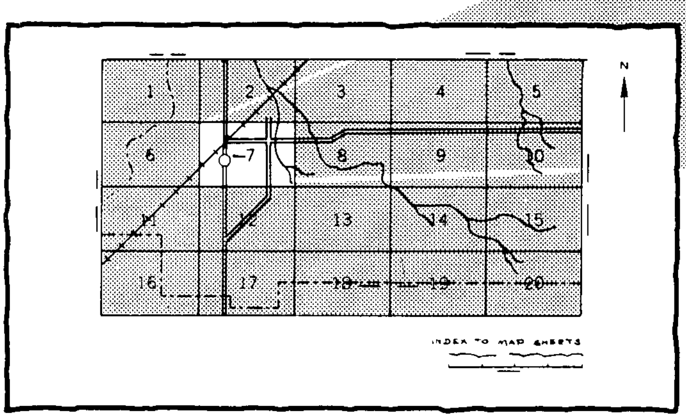
Soil Survey of

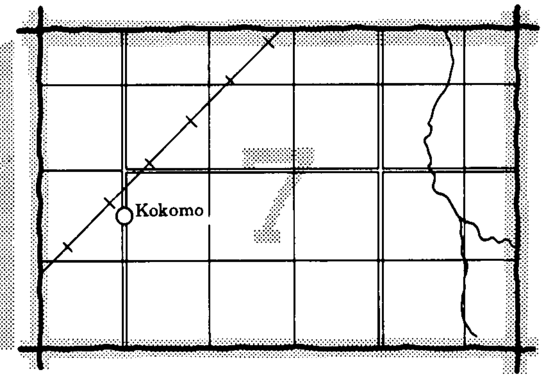
Columbia, McDuffie, and Warren Counties Georgia

United States Department of Agriculture
Soil Conservation Service
in cooperation with
the University of Georgia
College of Agriculture, Agricultural Experiment Stations

HOW TO USE

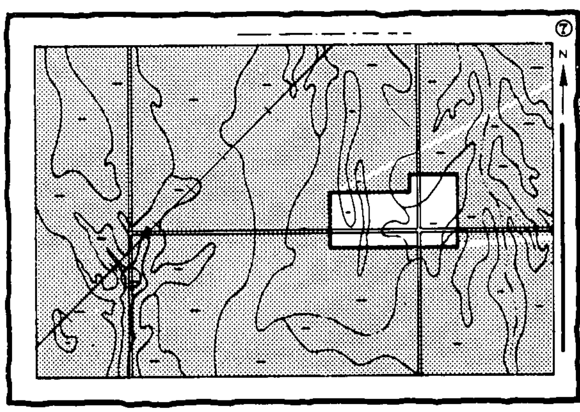
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

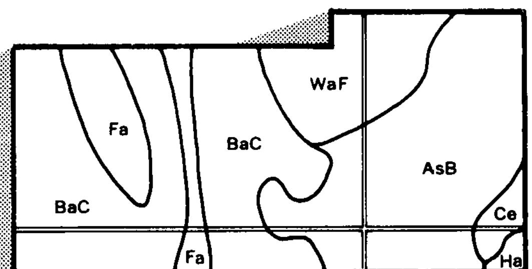




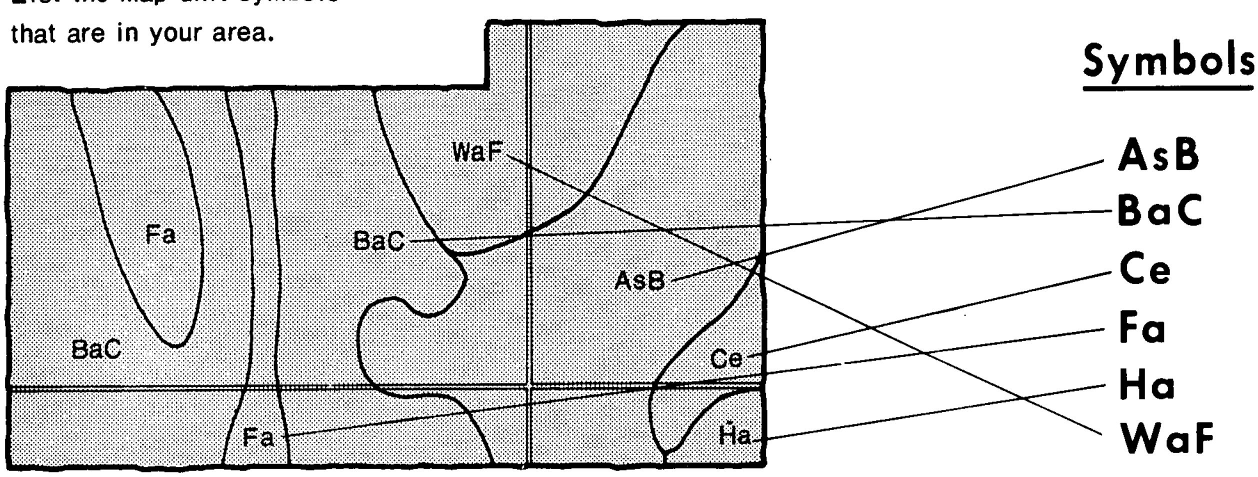
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.



