor	Severe erodibility; moderate shrink-swell potential; slopes of more than 10 percent.	Moderate permeability; slopes of more than 6 percent.	Moderate permeability.
Durham (DvB)	Fair	Fair	Severe erodibility; moderate shrink-swell potential.	Moderate permeability.	Moderate permeability.
Enon (EnB2, EnC2, EnD2)	Poor	Poor	Very severe erodibility; moderate shrink-swell potential; slopes of more than 10 percent.	Slopes of more than 6 percent.	None
Hayesville (HaD, HaE, HaF)	Fair	Fair	Severe erodibility; moderate shrink-swell potential; slopes of more than 10 percent.	Moderate permeability; slopes of more than 6 percent.	Moderate permeability.
Hiwassee (HwC2)	Fair	Fair	Severe erodibility; moderate shrink-swell potential.	Moderate permeability; slopes of more than 6 percent.	Moderate permeability.
Iredell (IdB)	Poor	Poor	Very severe erodibility; very high shrink-swell potential; poor traffic-supporting capacity.	None	None
Lockhart (LcC2)	Fair	Fair	Severe erodibility; moderate shrink-swell potential.	Slopes of more than 6 percent.	None

interpretations of soils

MnF); Severely gullied land (Se); and Stony land, moderately steep (StE), are variable, and interpretations for them were not made]

Soil features adversely affecting—Continued					Degree of limitation for septic tank filter fields
Farm ponds—Continued	Agricultural drainage	Sprinkler irrigation	Terraces and diversions	Waterways	
Embankment					
Moderate permeability; severe erodibility.	Not needed	None	Severe erodibility; slopes.	Severe erodibility; slopes.	Slight; moderate permeability.
Moderate shrink-swell potential; very severe erodibility.	Not needed	Slow infiltration; slow permeability; slopes of more than 10 percent.	Very severe erodibility; slopes.	Very severe erodibility; slopes.	Severe; percolation rate is more than 75 minutes per inch; some slopes more than 10 percent.
Severe erodibility	Not needed	Slopes of more than 10 percent.	Severe erodibility; slopes.	Severe erodibility	Slight for slopes of less than 10 percent; moderate for slopes of 10 to 15 percent; moderate permeability.
Rapid permeability; poor shear strength; high moisture content.	Seasonally high water table; frequent flooding.	None	Not needed	Not needed	Severe; high water table; frequent flooding.
Moderate shrink-swell potential; severe erodibility; poor shear strength.	Not needed	Moderate to moderately slow infiltration.	Severe erodibility; slopes.	Severe erodibility; slopes.	Slight for slopes of less than 10 percent; moderate for slopes of more than 10 percent; moderate permeability.
Moderate shrink-swell potential; severe erodibility.	Not needed	None	Severe erodibility	Severe erodibility	Slight for slopes of less than 10 percent; moderate permeability.
Moderate shrink-swell potential; very severe erodibility.	Slow permeability.	Slow intake rate; slopes of more than 10 percent.	Very severe erodibility; slopes.	Poor productivity; very severe erodibility; slopes.	Moderate for slopes of less than 10 percent; severe for slopes of more than 10 percent; percolation more than 75 minutes per inch; slow permeability.
Moderate shrink-swell potential; severe erodibility; moderate permeability.	Not needed	Slopes of more than 10 percent.	Severe erodibility; slopes.	Severe erodibility; slopes.	Severe for slopes of more than 10 percent; moderate permeability; hard rock at a depth of less than 4 feet.
Severe erodibility; moderate shrink-swell potential.	Not needed	None	Severe erodibility; slopes.	Severe erodibility; slopes.	Slight for slopes of less than 10 percent.
Very high shrink-swell potential; very severe erodibility; poor workability.	Very slow permeability.	Very slow intake rate.	Very severe erodibility; poor workability.	Very severe erodibility.	Severe; percolation more than 75 minutes per inch.
Severe erodibility; moderate shrink-swell potential.	Not needed	Slow permeability	Severe erodibility; slopes.	Severe erodibility; slopes.	Slight for slopes of less than 10 percent; moderate permeability.

TABLE 8.—*Engineering interpretations*

Soil series and symbol	Suitability as a source of—		Soil features adversely affecting—		
	Topsoil	Road fill	Highway location	Sewage lagoons	Farm ponds: Reservoir area
Louisa (LoC2, LoD2, LoE2)	Poor	Poor	Severe erodibility; poor traffic-supporting capacity; micaceous; slopes of more than 10 percent.	Rapid permeability; slopes of more than 6 percent.	Rapid permeability.
Louisburg (LuC, LuD, LuE)	Fair	Poor	Severe erodibility; slopes of more than 10 percent; moderately deep to hard rock.	Very rapid permeability; slopes of more than 6 percent; moderately deep to hard rock.	Very rapid permeability.
Madison (McB3, McC3, McD3, McF3, MdB2, MdC2, MdD2, MdE2, MdF2).	Fair	Poor	Severe erodibility; moderate shrink-swell potential; slopes of more than 10 percent; poor traffic-supporting capacity.	Moderate permeability; slopes of more than 6 percent.	Moderate permeability.
Madison, thin solum variant (MeB2, MeC2).	Poor	Poor	Severe erodibility; moderate shrink-swell potential; poor traffic-supporting capacity; micaceous.	Moderate. permeability; shallow to rock; slopes of more than 6 percent.	Moderate permeability.
Mecklenburg (MfB2, MfC2)	Poor	Poor	Very severe erodibility; high shrink-swell potential; poor traffic-supporting capacity.	Slopes of more than 6 percent.	None
Musella (MsC3, MsE3, MuC2, MuD2, MuF2).	Poor	Poor	Severe erodibility; shallow to hard rock.	Moderate permeability; slopes of more than 6 percent; shallow to hard rock.	Moderate permeability.
Pacolet (PaE3, PcE, PcE2, PcF)	Fair	Poor	Slopes of more than 15 percent.	Moderate permeability; slopes of more than 15 percent.	Moderate permeability.
Vance (VaB2, VaC2)	Fair	Poor	Very severe erodibility; moderate shrink-swell potential; poor traffic-supporting capacity.	Slopes of more than 6 percent.	None
Wickham (WcB2, WcC2)	Fair	Fair	Severe erodibility; moderate shrink-swell potential.	Moderate permeability; slopes of more than 6 percent.	Moderate permeability.
Wilkes (WkB2, WkC2, WkD2, WkF2).	Poor	Poor	Very severe erodibility; moderate shrink-swell potential; poor traffic-supporting capacity; shallow to hard rock.	Slopes of more than 6 percent; shallow to hard rock.	None
Worsham (WoB)	Poor	Poor	Very severe erodibility; moderate shrink-swell potential; frequent flooding; high water table.	Frequent flooding	None