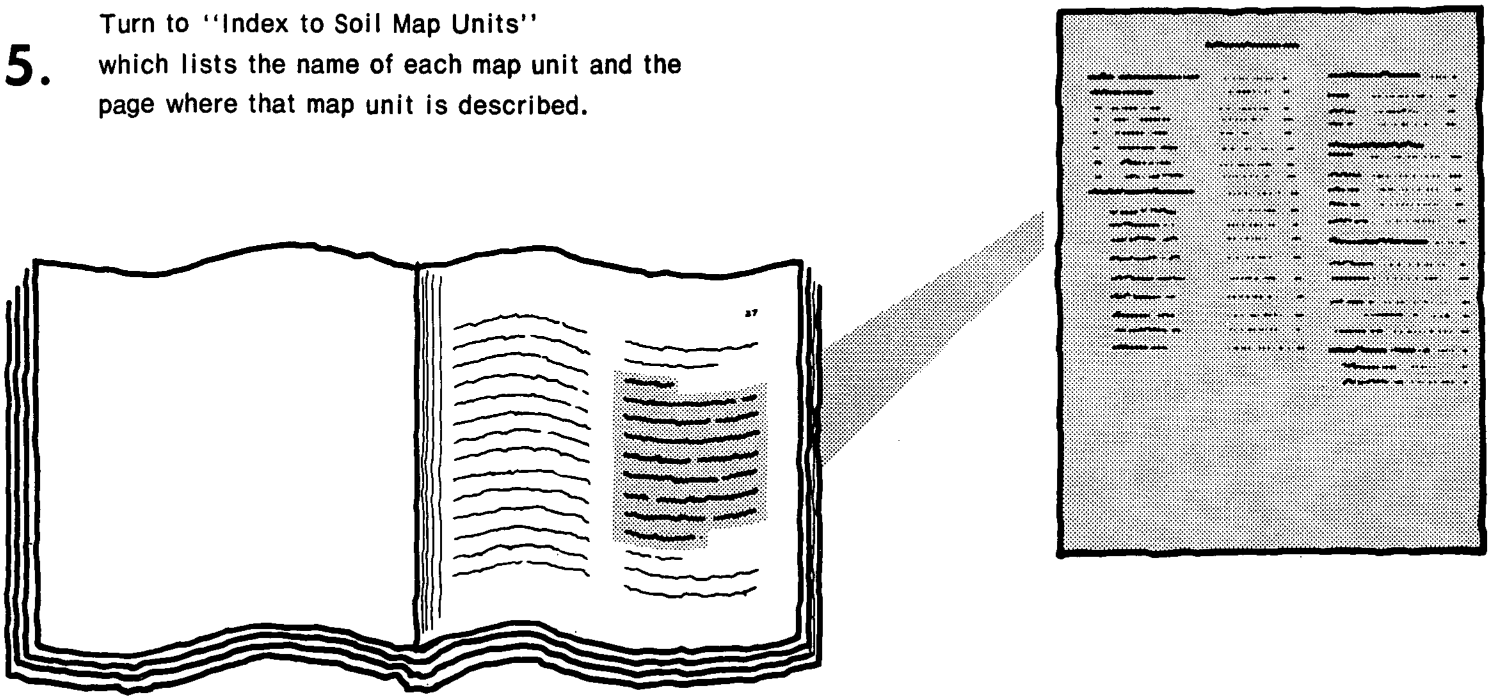


4. List the map unit symbols that are in your area.

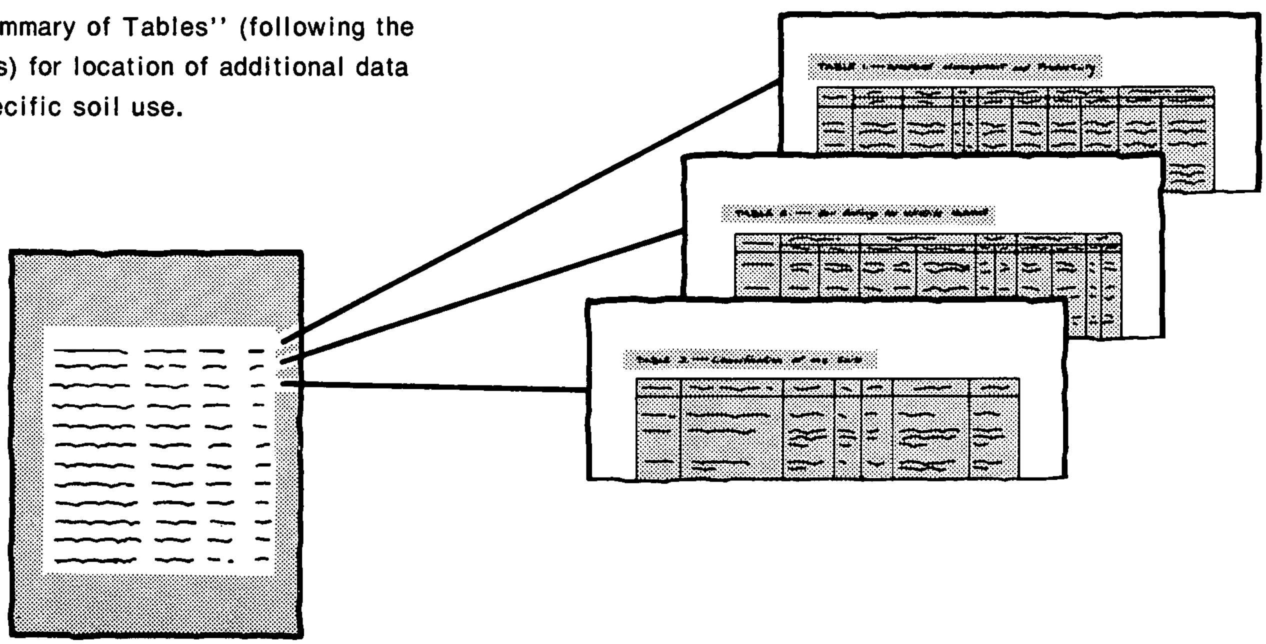


THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; to specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was performed in the period 1967-77. Soil names and descriptions were approved in 1977. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1977. This survey was made cooperatively by the Soil Conservation Service and the University of Georgia, College of Agriculture, Agricultural Experiment Stations. It is part of the technical assistance furnished to the Little River Soil and Water Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps could cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Properly constructed ponds can help control erosion and beautify the landscape. This recreation pond is in an area of Cecil sandy clay loam, 6 to 10 percent slopes, eroded.

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Issued April 1981

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Foreword

This soil survey contains much information that can be used in land-planning programs in Columbia, McDuffie, and Warren Counties. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

This soil survey has been prepared for many different users. Farmers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

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

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Dwight M. Treadway

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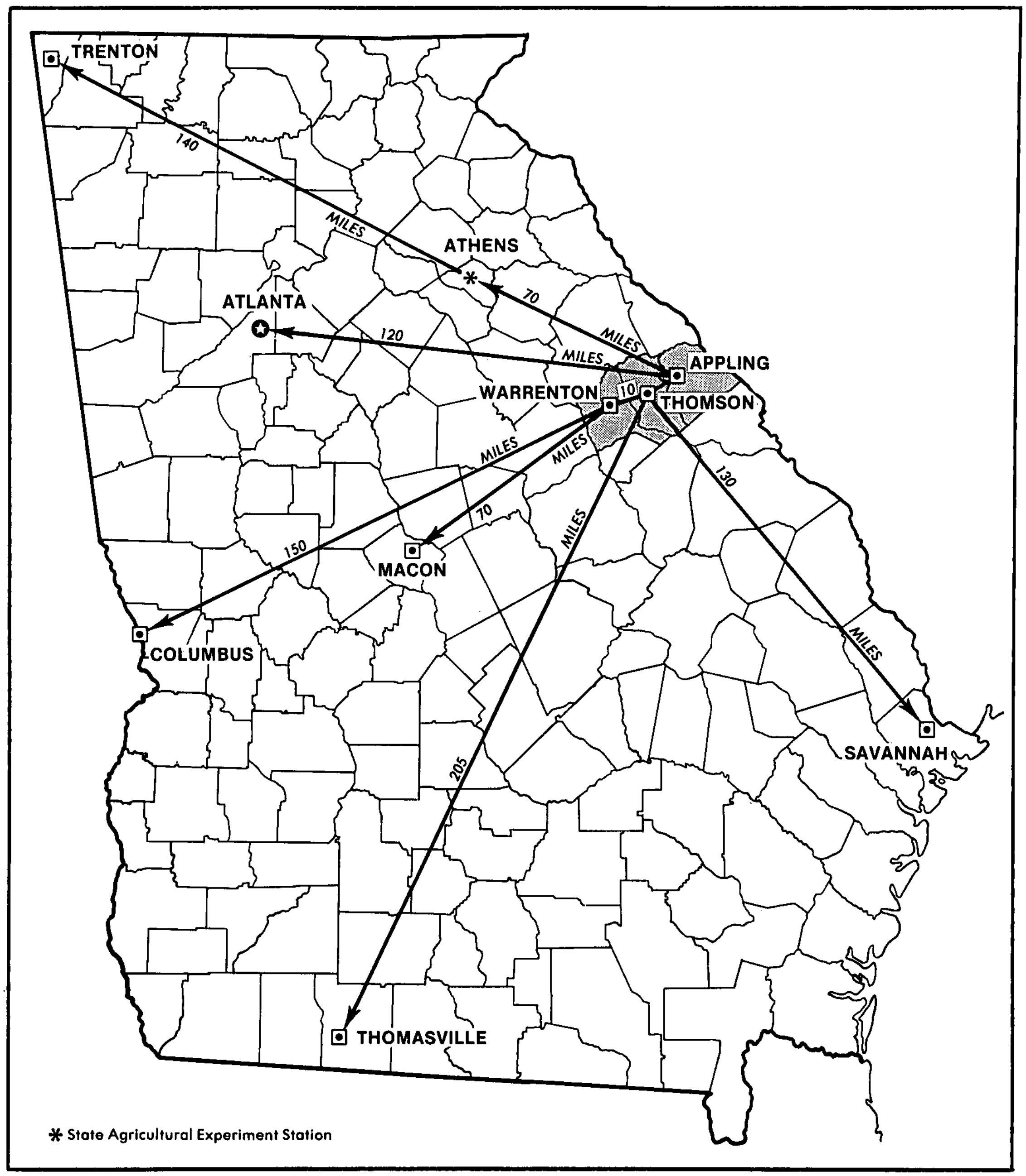
State Conservationist
Soil Conservation Service



Location of Columbia, McDuffie, and Warren Counties in Georgia.