of soils—Continued

Soil features adversely affecting—Continued					Degree of limitation for septic tank filter fields
Farm ponds—Continued	Agricultural drainage	Sprinkler irrigation	Terraces and diversions	Waterways	
Embankment					
Severe erodibility; material micaceous and unstable; rapid permeability.	Not needed	Low water-holding capacity; low fertility; slopes of more than 10 percent.	Severe erodibility; slopes.	Severe erodibility; slopes; poor soil for grass.	Severe for slopes of more than 10 percent; shallow to saprolite.
Very rapid permeability; severe erodibility; limited borrow material.	Not needed	Limited root zone; low water-holding capacity.	Severe erodibility; slopes.	Severe erodibility; limited root zone; limited for shaping.	Severe for slopes of more than 10 percent; moderately deep to hard rock.
Severe erodibility; moderate shrink-swell potential; material micaceous and unstable.	Not needed	Slopes of more than 10 percent.	Severe erodibility; slopes.	Severe erodibility; slopes.	Slight for slopes of less than 10 percent; moderate for slopes of more than 10 percent; moderate permeability.
Severe erodibility; moderate shrink-swell potential; material, micaceous and unstable; limited borrow material.	Not needed	Limited root zone.	Severe erodibility; slopes.	Severe erodibility; limited root zone; slopes.	Severe; moderate permeability; shallow to bedrock.
Very severe erodibility; high shrink-swell potential; poor workability.	Not needed	Slow intake rate	Very severe erodibility; slopes; poor workability.	Very severe erodibility; slopes; poor workability.	Severe; percolation more than 75 minutes per inch.
Severe erodibility; limited borrow material; shallow to hard rock.	Not needed	Restricted root zone.	Severe erodibility; slopes; shallow to hard rock.	Severe erodibility; slopes: restricted root zone; shallow to hard rock.	Severe; shallow to hard rock.
Severe erodibility	Not needed	Slopes of more than 15 percent.	Severe erodibility; slopes.	Severe erodibility; slopes.	Severe; steep slopes; slow percolation.
Very severe erodibility; moderate shrink-swell potential.	Not needed	Slow intake rate; slow permeability.	Very severe erodibility; slopes.	Very severe erodibility; slopes.	Severe; percolation more than 75 minutes per inch.
Severe erodibility; moderate shrink-swell potential; poor compactibility.	Not needed	None	Severe erodibility; slopes.	Severe erodibility; slopes.	Slight; deep to bedrock.
Very severe erodibility; moderate shrink-swell potential; limited borrow material; poor compactibility.	Not needed	Slow intake rate; limited root zone; slopes of more than 10 percent.	Very severe erodibility; slopes.	Very severe erodibility; slopes; restricted root zone; shallow to hard rock.	Severe on slopes of more than 10 percent; slow permeability; shallow to hard rock.
Very severe erodibility; high moisture content; poor compactibility; moderate shrink-swell potential; poor workability.	High water table; frequent flooding; slow permeability.	Not suited	Very severe erodibility; high moisture content; poor fertility.	Very severe erodibility; poor fertility.	Severe; high water table; slow permeability; frequent flooding.

and (4) stabilizing embankments and emergency spillways by establishing suitable plants.

Terraces can be constructed on soils that have slopes of 2 to 10 percent. The spacing between the terraces depends on the percentage of slope. The gradient of the terrace depends on the soil texture. Terraces on fine-textured, nonerodible soils can have steeper grades than terraces on light, erodible soils. Various grades, however, are used to improve terrace alinement and spacing, since crooked and unevenly spaced terraces make cultivation difficult. Waterways are constructed in all natural draws to serve as outlets for terraces. All natural draws and depressions should be seeded or sodded to adapted perennial grasses. The deepening of shallow depressions may be required so that drainage for terraces and rows is adequate.

Some soils in the county are not suitable for terracing. Constructing terraces on the Wilkes and Louisburg soils is difficult because they are shallow. The Iredell soil is plastic and is not suitable for terracing. It is not feasible to build terraces on slopes that are less than 2 percent or more than 10 percent.

Land smoothing may be desirable on some of the better, deeper soils where peaches or other crops of high value are grown. Land smoothing permits better row arrangement and better row drainage. The Appling, Cecil, and Davidson soils are suitable for this practice.

Most of the soils on the flood plains of the rivers and creeks have a high water table, or are subject to frequent overflow, or both. For favorable production, most areas of these soils need some type of open drain. Depending on the use of the land, either a trapezoidal ditch or a shallow V-ditch or W-ditch is generally needed.

On pastures, which are damaged less than row crops by flooding, the drainage system need not be so elaborate as that normally used for row crops. Very little tile is used in Spartanburg County.

Irrigation in the county is limited mostly to peach orchards and truck crops. In recent years a few vineyards have been established and irrigated. Most irrigation in Spartanburg County is done with sprinklers. Because most soils have a low rate of infiltration, irrigation is generally limited to sprinklers that deliver only a half inch of water per hour or less.

Use of Soils in Community Development

Table 9 rates the limitation of soils when they are used as foundations for dwellings, campsites, intensive play areas, golf fairways, picnic areas, sites for light industries, and trafficways. The ratings are *slight, moderate, severe,* and *very severe.* Also given, for all ratings except slight, are the soil properties that mainly determine the rating. A rating of slight means that the soils have few or no limitations, or that the limitations can be easily overcome. A rating of moderate indicates that the limitations should be recognized, but that they can be overcome by practical means. A rating of severe indicates that suitability of the soils for the specified use is questionable because the limitations are difficult to overcome. A rating of very severe indicates that the limitations are so restrictive that overcoming them may be impractical.

Listed in the following paragraphs, are the soil properties considered when the limitations were rated for the specified use.

Foundations for dwellings.—Limitations are rated for soils used as the foundations for dwellings of three stories or less that have public or community sewage systems. The factors used in rating the limitations are bearing capacity, shrink-swell potential, height of the water table, hazard of flooding, and depth to bedrock. Engineers and others should not apply specific values to the estimates given for bearing capacity of soils.

Recreational sites.—The chief factors that limit the use of soils for recreational sites are slope, trafficability, erodibility, height of the water table, and depth to bedrock. Limitations are rated for campsites, intensive play areas, golf fairways, and picnic areas.

Sites for light industries.—These are sites for buildings of three stories or less. Public or community facilities for sewage disposal are assumed to be available. The factors considered in rating the limitations are bearing capacity, rate of percolation, slope, height of the water table, hazard of flooding, and depth to bedrock. Here, as under "Foundations for dwellings," engineers and others should not apply specific values to the estimates given for bearing capacity of soils.

Trafficways.—Trafficways consist of streets in residential areas and roads that can be built at low cost. Required in construction are only small cuts and fills and little preparation of subgrade. Factors used in rating the limitations are slope, depth to bedrock, height of the water table, hazard of flooding, erodibility, and traffic-supporting capacity.

Formation and Classification of Soils

This section tells how the factors of soil formation affected the development of soils in Spartanburg County and it describes some of the processes responsible for the development of horizons. Then the current system of soil classification is explained, and each soil series in the county is placed in this system, as well as in the system adapted in 1938.

Factors of Soil Formation

Soil is the product of soil-forming processes acting on accumulated or deposited geologic materials. The five important factors in soil formation are parent material, climate, living organisms (plants and animals), relief, and time.

Climate and living organisms are the active forces of soil formation. Their effect on the parent material is modified by relief and by the length of time the parent material has been in place, The relative importance of each factor differs from place to place. In some places one factor dominates in the formation and fixes most of the properties of the soil formed, but normally the interaction of all five factors determines what kind of soil is formed at any given place.

Although soil formation is complex, some understanding of the soil-forming processes may be gained by considering each of the five factors separately.

Parent material

Parent material is the unconsolidated mass from which a soil is formed. It has much to do with the mineral and chemical composition of the soils. In Spartanburg County

the parent material was derived from two sources, residuum from the parent rocks and alluvium deposited by streams.

Residual parent material is formed in place through the weathering of the underlying rock. Soils formed in this material occupy about 93 percent of the county. For the most part, the rocks of Spartanburg County are (1) partly granitized mica gneiss; (2) hornblende gneiss; (3) mica schist; (4) massive or weakly foliated granite; and (5) diorite and gabbro that contain intrusions or ultramafic rocks (*2*).

The gneiss and schist are Precambrian rocks (*12*). The mica gneiss contains deeply weathered minerals of quartz, feldspar, and mica. The chief minerals in hornblende gneiss are quartz, feldspar, and hornblende, but in places this rock contains variable amounts of biotite mica and chlorite. The thick layers of residuum consist of clay mixed with fragments of gneiss and with the minerals quartz and mica. The Cecil and Cataula soils formed from this kind of parent material.

The granite, diorite, and gabbro are Paleozoic rocks (*2*). The granite is massive or weakly foliated. It is as an intrusion into the gneiss and schist rocks. In general, granite consists of quartz, orthoclase and plagioclase feldspar, biotite and muscovite mica, and of vermiculite and other accessory minerals in variable amounts. The residuum covering the granite ranges from a few inches to many feet in thickness. In Spartanburg County the soils formed from weathered granite are the Appling, Durham, and Louisburg.

In areas where the soils formed from diorite and gabbro, the rocks generally are intermediate between a true diorite and a gabbro. These rocks are coarse textured, distinctly massive, and not closely jointed. They consist chiefly of hornblende, pyroxene, and plagioclase feldspar, together with varying amounts of quartz and of accessory minerals. In some places flat rocks showing little weathering crop out, but in most places the rocks are deeply weathered and are covered with a thick layer of soil. The Mecklenburg and Iredell soils formed from weathered diorite and gabbro.