SOIL SURVEY OF COLUMBIA, McDUFFIE, and WARREN COUNTIES, GEORGIA

By Louie W. Frost, Jr., Soil Conservation Service

Fieldwork by J. Tom Ammons, Winfield S. Carson, and Louie W. Frost, Jr., Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with the University of Georgia College of Agriculture, Agricultural Experiment Stations

COLUMBIA, MCDUFFIE, AND WARREN COUNTIES are in the northeastern part of Georgia. The survey area covers 529,408 acres, or 827 square miles. Columbia County has 185,856 acres, or 290 square miles, and a population of about 22,500. McDuffie County has 161,792 acres, or 253 square miles, and a population of about 15,500. Warren County has 181,760 acres, or 284 square miles, and a population of about 7,000.

Columbia, McDuffie, and Warren Counties are in the Southern Piedmont and Carolina and Georgia Sandhills land resource areas. Drainage is provided principally by the Savannah River, the Ogeechee River, and tributaries of these rivers. The Savannah River is the boundary separating Columbia County and South Carolina; the Ogeechee River is the western boundary of Warren County.

The northern three-fourths of each county is in the Southern Piedmont resource area. The southern one-fourth of each county is in the Carolina and Georgia Sandhills Area. The Southern Piedmont Area is characterized by very gently sloping ridgetops or gently sloping ridgetops and hillsides above sloping and moderately steep hillsides. Appling, Cecil, Georgeville, Grover, Madison, and Wedowee soils predominate. These soils are well drained and commonly have a brown, loamy surface layer and a red or yellow, clayey subsoil. In most places, the soils are low in content of silt and in content of mica. However, soils in some areas are medium in content of silt and high in content of mica. The landscape is dissected by the Ogeechee River, the Little River, the Savannah River, and tributaries of these rivers.

The Carolina and Georgia Sandhills area is mainly a very gently sloping or gently sloping plain dissected by streams in small, shallow valleys. Faceville, Norfolk, Orangeburg, Troup, and Wagram soils predominate. These soils are well drained and have a red or brown, sandy or loamy surface layer and a red, brown, or yellow, loamy or clayey subsoil.

Narrow to moderately wide, nearly level flood plains are common throughout the survey area. In most places, the flood plains are adjacent to moderately steep hillsides. Chewacla, Roanoke, Toccoa, and Wehadkee soils are on flood plains. These soils are well drained to poorly drained and are predominantly loamy throughout; also, they have a brown surface layer and, mainly, a predominantly brown subsoil that is mottled with gray. On some flood plains, the soils are poorly drained and have a brown surface layer and a gray, clayey subsoil.

Elevation ranges from 200 feet, near the Savannah River at the eastern tip of Columbia County, to 650 feet, near Barnett at the northwestern tip of Warren County.

General nature of the counties

This section gives general information about the counties. It discusses climate; physiography, relief, and drainage; and history and development.

Climate

Columbia, McDuffie, and Warren Counties have long, hot summers because moist tropical air from the Gulf of Mexico persistently covers the area. Winters are cool and fairly short, with only a rare cold wave that moderates in 1 or 2 days. Precipitation is fairly heavy throughout the year, and prolonged droughts are rare. Summer precipitation, mainly afternoon thundershowers, is adequate for all crops.

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Warrenton, Georgia, in the period 1951 to 1975. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 47 degrees F, and the average daily minimum temperature is 36 degrees. The lowest temperature on record, which occurred at Warrenton on January 31, 1966, is 3 degrees. In summer the average temperature is 79 degrees, and the average daily maximum temperature is 90 degrees. The highest recorded temperature, which occurred on June 30, 1959, is 110 degrees.

Growing degree days, shown in table 1, are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

Of the total annual precipitation, 24 inches, or 50 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 4.65 inches at Warrenton on March 11, 1967. Thunderstorms occur on about 60 days each year, and most occur in summer.

Snowfall is rare; in 80 percent of the winters there is no measurable snowfall. In 20 percent, the snowfall, usually of short duration, is more than 1 inch. The heaviest 1-day snowfall on record was more than 4 inches.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 90 percent. The percentage of possible sunshine is 65 in summer and 55 in winter. The prevailing wind is from the southeast. Average wind speed is highest, 8 miles per hour, in March.

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

Climatic data in this section were specially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

Physiography, relief, and drainage

Columbia, McDuffie, and Warren Counties are in the Southern Piedmont and Carolina and Georgia Sandhills land resource areas of Georgia. The survey area consists mostly of broad to narrow, very gently sloping and gently sloping ridgetops and long to short, sloping and moderately steep hillsides adjacent to numerous, small drainageways that dissect the area. The ridgetops are wider and the drainageways are fewer in the southern part of the survey area than in the northern part. Ridgetops are smooth and convex, and hillsides are commonly irregular or complex and convex. Nearly level flood plains are along Brier Creek, the Little River, the Ogeechee River, Rocky Comfort Creek, the Savannah River, and their tributaries. In most of the survey area the flood plains are narrow, but in the lower part of the counties the flood plains are moderately wide. The upland soils are generally well drained. The bottom lands along the major streams and their tributaries are subject to frequent overflow in winter and early in spring. They drain off slowly and remain wet for long periods.

The lower part of the Savannah River is 200 feet above sea level. The highest elevation in the survey area, near Barnett, is 650 feet above sea level.

The drainage system for the three counties includes Brier Creek, the Little River, the Ogeechee River, Rocky Comfort Creek, the Savannah River, and their tributaries.

The headwaters of Brier Creek is 1 mile east of Camak. This creek and its tributaries drain the southeastern part of Warren County, the southern part of McDuffie County, and the southern tip of Columbia County. Important tributaries of Brier Creek are Boggy Gut Creek in Columbia and McDuffie Counties, Little Brier Creek in McDuffie and Warren Counties, and Fort Creek, Headstall Creek, and Sweetwater Creek in McDuffie County.

The Little River and its tributaries drain the northern parts of Columbia, McDuffie, and Warren Counties. Important tributaries are Williams Creek, which is the northern boundary of Warren County, Hart Creek and Middle Creek in McDuffie and Warren Counties, Mattox Creek and Germany Creek in McDuffie County, and Keg Creek in Columbia County.

The Ogeechee River and its tributaries drain the western part of Warren County. The most important tributary is Long Creek.

Rocky Comfort Creek drains the central part of Warren County. Important tributaries are Goldens Creek and Whetstone Creek.

The Savannah River drains the central part of Columbia County. Important tributaries are Greenbrier Creek, Kiokee Creek, Little Kiokee Creek, and Uchee Creek.

The Little River and the Savannah River form a part of Clark Hill Reservoir in the northern part of Columbia and McDuffie Counties.

Each of the tributaries of the major streams has its own small tributaries that branch into the upland and form a well defined trellis pattern.

History and development

The survey area is within the territory that was known as St. Paul's Parish during colonial times. Most of the land was acquired from grants by King George III of England.

Columbia County was formed December 10, 1790, from a part of Richmond County. It was named in honor of Christopher Columbus and was settled by Quakers before the American Revolution.

McDuffie County was formed October 18, 1870, from parts of Columbia, Richmond, and Warren Counties. It was named for George McDuffie, a political and military leader. The first important settlement, later named

Wrightsboro, was established at about the time of the American Revolution by about 200 Quaker families from Virginia. Gold was first discovered in Georgia in this part of the survey area.

Warren County was formed December 19, 1793, from part of Richmond, Columbia, and Wilkes Counties. The county was named for General Joseph Warren, an American Revolution hero from Massachusetts. Norwood is the site of the first rural delivery system for mail.

Most of the early settlers in the survey area came from the Virginias and Carolinas. Cotton was the chief crop until the boll weevil infestation in 1920. Since that time, the survey area has undergone several changes in land use, including an increase in pasture and forest land and a decrease in cropland. Columbia County is near the city of Augusta and is undergoing more rapid urbanization than the rest of the survey area.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the 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 parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After classifying and naming the soils, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to farmers, managers of woodland, engineers, planners, developers and builders, home buyers, and others.

General soil map for broad land use planning

The general soil map at the back of this publication shows map units that have a distinct pattern of soils, relief, and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscape in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The soils in the survey area vary widely in their potential for major land uses. In the descriptions that follow, general ratings of the potential of each map unit, in relation to the other map units, are given for major land uses. Soil properties that pose limitations to the use are indicated. The ratings of soil potential are based on the common practices used to overcome soil limitations in the survey area. These ratings reflect the ease of overcoming the soil limitations and the probability of soil problems persisting after such practices are used.

Description of map units in Columbia County

Soils on hillsides of the Piedmont Upland

Two map units in Columbia County consist of well drained soils on sloping and moderately steep hillsides. Slopes range from 10 to 25 percent. The soils have a reddish or brownish, loamy surface layer and a reddish or brownish, clayey or sandy subsoil.

1. Georgeville-Wedowee

Sloping and moderately steep, well drained soils that have a loamy or sandy surface layer and a clayey subsoil; the silt content is medium or low

The soils in this map unit are predominantly on convex hillsides; rills or galled spots, shallow gullies, and some deep gullies are common. These soils are in the northern part of the county. Slopes range from 10 to 25 percent.

This map unit makes up about 1 percent of the county. It consists of about 69 percent Georgeville soils, 21 percent Wedowee soils, and 10 percent minor soils.

Georgeville soils are medium in content of silt. Typically, the surface layer is yellowish red clay loam about 6 inches thick. The subsoil extends to a depth of about 48 inches. It is red throughout and has reddish yellow mottles in the lower part. It is clay in the upper part and silty clay in the lower part. The underlying material is weathered slate.

Wedowee soils are low in content of silt. Typically, the surface layer is grayish brown loamy sand 6 inches thick. The subsurface layer is light yellowish brown loamy sand and extends to a depth of 10 inches. The subsoil extends to a depth of 32 inches. It is yellowish red in the upper and middle parts and has red mottles in the middle part; it is mottled brown, red, and very pale brown in the lower part. The subsoil is clay in the upper part, sandy clay in the middle part, and clay loam in the lower part. The underlying material is mottled strong brown, light gray, and gray sandy loam and sandy clay loam. It extends to a depth of 48 inches. Hard rock is below a depth of 48 inches.

The minor soils in this unit are the Chewacla, Congaree, Toccoa, and Georgeville soils. The nearly level Chewacla, Congaree, and Toccoa soils are on the adjacent flood plains. The very gently sloping and gently sloping Georgeville soils are on ridgetops adjacent to the major soils.

This map unit is mostly woodland. In a few areas the soils are used for row crops or pasture. These soils have poor potential for farming and fair potential for pasture plants, loblolly pine, and Virginia pine. Their potential is poor for urban uses. Slope is the main limitation. Low strength is a limitation to some uses. The clayey subsoil retards absorption of effluent and is a limitation to use of the soils as septic tank absorption fields.

2. Wedowee-Cecil

Sloping and moderately steep, well drained soils that have a sandy or loamy surface layer and a clayey subsoil

The soils in this map unit are predominantly on convex and complex hillsides mainly in the central part of the county. Slopes range from 10 to 25 percent.

This map unit makes up about 18 percent of the county. It consists of about 50 percent Wedowee soils, 28 percent Cecil soils, and 22 percent minor soils.

Wedowee soils have a predominantly mottled, brownish or yellowish subsoil. Typically, the surface layer is grayish brown loamy sand 6 inches thick. The subsurface layer extends to a depth of 10 inches; it is light yellowish brown loamy sand. The subsoil extends to a depth of 32 inches. It is yellowish red in the upper and middle parts and has red mottles in the middle part; it is brown, red, and very pale brown in the lower part. The subsoil is clay in the upper part, sandy clay in the middle part, and clay loam in the lower part. The underlying material is mottled strong brown, light gray, and gray sandy loam and sandy clay loam. It extends to a depth of 48 inches. Hard rock is below a depth of 48 inches.

Cecil soils have a predominantly red subsoil. Typically, the surface layer is reddish brown sandy clay loam 5 inches thick. The subsoil extends to a depth of about 45 inches; it is sandy clay loam in the upper part, sandy clay in the middle part, and sandy clay loam mottled with strong brown in the lower part. The underlying material is mottled red, strong brown, and very pale brown clay loam to a depth of 60 inches or more.

The minor soils in this map unit are the Chewacla, Enon, Madison, and Toccoa soils. The nearly level Chewacla and Toccoa soils are on an adjacent flood plain. Enon and Madison soils are on hillsides with the major soils. In some places, gently sloping Madison soils are on narrow ridgetops adjacent to the major soils.

This map unit is mostly woodland. In a few small areas the soils are used for pasture and row crops. These soils have poor potential for farming, fair potential for woodland production, and poor potential for urban uses. Slope is a limitation to most uses, and low strength is a limitation to some uses. The clayey subsoil retards absorption of effluent and is a limitation to the use of the soils as septic tank absorption fields.

Soils on ridgetops and hillsides of the Piedmont Upland

Two map units in Columbia County consist of well drained soils on very gently sloping ridgetops and gently sloping ridgetops and hillsides. Slopes range from 2 to 10 percent. These soils have a mainly brownish, loamy surface layer and a mainly reddish or yellowish, clayey subsoil.

3. Georgeville-Wedowee

Very gently sloping and gently sloping, well drained soils that have a loamy or sandy surface layer and a clayey subsoil; the silt content is medium or low

The soils in this map unit are on very gently sloping ridgetops and gently sloping ridgetops and hillsides in the northern part of the county. Slopes range from 2 to 10 percent and are mainly smooth and convex.

This map unit makes up about 9 percent of the county. It consists of about 58 percent Georgeville soils, 20 percent Wedowee soils, and 22 percent minor soils.