The ultramafic intrusions consist chiefly of peridotite and pyroxenite rocks. The chief mineral of peridotite is olivine, and that of pyroxenite is pyroxene. The ultramafic rocks have been altered a great deal by metamorphism and by hydration, but weathering is slow, and barren rock crops out in places. When the ultramafic intrusions do disintegrate, the product is stiff, yellow to yellowish-brown clay. The Mecklenburg, Enon, and Iredell soils formed from this clay.

In Spartanburg County recent alluvium consists of a mixture of gravel, sand, silt, and clay. Much of this alluvium weathered from rocks in the uplands nearby, but some weathered from granite and metamorphosed rocks of the Piedmont Plateau and of the mountains farther north. The soils that formed in recent alluvium are on the bottom lands and terraces. The soils on first bottoms are weakly developed and still receive deposits during floods, but the soils on old, high terraces and on benches have been in place long enough to show developed horizons. The recent deposits along the smaller streams show little development, but along drainageways and in depressions throughout the uplands, narrow strips of local alluvium have been modified to some extent by the soil-forming processes. In this county the Congaree soils formed in recent alluvium, and the Hiwassee and Wickham soils formed in older alluvium on high stream terraces.

Climate

The climate of Spartanburg County is important in the formation of soils. The county has a temperate climate, and rainfall is well distributed throughout the year. Temperature and precipitation are discussed in a subsection on climate in the section "Additional Facts About the County."

Climate, particularly precipitation and temperature, affects the physical, chemical, and biological relationships in the soil. Water dissolves minerals, aids chemical and biological activity, and transports the dissolved mineral and organic material through the soil profile. Large amounts of rainwater promote leaching of the soluble bases and the translocation of the less soluble and colloidal material downward through the soil profile. A long frost-free season and high rainfall result in the downward movement of fine-textured soil material and the loss of plant nutrients.

The amount of water that percolates through the soil depends on the amount of rainfall, the relative humidity, and the length of the frost-free season. Percolation, or the downward movement of water, also is affected by relief, or lay of the land, and by permeability of the soil material. Weathering of the parent material is intensified if the percolation is interrupted only by brief periods of freezing that is shallow. A high average temperature therefore speeds weathering. A high average temperature also increases the number and kinds of living organisms in the soil, and the organisms, in turn, affect soil formation.

Living organisms

The number and kinds of plants and animals that live in and on the soil are determined mainly by the climate but, to a lesser extent, by parent material, relief, and age of the soil.

Bacteria, fungi, and other micro-organisms are indispensable in soil formation. They hasten the weathering of rock and the decomposing of organic matter. Larger plants alter the soil microclimate, furnish organic matter, and transfer chemical elements from the subsoil to the surface soil.

Most of the fungi, bacteria, and other micro-organisms in the soils of Spartanburg County are in the upper few inches of soil. The activity of earthworms and other small invertebrates is chiefly in the A horizon and upper part of the B horizon, where these organisms slowly but continuously mix the soil material. Bacteria and fungi decompose organic matter and release nutrients for plant use.

Animals play a secondary role in soil formation, but their influence is very great. By eating plants they perform one step in returning plant material to the soil.

In Spartanburg County the native vegetation in the uplands was chiefly oak, hickory, shortleaf pine, Virginia pine, and loblolly pine. On the well-drained bottom lands it was mainly yellow-poplar, sweetgum, ash, and sycamore trees and an abundant growth of canes. The trees on the poorly drained bottom lands were chiefly willow, birch, and beech.

TABLE 9.—*Limitations of soils*

[See text for explanation of the ratings

Soil series [1] and symbol	Foundations for dwellings	Recreational sites	
		Campsites	Intensive play areas
Appling (AcB, AcC2, ApB) (For limitations of Cecil soils in units AcB and AcC2, refer to the Cecil series.)	Slight	Slight or moderate. Slight where slopes are less than 6 percent, moderate where slopes are more than 6 percent. Moderate erodibility is a contributing limitation.	Slight or moderate: Gradient. Slight where slopes are less than 6 percent, moderate where slopes are more than 6 percent.
Cataula (CaB3, CaC3, CaD3, CdB2, CdC2, CdD2).	Severe. Very low bearing capacity; some slopes of more than 10 percent.	Moderate. Moderate erodibility; some slopes of more than 6 percent.	Slight or moderate: Gradient. Slight where slopes are less than 6 percent, moderate where slopes are more than 6 percent.
Cecil (CeB3, CeC3, CeD3, ClB2, ClC2, ClD2).	Slight	Slight or moderate. Slight where slopes are less than 6 percent, moderate where slopes are more than 6 percent. Moderate erodibility is a contributing limitation.	Slight
Congaree (Co)	Severe. Overflow hazard	Severe. Very poor trafficability	Severe. Very poor trafficability.
Davidson (DaB3, DaC3, DaD3, DdB2, DdC2, DsB2, DsC2, DsD2).	Slight or moderate. Slight where slopes are less than 10 percent, moderate where slopes are more than 10 percent.	Moderate or severe. Moderate where slopes are less than 10 percent, severe where slopes are more than 10 percent. Moderate erodibility is a contributing limitation.	Moderate or severe: Gradient. Moderate where slopes are less than 10 percent, severe where slopes are more than 10 percent.
Durham (DvB)	Slight	Slight	Slight
Enon (EnB2, EnC2, EnD2)	Severe. Shallow depth to partially weathered rock; some slopes of more than 10 percent.	Slight to severe. Slight where slopes are less than 6 percent, moderate where slopes are 6 to 10 percent, severe where slopes are more than 10 percent. Moderate erodibility is a contributing limitation.	Moderate or severe. Moderate where slopes are less than 10 percent, severe where slopes are more than 10 percent. Poor trafficability is a moderate limitation.
Hayesville (HaD, HaE, HaF)	Slight to severe. Slight where slopes are less than 10 percent, moderate where slopes are 10 to 25 percent, severe where slopes are more than 25 percent.	Moderate to very severe. Moderate where slopes are less than 10 percent, severe where slopes are 10 to 25 percent, very severe where slopes are more than 25 percent. Moderate erodibility is a contributing limitation.	Moderate to very severe: Gradient. Moderate where slopes are less than 10 percent, severe where slopes are 10 to 25 percent, very severe where slopes are more than 25 percent.
Hiwassee (HwC2)	Slight	Moderate. Moderate erodibility	Moderate. Poor trafficability
Iredell (IdB)	Severe. Low bearing capacity.	Severe. Very poor trafficability and moderate erodibility.	Severe. Very poor trafficability
Lockhart (LcC2)	Slight	Slight. Moderate erodibility	Slight

See footnote at end of table.

used in community development

slight, moderate, severe, and very severe]