Georgeville soils are medium in content of silt. Typically, the surface layer is brown fine sandy loam 7 inches thick. The subsoil extends to a depth of about 56 inches; it is red throughout and has strong brown mottles in the lower part. It is silty clay loam in the upper part, clay in the middle part, and silty clay loam in the lower part. The underlying material is reddish yellow weathered slate.

Wedowee soils are low in content of silt. Typically, the surface layer is pale brown loamy sand 6 inches thick. The subsurface layer is yellow loam 4 inches thick. The subsoil extends to a depth of 36 inches. It is mainly strong brown and has red and pale brown mottles, but in the lower part it is uniformly mottled very pale brown, strong brown, and red. It is sandy clay loam in the upper part, clay in the middle part, and sandy clay loam in the lower part. The underlying material to a depth of 60 inches is mottled light brownish gray, yellowish red, and reddish yellow sandy clay loam.

The minor soils in this map unit are the Appling, Chewacla, Congaree, and Toccoa soils. Appling soils are on the same landscape as the major soils. The somewhat poorly drained Chewacla soils and the well drained Congaree and Toccoa soils are nearly level and are on long, moderately wide flood plains.

This map unit is mostly woodland. In some small areas the soils are used for pasture and hay or for row crops. The very gently sloping soils have good potential for most uses, and the gently sloping soils have fair potential. All the soils have fair potential for most urban uses. Low strength is a limitation to some uses. The clayey subsoil retards absorption of effluent and is a limitation to use of the soils as septic tank absorption fields.

4. Cecil-Appling-Wedowee

Very gently sloping and gently sloping, well drained soils that have a loamy or sandy surface layer and a clayey subsoil

The soils in this map unit are on very gently sloping ridgetops and gently sloping ridgetops and hillsides throughout the county except the extreme northern and extreme southern parts. Slopes range from 2 to 10 percent and are mainly smooth and convex.

This map unit makes up about 53 percent of the county. It consists of about 29 percent Cecil soils, 16 percent Appling soils, 15 percent Wedowee soils, and 40 percent minor soils.

Cecil soils have a predominantly red subsoil. Typically, the surface layer is reddish brown sandy clay loam 4 inches thick. The subsoil extends to a depth of about 59 inches. It is clay in the upper part and clay loam that has yellowish red mottles in the lower part. The underlying material is weathered granite to a depth of 69 inches or more.

Appling soils have a predominantly mottled, yellowish red subsoil. Typically, the surface layer is brown sandy loam about 9 inches thick. The subsoil extends to a depth of about 48 inches. It is sandy clay loam in the upper part, mottled red and brownish yellow sandy clay in the middle part, and mottled red, reddish yellow, and brownish yellow clay loam in the lower part. The underlying material to a depth of 72 inches or more is mottled red and strong brown sandy loam.

Wedowee soils have a predominantly strong brown subsoil that is mottled. Typically, the surface layer is pale brown loamy sand 6 inches thick. The subsurface layer is yellow sandy loam 4 inches thick. The subsoil extends to a depth of 36 inches; it is mottled with red and pale brown in the upper part, and it is uniformly mottled very pale brown, strong brown and red in the lower part. The subsoil is sandy clay loam in the upper part, clay in the middle part, and sandy clay loam in the lower part. The underlying material is mottled light brownish gray, yellowish red, and reddish yellow sandy clay loam to a depth of 60 inches.

The minor soils in this map unit are the Altavista, Chewacla, Grover, and Helena soils. The somewhat poorly drained Chewacla soils are nearly level and are on moderately broad flood plains. Grover soils are on the same landscape as the major soils. The moderately well drained Altavista soils are on stream terraces, and the moderately well drained Helena soils are on low ridgetops and the adjacent hillsides.

The soils in this map unit are used mainly for row crops. In some areas they are used for pasture and as woodland. Most of the very gently sloping soils have good potential for row crops and pasture; the gently sloping soils have mainly fair potential. The potential for woodland and urban uses is fair. The clayey subsoil is a limitation to use of the soils for sanitary facilities.

Soils on ridgetops and hillsides of the Carolina and Georgia Sandhills

One map unit in Columbia County consists of well drained soils that are on smooth and convex, very gently sloping ridgetops and smooth and convex, gently sloping ridgetops and hillsides. Slopes range from 2 to 10 percent. The soils have a brownish, sandy surface layer and a predominantly brownish or yellowish, loamy subsoil.

5. Wagram-Troup-Norfolk

Very gently sloping and gently sloping, well drained soils that have a sandy surface layer and a loamy subsoil

The soils in this map unit are on very gently sloping ridgetops and gently sloping ridgetops and hillsides mainly in the southeastern part of the county. Slopes range from 2 to 10 percent and are mainly smooth, undulating, and convex.

This map unit makes up about 17 percent of the county. It consists of about 38 percent Wagram soils, 14 percent Troup soils, 10 percent Norfolk soils, and 38 percent minor soils.

Wagram soils have thick, sandy surface and subsurface layers. Typically, the surface layer is grayish brown loamy sand about 10 inches thick. The subsurface layer is loamy sand and extends to a depth of 35 inches; it is light yellowish brown in the upper part and very pale brown in the lower part. The subsoil is predominantly sandy clay loam to a depth of 69 inches; it is brownish yellow and has brown and red mottles in the lower part.

Troup soils have very thick, sandy surface and subsurface layers. Typically, the surface layer is brown sand about 9 inches thick. The subsurface layer is loamy sand and extends to a depth of 58 inches; it is light yellowish brown in the upper part and yellowish brown in the lower part. The subsoil extends to a depth of 72 inches or more. The upper part of the subsoil is yellowish brown sandy loam, and the lower part is sandy clay loam that is predominantly yellowish brown and has red and brown mottles.

Norfolk soils have thin, sandy surface and subsurface layers. Typically, the surface layer is yellowish brown loamy sand 6 inches thick. The subsurface layer is light yellowish brown sandy loam and extends to a depth of 9 inches. The subsoil extends to a depth of about 65 inches; it is yellowish brown in the upper and middle parts and is mottled yellow, brown, and red in the lower part. It is sandy loam in the upper part, sandy clay loam in the middle part, and clay loam in the lower part.

The minor soils in this map unit are the Appling, Bibb, Orangeburg, and Vaucluse soils. Appling soils are on the Piedmont Upland and protrude into areas of the major soils on the Coastal Plain. Bibb soils are on flood plains of the smaller streams. Orangeburg soils are on the same landscape as the major soils. Vaucluse soils are on short, sloping, narrow, and irregular hillsides adjacent to the major soils.

The soils in this map unit are used mainly for row crops and as woodland. In a few areas these soils are used for pasture. Most of these soils have fair potential for these uses; the soils that have a thin sandy surface layer have good potential. The potential is good for urban uses (fig. 1). The soils that have thick and very thick sandy surface and subsurface layers are subject to seepage, which limits the use of those soils for sanitary facilities. The thick sandy surface and subsurface layers are a limitation to recreation development.

Soils on flood plains

One map unit in Columbia County consists of poorly drained to well drained soils that are nearly level. Slopes are less than 2 percent. The soils have a brownish, loamy surface layer and a predominantly brownish, loamy underlying layer that has gray mottles.

6. Chewacla-Toccoa-Wehadkee

Nearly level, poorly drained to well drained soils that are predominantly loamy throughout

The soils in this map unit are on flood plains of the Savannah River and Kiokee, Little Kiokee, and Uchee Creeks. These soils are in small, low lying, poorly drained areas and in areas that are larger, somewhat higher lying, and better drained. The probability of flooding is high late in winter and early in spring. Slopes are less than 2 percent.