Recreational sites—Continued		Sites for light industries	Trafficways
Golf fairways	Picnic areas		
Slight	Slight	Moderate. Slow percolation rate; in some areas slope is more than 6 percent.	Moderate. Moderate traffic-supporting capacity and moderate erodibility.
Slight or moderate: Gradient. Slight where slopes are less than 10 percent, moderate where slopes are more than 10 percent.	Slight or moderate. Slight where slopes are less than 10 percent, moderate where slopes are more than 10 percent. Moderate erodibility is a contributing limitation.	Severe or very severe. Severe where slopes are less than 10 percent, very severe where slopes are more than 10 percent. Very slow percolation and very low bearing capacity are contributing limitations.	Severe. Very poor traffic-supporting capacity. Erodibility is a contributing limitation.
Slight	Slight	Moderate. Moderate percolation rate; in some areas the slope is more than 6 percent.	Moderate. Moderate traffic-supporting capacity and moderate erodibility.
Very severe. Very poor trafficability.	Moderate. Very poor trafficability.	Severe. Overflow hazard	Severe. Overflow hazard.
Slight or severe: Gradient. Slight where slopes are less than 10 percent, severe where slopes are more than 10 percent.	Slight or moderate. Slight where slopes are less than 10 percent, moderate where slopes are more than 10 percent. Moderate erodibility is a contributing limitation.	Moderate or severe. Moderate where slopes are less than 10 percent, severe where slopes are more than 10 percent. Moderate percolation rate and bearing capacity are contributing limitations.	Severe. Poor traffic-supporting capacity; some slopes more than 10 percent. Erodibility is a contributing limitation.
Slight	Slight	Moderate. Moderate bearing capacity and percolation rate.	Moderate. Moderate erodibility and traffic-supporting capacity.
Slight or moderate: Gradient. Slight where slopes are less than 10 percent, moderate where slopes are more than 10 percent.	Moderate. Moderate erodibility and poor trafficability.	Severe or very severe. Severe where slopes are less than 10 10 percent, very severe where slopes are more than 10 percent. Slow percolation rate and low bearing capacity are contributing limitations.	Severe. Poor traffic-supporting capacity; some slopes of more than 10 percent. Erodibility is a contributing limitation.
Slight or severe: Gradient. Slight where slopes are less than 10 percent, severe where slopes are more than 10 percent.	Slight to severe. Slight where slopes are less than 10 percent, moderate where slopes are 10 to 25 percent, severe where slopes are more than 25 percent. Moderate erodibility is a contributing limitation.	Moderate to very severe. Moderate where slopes are less than 10 percent, severe where slopes are 10 to 25 percent, very severe where slopes are more than 25 percent. Bearing capacity is a contributing limitation.	Moderate or severe. Moderate where slopes are less than 25 percent, severe where slopes are more than 25 percent. Traffic-supporting capacity and erodibility are contributing limitations.
Slight	Moderate. Moderate erodibility and poor trafficability.	Moderate. Slow percolation rate and moderate bearing capacity.	Severe. Poor traffic-supporting capacity. Erodibility is a contributing limitation.
Slight	Moderate. Moderate erodibility and very poor trafficability.	Severe. Low bearing capacity and slow percolation rate.	Severe. Very poor traffic-supporting capacity. Erodibility is a contributing limitation.
Slight	Slight	Moderate. Percolation rate and bearing capacity are contributing limitations.	Moderate. Moderate erodibility and traffic-supporting capacity.

TABLE 9.—*Limitations of soils used in*

Soil series [1] and symbol	Foundations for dwellings	Recreational sites	
		Campsites	Intensive play areas
Louisa (LoC2, LoD2, LoE2)	Moderate. Shallow depth to disintegrated rock; some slopes of 10 to 25 percent.	Moderate or severe. Moderate where slopes are less than 10 percent, severe where slopes are more than 10 percent. Moderate erodibility is a contributing limitation.	Severe. Shallow depth to disintegrated rock.
Louisburg (LuC, LuD, LuE)	Moderate. Shallow depth to partially weathered rock; some slopes of 10 to 25 percent.	Moderate or severe. Moderate where slopes are less than 10 percent, severe where slopes are more than 10 percent. Moderate erodibility is a contributing limitation.	Severe. Shallow depth to partially weathered rock.
Madison (McB3, McC3, McD3, McF3, MdB2, MdC2, MdD2, MdE2, MdF2).	Slight or severe. Slight where slopes are less than 25 percent, severe where slopes are more than 25 percent. Moderately shallow depth to partially weathered rock is a contributing limitation.	Slight or severe. Slight where slopes are less than 10 percent, severe where slopes are more than 10 percent. Severe erodibility is a contributing limitation.	Slight to very severe: Gradient. Slight where slopes are less than 10 percent, severe where slopes are 10 to 25 percent, and very severe where slopes are more than 25 percent.
Madison, thin solum variant (MeB2, MeC2).	Severe. Low bearing capacity and shallow depth to rock.	Moderate. Moderate erodibility	Severe. Shallow depth to rock
Mecklenburg (MfB2, MfC2)	Severe. Very low bearing capacity.	Moderate. Moderate erodibility and poor trafficability.	Moderate. Poor trafficability
Musella (MsC3, MsE3, MuC2, MuD2, MuF2).	Moderate or severe. Moderate where slopes are less than 25 percent, severe where slopes are more than 25 percent. Shallow depth to bedrock is a contributing limitation.	Moderate or severe. Moderate where slopes are 10 percent or less, severe where slopes are more than 10 percent. Severe erodibility is a contributing limitation.	Severe. Shallow depth to rock
Pacolet (PaE3, PcE, PcE2, PcF)	Severe. Steep slopes and severe erodibility.	Severe. Steep slopes and severe erodibility.	Severe to very severe: Gradient. Severe where slopes are less than 25 percent, very severe where slopes are more than 25 percent.
Vance (VaB2, VaC2)	Severe. Very low bearing capacity.	Slight or moderate. Slight where slopes are less than 6 percent, moderate where slopes are more than 6 percent. Moderate erodibility is a contributing limitation.	Moderate. Gradient
Wickham (WcB2, WcC2)	Slight	Slight or moderate. Slight where slopes are less than 6 percent, moderate where slopes are more than 6 percent. Moderate erodibility is a contributing limitation.	Slight or moderate: Gradient. Slight where slopes are less than 6 percent, moderate where slopes are more than 6 percent.

See footnote at end of table.

community development—Continued

Recreational sites—Continued		Sites for light industries	Trafficways
Golf fairways	Picnic areas		
Severe. Shallow root zone	Slight	Moderate or severe. Moderate where slopes are less than 10 percent, severe where slopes are more than 10 percent. Shallow depth to disintegrated rock is a contributing limitation.	Moderate. Moderate erodibility; some slopes of more than 10 percent.
Severe. Shallow root zone	Slight	Moderate or severe. Moderate where slopes are less than 10 percent, severe where slopes are more than 10 percent. Shallow depth to partially weathered rock is a contributing limitation.	Moderate. Moderate erodibility, some slopes of more than 10 percent.
Slight or severe: Gradient. Slight where slopes are less than 10 percent, severe where slopes are more than 10 per-percent.	Slight or severe. Slight where slopes are less than 25 percent, severe where slopes are more than 25 percent. Severe erodibility is a contributing limitation.	Moderate or severe. Moderate where slopes are less than 10 percent, severe where slopes are more than 10 percent. Bearing capacity and percolation rate are contributing limitations.	Moderate or severe. Moderate where slopes are less than 25 percent, severe where slopes are more than 25 percent. Erodibility and traffic-supporting capacity are contributing limitations.
Severe. Shallow root zone	Moderate. Moderate erodibility.	Severe. Low bearing capacity, slow percolation rate, and shallow depth to bedrock.	Severe. Shallow depth to rock, and poor traffic-supporting capacity. Moderate erodibility is a contributing limitation.
Slight. Poor trafficability	Moderate. Moderate erodibility and poor trafficability.	Severe. Slow percolation rate and very low bearing capacity.	Severe. Poor traffic-supporting capacity. Erodibility is a contributing limitation.
Moderate or severe: Gradient. Moderate where slopes are less than 10 percent, severe where slopes are more than 10 percent.	Moderate or severe. Moderate where slopes are less than 25 percent, severe where slopes are more than 25 percent. Severe erodibility is a contributing limitation.	Moderate. Shallow depth to bedrock and slow percolation rate.	Severe. Shallow depth to bedrock, poor traffic-supporting capacity, some slopes of more than 25 percent and severe erodibility.
Severe. Steep slopes and severe erodibility.	Moderate or severe. Moderate where slopes are less than 25 percent, severe where slopes are more than 25 percent. Severe erodibility is a contributing limitation.	Severe. Slow percolation rate; some slopes of more than 15 percent.	Severe. Very poor traffic-supporting capacity and severe erodibility.
Slight	Moderate. Moderate erodibility.	Severe. Very slow percolation rate and very low bearing capacity.	Severe. Very poor traffic-supporting capacity. Erodibility is a contributing limitation.
Slight	Slight	Moderate. Moderate percolation rate and bearing capacity.	Moderate. Moderate traffic-supporting capacity and erodibility.

TABLE 9.—*Limitations of soils used in*

Soil series and symbol	Foundations for dwellings	Recreational sites	
		Campsites	Intensive play areas
Wilkes (WkB2, WkC2, WkD2, WkF2).	Severe. Shallow depth to bedrock, very low bearing capacity, and in places slopes are more than 25 percent.	Moderate or severe. Moderate where slopes are less than 10 percent, severe where slopes are more than 10 percent. Severe erodibility is a contributing limitation.	Moderate. Shallow depth to bedrock.
Worsham (WoB)	Very severe. High water table and very low bearing capacity.	Very severe. Very poor trafficability and high water table. Severe erodibility is a contributing limitation.	Very severe. Very poor trafficability and high water table.