This map unit makes up about 2 percent of the county. It consists of about 34 percent Chewacla soils, 24 percent Toccoa soils, 20 percent Wehadkee soils, and 22 percent minor soils.

Chewacla soils are somewhat poorly drained. Typically, the surface layer is 6 inches deep; it is brown silt loam that has very pale brown mottles. The subsoil extends to a depth of about 60 inches; the upper part is brown silt loam that has very pale brown mottles, the middle part is brown overlying light yellowish brown silt loam that has light gray mottles throughout, and the lower part is brown clay loam that has reddish yellow and light gray mottles.

Toccoa soils are well drained. Typically, the surface layer is brown loam about 8 inches thick. The underlying material, to a depth of 60 inches, is stratified sandy loam, loamy sand, and fine sandy loam that is predominantly brown. Below that, a buried soil that is mottled yellowish brown, dusky red, and light gray sandy loam extends to a depth of 70 inches or more.

Wehadkee soils are poorly drained. Typically, the surface layer is grayish brown silt loam and has yellowish brown mottles about 8 inches thick. The subsoil extends to a depth of 42 inches; it is gray and has yellowish brown mottles. It is silty clay loam in the upper part, and clay loam in the lower part. The underlying material to a depth of 60 inches is gray loamy fine sand that has brown mottles.

The minor soils in this map unit are the Altavista, Congaree, Helena, and Roanoke soils. Moderately well drained Altavista soils and poorly drained Roanoke soils are on stream terraces. Well drained Congaree soils are in the somewhat higher lying and better drained areas on the flood plain. Moderately well drained Helena soils are on ridgetops and hillsides of the Piedmont Upland.

This map unit is mostly woodland. A few areas of the better drained soils are used for cultivated crops or for pasture. Most of these soils have good potential for woodland production. Equipment limitations and seedling mortality are limitations to this use. These soils have good potential for farming and poor potential for urban use. Flooding and wetness are the main limitations.

Description of map units in McDuffie County

Soils on hillsides of the Piedmont Upland

Two map units in McDuffie County consist of well drained soils on sloping and moderately steep hillsides. Slopes range from 10 to 25 percent. The soils have a reddish or brownish, loamy or sandy surface layer and a reddish or brownish, clayey subsoil.

1. Georgeville-Wedowee

Sloping and moderately steep, well drained soils that have a loamy or sandy surface layer and a clayey subsoil; the silt content is medium or low

The soils in this map unit are mainly on convex hillsides; rills or galled spots, shallow gullies, and some deep gullies are common. These soils are in the northern part of the county. Slopes range from 10 to 25 percent.

This map unit makes up about 7 percent of the county. It consists of 64 percent Georgeville soils, 23 percent Wedowee soils, and 13 percent minor soils.

Georgeville soils are medium in content of silt. Typically, the surface layer is yellowish red clay loam about 6 inches thick. The subsoil extends to a depth of about 48

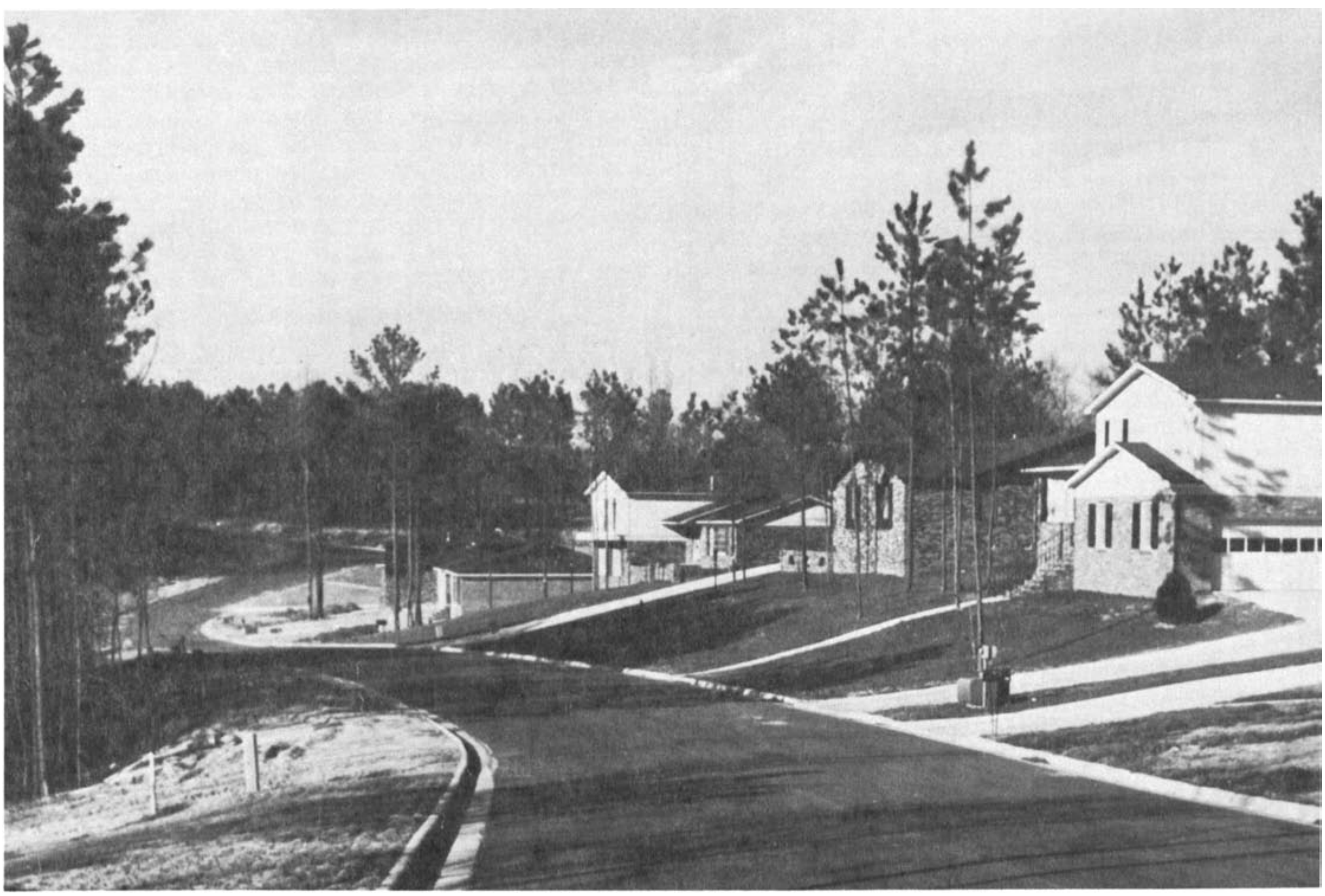


Figure 1.—This subdivision is in an area of the Wagram-Troup-Norfolk map unit. The soils have good potential for most urban uses.

inches; it is red throughout and has reddish yellow mottles in the lower part. It is clay in the upper part and silty clay in the lower part. The underlying material is weathered slate.

Wedowee soils are low in content of silt. Typically, the surface layer is grayish brown loamy sand 6 inches thick. The subsurface layer is light yellowish brown loamy sand and extends to a depth of 10 inches. The subsoil extends to a depth of 32 inches; it is yellowish red in the upper and middle parts and has red mottles in the middle part. It is mottled brown, red, and very pale brown in the lower part. The subsoil is clay in the upper part, sandy clay in the middle part, and clay loam in the lower part. The underlying material is mottled strong brown, light gray, and gray sandy loam and sandy clay loam. It extends to a depth of 48 inches. Hard rock is at a depth below 48 inches.