[1] Local alluvial land (La); Made land (Ma); Mine pits and dumps (Mh); Mixed alluvial land, wet (Mk); Moderately gullied land not made.

Time

Time is necessary in the formation of soils. The length of time required for a soil to develop depends largely on the intensity of other soil-forming factors. The soils in Spartanburg County range from immature, or young, to mature. The young soils have very little profile development, and the mature soils have well-defined horizons.

On the smoother parts of the uplands and on the older stream terraces, the soils have generally developed to maturity. Examples of these mature soils are the Cecil soils on uplands and the Hiwassee soils on stream terraces. On the stronger slopes, geologic erosion has removed the soil material almost as rapidly as it has formed. Consequently, the soils on these slopes are shallow and have little profile development in most places. Examples are the Louisburg and Wilkes soils. On the first bottoms of streams and in areas of local alluvium, the soils are young because the material has not been in place long enough for soil horizons to form. The Congaree is an example of a young soil.

Relief

Relief, or lay of the land, influences soil formation because of its effect on moisture, temperature, and erosion. This influence, however, is modified somewhat by the influence of the other soil-forming factors.

In Spartanburg County, slopes range from 0 to 40 percent. Most soils on uplands with slopes of less than 15 percent have a thick, well-developed profile. On slopes of 15 to 40 percent, geologic erosion removes soil material almost as fast as it forms. As a result, the Wilkes and Louisburg soils have thin, weakly defined profiles. In Spartanburg County, however, the most extensive soils are gently sloping to strongly sloping and have not been adversely affected by relief.

On stream bottoms and terraces, the slopes range from 0 to about 10 percent. Here, the soils are young because the parent material has been in place for a relatively short time.

Processes of Horizon Differentiation

Horizon differentiation, or the development of horizons in a soil profile, is the result of the factors of soil formation interacting. Most of the soils in Spartanburg County have strongly developed horizons. A few soils, however, have weakly developed horizons.

The mature soils are in equilibrium with the soil-forming factors. The B horizon of most of these mature soils contains much clay, and the structure is strong and subangular blocky or strong and blocky.

The development of horizons is the result of one or more of these main processes: (1) accumulation of organic matter, (2) leaching of carbonates and salts, (3) translocation of silicate clay minerals, and (4) reduction and transfer of iron. In most of the profiles, two or more of these processes have operated in the development of horizons.

Some organic matter has accumulated in the upper layer of nearly all soils in the county, and an A1 horizon has formed. Much of this organic matter is in the form of humus. Generally, the quantity is very small, and in much of the county the A1 horizon has been destroyed by cultivation or accelerated erosion. Appling and Cecil soils that have never been cultivated have a distinct, thin A1 horizon containing little organic matter. The A1 horizon is thicker in the Congaree soils than that in Appling or Cecil soils and contains more organic matter.

Leaching of carbonates and bases has taken place in all soils in the county but has been of limited importance in the development of horizons. In many soils, however, leaching has had the indirect effect of permitting the translocation of silicate clay minerals. Also, leaching has completely removed carbonates and salts from the profile of some soils. Nearly all soils in the county are medium acid to strongly acid. The Davidson and Iredell soils have been affected less by leaching and are less acid than the other upland soils. Leaching has had little effect on the Congaree and other young soils on the bottom lands.

Translocation of silicate clay has contributed to the development of almost all the soils except those that formed in recent alluvium. This translocation is one of

community development—Continued

Recreational sites—Continued		Sites for light industries	Trafficways
Golf fairways	Picnic areas		
Slight or moderate. Slight where slopes are less than 10 percent, moderate where slopes are more than 10 percent. The shallow root zone is a contributing limitation.	Moderate. Moderate erodibility.	Severe or very severe. Severe where slopes are less than 10 percent, very severe where slopes are more than 10 percent. Very slow percolation rate, very low bearing capacity, and shallow depth to bedrock are also severe limitations.	Severe. Very poor traffic-supporting capacity, severe erodibility, shallow depth to bedrock, and some slopes of more than 25 percent.
Very severe. High water table and very low traffic-supporting capacity.	Very severe. Very poor trafficability, high water table, and severe erodibility.	Very severe. Very slow percolation rate, very low bearing capacity, and high water table.	Very severe. Very poor traffic-supporting capacity, severe erodibility, and high water table.

(Mm, MnC, MnF); Severely gullied land (Se); and Stony land, moderately steep (StE), are variable, and interpretations for them were

the more important processes in the formation of horizons in the older soils in the county. Many of the soils show strong translocation of clay from the A horizon and high accumulation of clay in the B horizon. Clay films in root channels and on ped faces indicate that silicate clay has moved from the A horizon into the B horizon. The Iredell, Enon, and Vance soils show evidence of this translocation.

The reduction and transfer of iron, called gleying, has occurred in all of the poorly drained and somewhat poorly drained soils in the county. Gleying has occurred in the deeper horizons of Vance sandy loam and other moderately well drained soils. In small areas of Worsham fine sandy loam, this process has been important in the development of horizons. In some soils iron has been segregated in some horizons so as to form mottles of yellowish red, strong brown, or yellowish brown. In other soils iron has formed concretions in the lower horizons.

Classification of Soils

Soils are classified so that we may more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us understand their behavior and their response to manipulation. First through classification, and then through the use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Thus in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and applied in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. They are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*16*) and later revised (*13*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. The current system is under continual study (*8, 10*). Therefore, readers interested in developments of this system should search for the latest literature available. In table 10, some classes in the current system and the great soil groups in the older system are given for each soil series. The classes in the current system are briefly defined in the following paragraphs. A description of each soil series in the county, including a profile representative of a soil in that series, can be found in the section "Descriptions of the Soils."

ORDER: Ten soil orders are recognized in the current system. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate the soil orders are those that tend to give broad climatic groupings of the soils. Two exceptions are the Entisols and Histosols, which occur in many different climates. Because of the importance of climate to soil formation, the orders to some extent are climatic zonal groups, and they tend to have definite geographic ranges. Table 10 shows the three soil orders in Spartanburg County—Inceptisols, Alfisols, and Ultisols.

SUBORDER: Each order is divided into suborders. Soils within a suborder are similar in soil properties that mainly reflect the presence or absence of waterlogging or soil differences resulting from climate or vegetation. Those properties are mineralogy, chemistry, degree of gleying, soil moisture, texture, and the presence or absence of accumulated soluble material. The suborder is not shown in table 10.

GREAT GROUP: Suborders are separated into great groups on the basis of uniformity in the presence, absence, and arrangement of diagnostic horizons and features. The diagnostic horizons are those that contain illuvial clay, iron, and humus; or they are thick, dark-colored surface horizons; or horizons which have a pan that interferes with water movement or root development. The features are colors of dark brown and dark red that are associated with basic rocks; major differences in chemical composition; and wide differences in base saturation. The great group is not shown in table 10 for the current system of classification. The name of the

TABLE 10.—*Soil series classified according to the current and the older systems [1] of classification*

Series	Current classification			1938 classification
	Family	Subgroup	Order	Great soil group
Appling	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Cataula	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Cecil	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Congaree	Fine loamy, mixed, thermic	Fluventic Dystrochrepts	Inceptisols	Alluvial soils.
Davidson	Clayey, kaolinitic, thermic	Humic Paleudults	Ultisols	Reddish-Brown Lateritic soils.
Durham	Fine loamy, siliceous, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Enon	Fine, mixed, thermic	Typic Hapludults	Alfisols	Red-Yellow Podzolic soils.
Hayesville	Clayey, kaolinitic, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Hiwassee	Clayey, kaolinitic, thermic	Typic Rhodudults	Ultisols	Reddish-Brown Lateritic soils.
Iredell	Fine, montmorillonitic, thermic	Vertic Hapludalfs	Alfisols	Planosols.
Lockhart	Clayey, mixed, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Louisa	Fine loamy, micaceous, thermic	Ruptic-Ultic Dystrochrepts	Inceptisols	Lithosols.
Louisburg	Coarse loamy, siliceous, thermic	Typic Dystrochrepts	Inceptisols	Lithosols.
Madison	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Mecklenburg	Clayey, mixed, thermic	Alfic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Musella	Fine loamy, mixed, thermic	Typic Rhodudults	Ultisols	Reddish-Brown Lateritic soils.
Pacolet	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Vance	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Wickham	Fine loamy, mixed, thermic	Typic Paleudults	Ultisols	Red-Yellow Podzolic soils.
Wilkes	Fine loamy, mixed, thermic	Ruptic-Alfic Dystrochrepts	Inceptisols	Lithosols.
Worsham	Clayey, kaolinitic, thermic	Typic Ochraquults	Ultisols	Low-Humic Gley soils.

[1] Placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available.

great group, however, is the last word in the name of the subgroup.

SUBGROUP: The subgroups are subdivisions of the great group and are defined in terms of reference to the great groups. One of the subgroups represents the central (typic) concept of the great group, and others, called intergrades, have properties of one great group that are dominant and also weakly expressed properties of another great group, suborder, or order. Subgroups may also be made where there is some soil property unlike that of the great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Hapludult (a typical Hapludult).

FAMILIES: Families are separated within a subgroup primarily on the basis of properties important to the growth of plants or to the behavior of soils when used for engineering. Among the properties considered are texture, consistence, permeability, reaction, mineralogy, soil temperature, and thickness of horizons. An example is the clayey, kaolinitic, thermic family of Typic Hapludults.

SERIES: The series consists of a group of soils that formed from a particular kind of parent material and having genetic horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, structure, reaction, consistence, and mineralogical and chemical composition.

New soil series must be established and concepts of some established series, especially older ones that have been used little in recent years, must be revised in the course of the soil survey program across the country. A proposed new series has tentative status until review of the series concept at state, regional, and national levels of responsibility for soil classification result in a judgment that the new series should be established. All of the soil series described in this survey except the Pacolet series have been established earlier. The Pacolet series had tentative status when the survey was sent to the printer.

Additional Facts About the County

The climate and the physiography, relief, and geology of Spartanburg County are discussed in this section.

Climate [6]

The climate of Spartanburg County is mild, and rainfall is well distributed throughout the year. The day-to-day weather is controlled mostly by the movement of pressure systems across the county, but complete changes of air masses are relatively few in summer, since masses of tropical maritime air persist for long periods.

The prevailing winds are from the southwest most of the year but are from the northeast late in summer and early in fall. The average velocity is about 8 miles per hour. In the Greenville area the highest wind velocity recorded for a 1-minute period in recent years was 79 miles per hour. This wind was from the north. The average relative humidity at 1:00 p.m. ranges from a maximum of 57 percent in winter to a minimum of 47 percent in April and May. The average relative humidity for the year is approximately 70 percent.

In the average year, about 76 days have one-tenth of an inch or more of rain, about 33 have one-half of an inch or more, and about 14 have 1 inch or more. The highest rainfall in the county in the last 50 years was 73.93 inches in 1929. The lowest annual rainfall recorded was 31.16 inches in 1954 (*3*, *17*).

[6] By NATHAN KRONBERG, State climatologist, U.S. Weather Bureau.

The average annual sunshine is about 62 percent of the possible. The range in percent is from the middle and high fifties in winter to the middle sixties in summer. Skies are cloudy or overcast about 43 percent of the time. The clouds are below 500 feet for about 4 percent of the time and are below 1,000 feet for about 9 percent of the time.

Warm weather generally lasts from some time in May into September, and there are few breaks in the heat during midsummer. Typically, temperatures of 100°F. or more are recorded on about 3 days: 1 day, each, in June, July, and August. Temperatures of 90° or higher are recorded on an average of 50 days. Most summers have 1 day or more when the temperature exceeds 100°. About 25 percent of the annual rainfall occurs in summer, chiefly in local thundershowers.

Fall generally is the most pleasant season, especially from late in September to early in November. During this period, rainfall is light, the percentage of sunshine is high, and the temperature is generally moderate. Heavy rains and gale-force winds resulting from nearby tropical storms have occurred about five times in the past 30 years. Damage from these storms generally have been minor in the county. About 23 percent of the total annual rainfall is in fall.

Winters are mild and relatively short, though about 60 days have temperatures at freezing or below. The chance is good that a snow flurry will occur in winter, but a significant snowfall and extended snow cover are unusual. In the average winter, the temperature is 20° or lower in about 4 days and 15° or lower in about 3 days. During the last 30 years, only 2 days with a temperature of lower than 10° have been reported. About 26 percent of the annual rainfall occurs in winter, mainly in steady rains.

Spring is the most changeable season. March is frequently cold and windy, but May is generally warm and pleasant. Severe thunderstorms and tornadoes are most likely in spring. Spartanburg County has had about six tornadoes in the past 40 years. About 26 percent of the total annual rainfall occurs in spring.

The climate of the county is favorable for the principal crops: peaches, cotton, corn, small grain, soybeans, hay, and vegetables. Moisture accumulates in the soils during winter and spring, and in most years the soils are at field capacity at planting time. Dry periods are sufficient, however, to permit tillage. The probabilities of the last freezing temperatures in spring and the first in fall are shown in table 11 (*3*, *4*). The average growing season is about 227 days, or long enough to allow crops to mature, even if they are planted over a period of weeks or months.

The amount of rainfall in the growing season normally is enough for crop development and maturity, but in some years it is either inadequate or excessive. Table 12 shows that extreme monthly and annual deficiencies may occur 1 year in 10, and extreme excesses, 1 year in 10. For example, the average rainfall in July is 4.4 inches, but in 1 year in 10 rainfall may be less than 2.4 inches, and in another July, in the same 10-year period, rainfall may be more than 6.8 inches.

Droughts were disastrous in 1925 and 1954, but they generally are less severe and occur once or twice in every 10 years. By definition, a drought occurs when no water in the soil is available to plants. A drought day is a day during which no water in the soil is available to plants. Calculation of drought days is based on the capacity of the soil to hold available water, on the amount of precipitation, and on the amount of water used or transpired by plants. Even in a normal year, there are periods when rainfall does not meet the need of most crops. Supplementary irrigation is needed for maximum crop production during most years. During a severe drought, however, almost no water is available for irrigation.

The probabilities of stated numbers of drought days are shown in table 13. These estimates were obtained by using the Penman method for computing evapotranspiration and by defining a drought day in terms stated earlier. The total possible amount of stored moisture available to plants varies with the soils and with the depth of the roots of different plants. Table 13, therefore, shows the estimated number of drought days for five levels of storage capacity and five probabilities. For example, in Spartanburg County for a soil that has a 2-inch storage capacity, the chance is fifty-fifty, or 5 in 10, that there will be 10 drought days in July (*19*).

The duration and amount of rainfall for the period 1941–61 was recorded by an automatic rain gauge at Spartanburg. Maximum intensity for the period is shown in the following list.

Duration (hours):	*Inches*
1	3. 20
2	3. 52
3	4. 42
6	6. 19
12	6. 67

TABLE 11.—*Probabilities of last freezing temperatures in spring and first in fall (3, 4)*

Probability	Dates for given probability and temperature		
	24° F. or less	28° F. or less	32° F. or less
Spring:			
1 year in 10 later than	March 21	April 1	April 19
2 years in 10 later than	March 14	March 25	April 12
5 years in 10 later than	February 28	March 11	March 29
Fall:			
1 year in 10 earlier than	November 14	November 7	October 27
2 years in 10 earlier than	November 20	November 13	November 1
5 years in 10 earlier than	December 2	November 23	November 11

TABLE 12.—*Temperature and precipitation (18)*

Month	Temperature				Precipitation			
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average monthly total	One year in 10 will have—		Average snowfall
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—	
	°F.	°F.	°F.	°F.	*Inches*	*Inches*	*Inches*	*Inches*
January	53	35	68	20	4.3	1.9	7.0	0.8
February	55	35	70	23	4.0	1.6	7.5	1.4
March	62	40	76	28	4.6	2.1	7.3	.8
April	72	50	85	39	4.0	1.8	6.6	0
May	81	59	90	48	3.2	1.3	5.4	0
June	88	67	95	59	3.0	1.6	4.6	0
July	89	69	96	64	4.4	2.4	6.8	0
August	88	68	95	63	4.3	2.3	6.5	0
September	82	63	92	54	3.9	1.4	6.7	0
October	73	52	83	40	3.4	.7	7.0	0
November	62	41	75	27	2.9	.8	5.3	[1]
December	53	34	68	22	3.8	1.5	6.7	.6
Year	71	51	[2] 99	[3] 13	45.8	35.7	55.6	3.6

[1] Trace: Less than 0.05 inch. [2] Average highest annual maximum. [3] Average annual lowest minimum.