The minor soils in this map unit are the Chewacla, Congaree, Toccoa, and Georgeville soils. The nearly level Chewacla, Congaree, and Toccoa soils are on the adjacent flood plain. The very gently sloping and gently sloping Georgeville soils are on ridgetops adjacent to the major soils.

This map unit is mostly woodland. In a few areas the soils are used for row crops or pasture. Their potential is poor for farming, fair for pasture plants, loblolly pine, and Virginia pine, and poor for urban uses. Slope is the main limitation. Low strength is a limitation to some uses. The clayey subsoil retards absorption of effluent and is a limitation to use of the soils as septic tank absorption fields.

2. Wedowee-Cecil-Madison

Sloping and moderately steep, well drained soils that have a sandy or loamy surface layer and a clayey subsoil

The soils in this map unit are mainly on convex and complex hillsides in the central part of the county. Slopes range from 10 to 25 percent.

This map unit makes up about 5 percent of the county. It consists of about 45 percent Wedowee soils, 18 percent Cecil soils, 9 percent Madison soils, and 28 percent minor soils.

Wedowee soils have a predominantly mottled, brownish or yellowish subsoil. Typically, the surface layer is grayish brown loamy sand 6 inches thick. The subsurface layer is light yellowish brown loamy sand and extends to a depth of 10 inches. The subsoil extends to a depth of 32 inches; it is yellowish red in the upper and middle parts and has red mottles in the middle part. It is mottled brown, red, and very pale brown in the lower part. The subsoil is clay in the upper part, sandy clay in the middle part, and clay loam in the lower part. The underlying weathered material is mottled strong brown, light gray, and gray sandy loam and sandy clay loam. It extends to a depth of 48 inches. Hard rock is below a depth of 48 inches.

Cecil soils have a predominantly red subsoil. Typically, the surface layer is reddish brown sandy clay loam 5 inches thick. The subsoil extends to a depth of about 45 inches; it is sandy clay loam in the upper part, sandy clay in the middle part, and sandy clay loam mottled with strong brown in the lower part. The underlying material is mottled red, strong brown, and very pale brown clay loam to a depth of 60 inches or more.

Madison soils are high in content of mica and have a predominantly red subsoil. Typically, the surface layer is brown sandy loam 7 inches thick. The subsoil extends to a depth of about 37 inches; it is sandy clay loam in the upper part, clay in the middle part, and sandy clay loam in the lower part. The underlying material is reddish brown and red sandy loam and sandy clay loam to a depth of 62 inches or more.

The minor soils in this map unit are the Chewacla, Enon, Grover, and Toccoa soils. The nearly level Chewacla and Toccoa soils are on long, narrow to moderately wide flood plains. Grover soils are on ridgetops. Enon soils are on hillsides with the major soils.

This map unit is mostly woodland. In a few small areas these soils are used for pasture and row crops. The potential is poor for farming. The potential is fair for woodland production. The potential is poor for urban uses. Slope is a limitation to most uses, and low strength is a limitation to some uses. The clayey subsoil retards absorption of effluent and is a limitation to the use of the soils as septic tank absorption fields.

Soils on ridgetops and hillsides of the Piedmont Upland

Three map units in McDuffie County consist of well drained soils on very gently sloping ridgetops and gently sloping ridgetops and hillsides. Slopes range from 2 to 10 percent. The soils have mainly a brownish, loamy surface layer and a predominantly red or brownish, clayey subsoil.

3. Georgeville

Very gently sloping and gently sloping, well drained soils that have a loamy surface layer and a clayey subsoil; the silt content is medium

The soils in this map unit are on very gently sloping ridgetops and gently sloping ridgetops and hillsides in the northern part of the county. Slopes range from 2 to 10 percent and are mainly smooth and convex.

This map unit makes up about 18 percent of the county. It consists of about 85 percent Georgeville soils and 15 percent minor soils.

Georgeville soils are medium in content of silt. Typically, the surface layer is brown fine sandy loam 7 inches thick. The subsoil extends to a depth of about 56 inches; it is red throughout and has strong brown mottles in the lower part. It is silty clay loam in the upper part, clay in the middle part, and silty clay loam in the lower part. The underlying material is reddish yellow weathered slate.

The minor soils are the Appling, Chewacla, and Toccoa soils. Appling soils are on the same ridgetop landscape as Georgeville soils. The nearly level, well drained Toccoa soils and the somewhat poorly drained Chewacla soils are on flood plains. Toccoa soils commonly are adjacent to stream channels, and Chewacla soils are in broad, somewhat lower lying areas.

This map unit is mostly woodland. In some small areas these soils are used for pasture and hay or for row crops. The very gently sloping soils have good potential for most uses, and the gently sloping soils have fair potential. The potential for most urban uses is fair. Low strength is a limitation to some uses. The clayey subsoil retards absorption of effluent and is a limitation to use of the soils as septic tank absorption fields.

4. Grover-Madison-Appling

Very gently sloping and gently sloping, well drained soils that have a loamy surface layer and a loamy or clayey subsoil; Grover and Madison soils are high in content of mica

The soils in this map unit are on very gently sloping, broad ridgetops and gently sloping ridgetops and hillsides that are commonly dissected by small drainageways. These soils are in a small area in the west-central part of the county. Slopes range from 2 to 10 percent and are mainly smooth and convex.

This map unit makes up about 1 percent of the county. It consists of about 62 percent Grover soils, 15 percent Madison soils, 12 percent Appling soils, and 11 percent minor soils.

Grover soils are high in content of mica and have a yellowish brown, loamy subsoil. Typically, the surface layer is brown sandy loam 5 inches thick. The subsoil extends to a depth of 30 inches; it is sandy clay loam and has red and brown mottles below a depth of 10 inches. The underlying material to a depth of 55 inches is weathered mica schist.

Madison soils are high in content of mica and have a predominantly red, clayey subsoil. Typically, the surface layer is predominantly strong brown sandy loam 6 inches thick. The subsoil extends to a depth of about 32 inches. In the upper part it is sandy clay loam, and in the lower part it is clay overlying several inches of clay loam. The underlying material to a depth of 62 inches or more is red and strong brown clay loam and loam.

Appling soils have a predominantly mottled, yellowish red subsoil. Typically, the surface layer is brown sandy loam about 9 inches thick. The subsoil extends to a depth of about 48 inches. It is sandy clay loam in the upper part, sandy clay that has red and brownish yellow mottles in the middle part, and mottled red, reddish yellow, and brownish yellow clay loam in the lower part. The underlying material, to a depth of 72 inches or more, is mottled red and strong brown sandy loam.

The minor soils in this map unit are the Chewacla, Congaree, and Toccoa soils. These somewhat poorly drained and well drained, nearly level soils are on long, narrow to moderately wide flood plains.

The soils in this map unit are used mainly for row crops. In some areas they are used for pasture and as woodland. The soils have good potential for these uses. They have fair potential for urban uses. Some of the soils have a clayey subsoil, which limits their use for sanitary facilities.

5. Appling-Cecil-Wedowee

Very gently sloping and gently sloping, well drained soils that have a loamy or sandy surface layer and a clayey subsoil

The soils in this map unit are on very gently sloping ridgetops and gently sloping ridgetops and hillsides mainly in the central part of the county. Slopes range from 2 to 10 percent and are mainly smooth and convex.