TABLE 13.—*Probabilities of drought days on soils of five different moisture-storage capacities (19)*

Month [1]	Probability	Minimum number of drought days if soil has a moisture-storage capacity of [2]—				
		1 inch	2 inches	3 inches	4 inches	5 inches
April	1 in 10	15	0	0	0	0
	2 in 10	12	0	0	0	0
	3 in 10	11	0	0	0	0
	5 in 10	8	0	0	0	0
May	1 in 10	24	23	17	10	3
	2 in 10	21	17	12	3	0
	3 in 10	18	15	7	0	0
	5 in 10	15	9	0	0	0
June	1 in 10	25	24	22	18	15
	2 in 10	19	17	16	15	14
	3 in 10	17	14	13	12	11
	5 in 10	15	10	9	8	3
July	1 in 10	21	20	20	20	18
	2 in 10	19	17	16	15	14
	3 in 10	17	14	13	12	11
	5 in 10	15	10	9	8	3
August	1 in 10	20	17	16	15	14
	2 in 10	17	13	11	10	9
	3 in 10	15	10	5	5	4
	5 in 10	12	4	3	0	0
September	1 in 10	24	22	19	17	15
	2 in 10	21	17	14	11	9
	3 in 10	19	14	10	7	4
	5 in 10	15	9	3	0	0
October	1 in 10	27	26	24	12	20
	2 in 10	23	21	18	15	12
	3 in 10	20	17	14	10	7
	5 in 10	15	11	7	0	0

[1] Months of January, February, March, November and December are not shown, because crops are seldom damaged by drought in these months.

[2] The depth that a soil can hold water and make it available to plants.

Physiography, Drainage, and Geology

Spartanburg County is mainly on the Piedmont Plateau, but its northwestern corner is on the foothills of the Blue Ridge Mountains. The general slope is southeastward, which is the general direction of the main drainageways. The land ranges from nearly level to steep, but most areas are gently sloping to moderately steep.

The total area of the flood plains and stream terraces is small. Except for moderately steep and steep escarpments adjacent to the flood plains, stream terraces are gently undulating to sloping. The highest point in the county, about 1,480 feet, is on Bird Mountain in the northwestern part. In the central part the elevation ranges from 750 to 900 feet. In the northern part of the county, a series of hills rises about 200 feet above the surrounding land and does not conform to the general pattern of relief. The lowest elevation is on the Enoree River in the extreme southeastern part of the county near the Union County line.

The rivers and smaller streams in the county form a dendritic pattern of drainage. Except for a small area in the northeast corner, the main streams flow southeastward. In the northeast corner the streams flow northeastward into the Broad River. The major streams that drain the county are the Pacolet, Tyger, and Enoree Rivers (*5*). Their chief tributaries are Page, Motlow, Holston, Lawsons Fork, Fairforest, Buck, Big Ferguson, Little Ferguson, Abner, Dutchman, Jimmies, and Cedar Shoals Creeks.

Thirteen geologic formations are in Spartanburg County (*5*). These formations are made up of alluvium, fine-grained rocks, medium-grained rocks, fine-grained to coarse-grained rocks, and coarse-grained rocks. Alluvium consists of material recently deposited on flood plains. The fine-grained rocks are quartzite, diabase, taluca quartz monzonite, and sericite schist. The medium-grained rocks are granite, biotite gneiss, and migmatite. The fine-grained to coarse-grained rocks are biotite schist, Yorkville quartz monzonite, and hornblende schist. The coarse-grained rocks are hornblende gneiss, coarse-grained granite, and muscovite pegmatite dikes.

Glossary

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity. The capacity of a soil to hold water in a form available to plants. Amount of moisture held in soil between field capacity, or about one-third atmosphere of tension, and the wilting coefficient, or about 15 atmospheres of tension.

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.

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; soil will not hold together in a mass.

Friable.—When moist, soil crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, soil crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, soil 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, soil adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, soil is moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, soil breaks into powder or individual grains under very slight pressure.

Cemented.—Soil is hard and brittle; little affected by moistening.

Erosion. The wearing away of the land surface by wind, running water, and other geologic agents.

Gleyed soil. A soil in which waterlogging and lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes.

Leaching. The removal of soluble materials from soils or other material by percolating water.

Morphology, soil. The makeup of the soil, including the texture, structure, consistence, color, and other physical, mineralogical, and biological properties of the various horizons of the soil profile.

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of 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 these: *Fine*, less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium*, ranging from 5 to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse*, more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Natural drainage. Refers to the conditions that existed during the development of the soil, 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 (*9*).

Nutrient, plant. Any element taken in by a plant that is essential to its growth, and is used by the plant in producing food and tissue. Important plant nutrients obtained from the soil are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps others. Those obtained largely from the air and water are carbon, hydrogen, and oxygen.

Parent material (soil). The horizon of weathered rock or partly weathered soil material from which soil has formed; C horizon in the soil profile.

Permeability, soil. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *Very slow*, *slow*, *moderately slow*, *moderate*, *moderately rapid*, *rapid*, and *very rapid*.

Plastic limit (soil engineering). The moisture content at which a soil changes from a semisolid to a plastic state.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. Individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in a mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. Mostly confined to the solum are the living roots and other plant life and the animal life characteristic of the soil.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. 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 (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizons; roughly, the part of the profile below plow depth.

Surface soil. The soil ordinarily moved in tillage or its equivalent in uncultivated soil. Generally, the top 5 to 8 inches of soil.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly and without harm to a prepared outlet. Terraces are generally built so that they do not interfere with the use of farm machinery. Those intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, or first bottoms, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

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."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

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GUIDE TO MAPPING UNITS

[For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs.

[See table 1, page 7, for approximate acreage and proportionate extent of soils and table 3, page 44, for estimated average acre yields of principal crops. For information significant to engineering, see section beginning on page 54]

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group		Wildlife suitability group	
			Symbol	Page	Number	Page	Number	Page
AcB	Appling and Cecil sandy loams, 2 to 6 percent slopes	8	IIe-2	37	3	47	1	52
AcC2	Appling and Cecil sandy loams, 6 to 10 percent slopes, eroded	8	IIIe-2	40	4	47	1	52
ApB	Appling sandy loam, 2 to 6 percent slopes	9	IIe-2	37	3	47	1	52
CaB3	Cataula clay loam, 2 to 6 percent slopes, severely eroded	10	IIIe-3	40	9	50	3	52
CaC3	Cataula clay loam, 6 to 10 percent slopes, severely eroded	10	IVe-2	40	9	50	3	52
CaD3	Cataula clay loam, 10 to 15 percent slopes, severely eroded	10	VIe-3	41	9	50	3	52
CdB2	Cataula sandy loam, 2 to 6 percent slopes, eroded	10	IIe-3	38	10	50	4	52
CdC2	Cataula sandy loam, 6 to 10 percent slopes, eroded	11	IIIe-3	40	10	50	4	52
CdD2	Cataula sandy loam, 10 to 15 percent slopes, eroded	11	IVe-2	40	10	50	4	52
CeB3	Cecil clay loam, 2 to 6 percent slopes, severely eroded	12	IIIe-1	39	6	48	3	52
CeC3	Cecil clay loam, 6 to 10 percent slopes, severely eroded	12	IVe-1	40	6	48	3	52
CeD3	Cecil clay loam, 10 to 15 percent slopes, severely eroded	12	VIe-1	41	6	48	3	52
ClB2	Cecil sandy loam, 2 to 6 percent slopes, eroded	12	IIe-1	37	3	47	1	52
ClC2	Cecil sandy loam, 6 to 10 percent slopes, eroded	13	IIIe-1	39	3	47	1	52
ClD2	Cecil sandy loam, 10 to 15 percent slopes, eroded	13	IVe-1	40	4	47	2	52
Co	Congaree soils	13	IIw-2	38	1	46	6	54
DaB3	Davidson clay loam, 2 to 6 percent slopes, severely eroded	14	IIIe-1	39	6	48	3	52
DaC3	Davidson clay loam, 6 to 10 percent slopes, severely eroded	14	IVe-1	40	6	48	3	52
DaD3	Davidson clay loam, 10 to 15 percent slopes, severely eroded	14	IVe-1	40	6	48	3	52
DdB2	Davidson loam, 2 to 6 percent slopes, eroded	15	IIe-1	37	3	47	1	52
DdC2	Davidson loam, 6 to 10 percent slopes, eroded	15	IIIe-1	39	4	47	1	52
DsB2	Davidson sandy clay loam, 2 to 6 percent slopes, eroded	15	IIe-1	37	3	47	1	52
DsC2	Davidson sandy clay loam, 6 to 10 percent slopes, eroded	15	IIIe-1	39	4	47	1	52
DsD2	Davidson sandy clay loam, 10 to 15 percent slopes, eroded	15	IVe-1	40	4	47	2	52
DvB	Durham loamy sand, 2 to 6 percent slopes	17	IIe-2	37	3	47	1	52
EnB2	Enon sandy loam, 2 to 6 percent slopes, eroded	17	IIe-3	38	10	50	4	52
EnC2	Enon sandy loam, 6 to 10 percent slopes, eroded	18	IIIe-3	40	10	50	4	52
EnD2	Enon sandy loam, 10 to 15 percent slopes, eroded	18	IVe-2	40	10	50	4	52

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group		Wildlife suitability group	
			Symbol	Page	Number	Page	Number	Page
HaD	Hayesville sandy loam, 6 to 15 percent slopes	19	IVe-1	40	4	47	1	52
HaE	Hayesville sandy loam, 15 to 25 percent slopes	19	VIe-1	41	5	48	2	52
HaF	Hayesville sandy loam, 25 to 40 percent slopes	19	VIIe-1	41	5	48	3	52
HwC2	Hiwassee sandy loam, 2 to 8 percent slopes, eroded	20	IIIe-1	39	3	47	1	52
IdB	Iredell fine sandy loam, 2 to 6 percent slopes	20	IIe-4	38	8	49	4	52
La	Local alluvial land	20	I-1	37	1	46	6	54
LcC2	Lockhart sandy loam, 4 to 10 percent slopes, eroded	21	IIIe-2	40	4	47	1	52
LoC2	Louisa sandy loam, 6 to 10 percent slopes, eroded	22	IVe-3	40	11	50	5	53
LoD2	Louisa sandy loam, 10 to 15 percent slopes, eroded	22	VIe-2	41	11	50	5	53
LoE2	Louisa sandy loam, 15 to 25 percent slopes, eroded	22	VIIe-2	42	11	50	5	53
LuC	Louisburg loamy sand, 6 to 10 percent slopes	23	IVe-3	40	11	50	5	53
LuD	Louisburg loamy sand, 10 to 15 percent slopes	23	VIe-2	41	11	50	5	53
LuE	Louisburg loamy sand, 15 to 25 percent slopes	23	VIIe-2	42	11	50	5	53
Ma	Made land	23	VIIe-2	42	14	51	--	--
McB3	Madison clay loam, 2 to 6 percent slopes, severely eroded	24	IIIe-1	39	6	48	3	52
McC3	Madison clay loam, 6 to 10 percent slopes, severely eroded	24	IVe-1	40	6	48	3	52
McD3	Madison clay loam, 10 to 15 percent slopes, severely eroded	24	VIe-1	41	6	48	3	52
McF3	Madison clay loam, 15 to 40 percent slopes, severely eroded	25	VIIe-1	41	7	48	3	52
MdB2	Madison sandy loam, 2 to 6 percent slopes, eroded	25	IIe-1	37	3	47	1	52
MdC2	Madison sandy loam, 6 to 10 percent slopes, eroded	25	IIIe-1	39	4	47	1	52
MdD2	Madison sandy loam, 10 to 15 percent slopes, eroded	25	IVe-1	40	4	47	2	52
MdE2	Madison sandy loam, 15 to 25 percent slopes, eroded	26	VIe-1	41	5	48	2	52
MdF2	Madison sandy loam, 25 to 40 percent slopes, eroded	26	VIIe-1	41	5	48	3	52
MeB2	Madison sandy loam, thin solum variant, 2 to 6 percent slopes, eroded	26	IVe-1	40	11	50	5	53
MeC2	Madison sandy loam, thin solum variant, 6 to 10 percent slopes, eroded	26	VIe-1	41	11	50	5	53
MfB2	Mecklenburg fine sandy loam, 2 to 6 percent slopes, eroded	27	IIe-3	38	12	51	1	52
MfC2	Mecklenburg fine sandy loam, 6 to 10 percent slopes, eroded	27	IIIe-3	40	12	51	1	52
Mh	Mine pits and dumps	27	VIIe-2	42	14	51	--	--
Mk	Mixed alluvial land, wet	28	IVw-1	41	2	47	7	54
Mm	Moderately gullied land, firm materials	28	VIIe-2	42	14	51	--	--
MnC	Moderately gullied land, friable materials, 2 to 10 percent slopes	28	VIIe-2	42	14	51	--	--
MnF	Moderately gullied land, friable materials, 10 to 40 percent slopes	28	VIIe-2	42	14	51	--	--

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group		Wildlife suitability group	
			Symbol	Page	Number	Page	Number	Page
MsC3	Musella clay loam, 6 to 10 percent slopes, severely eroded	29	IVe-1	40	6	48	3	52
MsE3	Musella clay loam, 10 to 25 percent slopes, severely eroded	29	VIe-1	41	7	48	3	52
MuC2	Musella fine sandy loam, 6 to 10 percent slopes, eroded	29	IIIe-1	39	4	47	1	52
MuD2	Musella fine sandy loam, 10 to 15 percent slopes, eroded	30	IVe-1	40	4	47	2	52
MuF2	Musella fine sandy loam, 15 to 40 percent slopes, eroded	30	VIIe-1	41	5	48	2	52
PaE3	Pacolet clay loam, 15 to 25 percent slopes, severely eroded	31	VIIe-1	41	7	48	3	52
PcE	Pacolet sandy loam, 15 to 25 percent slopes	31	VIe-1	41	5	48	2	52
PcE2	Pacolet sandy loam, 15 to 25 percent slopes, eroded	31	VIe-1	41	5	48	2	52
PcF	Pacolet sandy loam, 25 to 40 percent slopes	31	VIIe-1	41	5	48	2	52
Se	Severely gullied land	31	VIIe-2	42	14	51	--	--
StE	Stony land, moderately steep	32	VIs-1	41	14	51	5	53
VaB2	Vance sandy loam, 2 to 6 percent slopes, eroded	33	IIe-3	38	10	50	4	52
VaC2	Vance sandy loam, 6 to 10 percent slopes, eroded	33	IIIe-3	40	10	50	4	52
WcB2	Wickham sandy loam, 2 to 6 percent slopes, eroded	34	IIe-1	37	3	47	1	52
WcC2	Wickham sandy loam, 6 to 10 percent slopes, eroded	34	IIIe-1	39	4	47	1	52
WkB2	Wilkes fine sandy loam, 2 to 6 percent slopes, eroded	35	IIIe-5	40	11	50	5	53
WkC2	Wilkes fine sandy loam, 6 to 10 percent slopes, eroded	35	IVe-3	40	11	50	5	53
WkD2	Wilkes fine sandy loam, 10 to 15 percent slopes, eroded	35	VIe-2	41	11	50	5	53
WkF2	Wilkes fine sandy loam, 15 to 40 percent slopes, eroded	35	VIIe-2	42	11	50	5	53
WoB	Worsham fine sandy loam, 0 to 6 percent slopes	36	Vw-1	41	13	51	7	54

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All Other Inquiries

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