This map unit makes up about 27 percent of the county. It consists of about 21 percent Appling soils, 18 percent Cecil soils, 13 percent Wedowee soils, and 48 percent minor soils.

Appling soils have a predominantly mottled, yellowish red subsoil. Typically, the surface layer is brown sandy loam about 9 inches thick. The subsoil extends to a depth of about 48 inches. It is sandy clay loam in the upper part, sandy clay that has red and brownish yellow mottles in the middle part, and mottled red, reddish yellow, and brownish yellow clay loam in the lower part. The underlying material to a depth of 72 inches or more is mottled red and strong brown sandy loam.

Cecil soils have a predominantly red subsoil. Typically, the surface layer is reddish brown sandy clay loam 4 inches thick. The subsoil extends to a depth of about 59 inches. It is clay in the upper part and clay loam that has yellowish red mottles in the lower part. The underlying material is weathered granite to a depth of 69 inches or more.

Wedowee soils have a predominantly strong brown subsoil that is mottled. Typically, the surface layer is pale brown loamy sand 6 inches thick. The subsurface layer is yellow sandy loam 4 inches thick. The subsoil extends to a depth of 36 inches. It is mottled with red and pale brown in the upper part, and it is uniformly mottled very pale brown, strong brown, and red in the lower part. It is sandy clay loam in the upper part, clay in the middle part, and sandy clay loam in the lower part. The underlying material is mottled light brownish gray, yellowish red, and reddish yellow sandy clay loam to a depth of 60 inches.

The minor soils in this map unit are the Altavista, Chewacla, Grover and Helena soils. The somewhat poorly drained, nearly level Chewacla soils are on moderately broad flood plains. Grover soils are on the same ridgetop landscape as the major soils. The moderately well drained Altavista soils are on stream terraces, and the moderately well drained Helena soils are on low ridgetops and the adjacent hillsides.

The soils in this map unit are used mainly for row crops. In some areas they are used for pasture and as woodland. Most of the very gently sloping soils have good potential for row crops and pasture; the gently sloping soils have mainly fair potential. The potential is fair for woodland and urban uses. The clayey subsoil is a limitation to use of these soils for sanitary facilities.

Soils on ridgetops and hillsides of the Carolina and Georgia Sandhills

One map unit in McDuffie County consists of well drained soils that are on smooth and convex, very gently sloping ridgetops and smooth and convex, gently sloping ridgetops and hillsides. Slopes range from 2 to 10 percent. The soils have a brownish, sandy surface layer and a predominantly brown or yellow, loamy subsoil.

6. Wagram-Troup-Norfolk

Very gently sloping and gently sloping, well drained soils that have a sandy surface layer and a loamy subsoil

The soils in this map unit are very gently sloping ridgetops and gently sloping ridgetops and hillsides in the central and southern parts of the county. Slopes range from 2 to 10 percent and are mainly smooth, undulating, and convex.

This map unit makes up about 41 percent of the county. It consists of about 24 percent Wagram soils, 17 percent Troup soils, 13 percent Norfolk soils, and 46 percent minor soils.

Wagram soils have thick, sandy surface and subsurface layers. Typically, the surface layer is grayish brown loamy sand about 10 inches thick. The subsurface layer is loamy sand and extends to a depth of 35 inches; it is light yellowish brown in the upper part and very pale brown in the lower part. The subsoil is predominantly sandy clay loam and extends to a depth of 69 inches. It is brownish yellow throughout and has brown and red mottles in the lower part.

Troup soils have very thick sandy surface and subsurface layers. Typically, the surface layer is brown sand about 9 inches thick. The subsurface layer extends to a depth of 58 inches; it is light yellowish brown overlying yellowish brown loamy sand. The subsoil extends to a depth of 72 inches or more. The upper part is yellowish brown sandy loam, and the lower part is sandy clay loam that is predominantly yellowish brown and has red and brown mottles.

Norfolk soils have thin sandy surface and subsurface layers. Typically, the surface layer is yellowish brown loamy sand 6 inches thick. The subsurface layer extends to a depth of 9 inches; it is light yellowish brown sandy loam. The subsoil extends to a depth of about 65 inches; it is yellowish brown in the upper and middle parts and is mottled yellow, brown, and red in the lower part. It is sandy loam in the upper part, sandy clay loam in the middle part, and clay loam in the lower part.

The minor soils in this map unit are the Appling, Cecil, Grover, and Wedowee soils. These soils are on the Piedmont Upland and protrude into areas of the major soils on the Coastal Plain.

The soils in this map unit are used mainly for row crops and as woodland. In a few areas the soils are used for pasture. Most of these soils have fair potential for these uses; the soils that have a thin sandy surface layer have good potential. The potential is good for urban uses. The soils that have thick and very thick sandy surface and subsurface layers are subject to seepage, which limits the use of these soils for sanitary facilities. The sandy surface layer limits use for recreation development.

Soils on flood plains

One map unit in McDuffie County consists of poorly drained soils that are nearly level. Slopes are less than 2 percent. The soils have a mainly brownish, loamy surface layer and a grayish, loamy subsoil.

7. Roanoke

Nearly level, poorly drained soils that have a loamy surface layer and a loamy subsoil

The soils in this map unit are on low, somewhat narrow terraces along Brier Creek in the extreme southern part of the county. The probability of frequent flooding for brief periods is high in winter and spring. Slopes are less than 2 percent.

This map unit makes up less than 1 percent of the county. It consists of 73 percent Roanoke soils and 27 percent minor soils.

Roanoke soils typically have a surface layer of dark grayish brown silt loam 3 inches thick. The subsurface layer is gray silt loam and extends to a depth of 9 inches. The subsoil is predominantly clay loam and extends to a depth of about 55 inches. The upper part is mainly gray and has strong brown mottles, and the lower part is light gray and has reddish yellow mottles. The underlying material is mottled light gray and reddish yellow clay to a depth of 65 inches or more.

The minor soils are the loamy Bibb soils on the flood plain of Headstall Creek.

The soils in this map unit are used as woodland. They have good potential for that use; however, there are limitations to the use of equipment, and seedling mortality is a problem. The potential is poor for farming and for urban uses. Flooding and wetness are primary concerns in use and management of these soils.

Description of map units in Warren County

Soils on hillsides of the Piedmont Upland

Two map units in Warren County consist of well drained soils on sloping and moderately steep hillsides. Slopes range from 10 to 25 percent. The soils have a reddish or brownish, loamy or sandy surface layer and a reddish or brownish, clayey subsoil.

1. Georgeville-Wedowee

Sloping and moderately steep, well drained soils that have a loamy or sandy surface layer and a clayey subsoil; the silt content is medium or low

The soils in this map unit are predominantly on convex hillsides; rills or galled spots, shallow gullies, and some deep gullies are common. These soils are in the northern part of the county. Slopes range from 10 to 25 percent.

This map unit makes up about 3 percent of the county. It consists of about 65 percent Georgeville soils, 20 percent Wedowee soils, and 15 percent minor soils.

Georgeville soils are medium in content of silt. Typically, the surface layer is yellowish red clay loam about 6 inches thick. The subsoil extends to a depth of about 48 inches; it is red throughout and has reddish yellow mottles in the lower part. It is clay in the upper part and silty clay in the lower part. The underlying material is weathered slate.

Wedowee soils are low in content of silt. Typically, the surface layer is grayish brown loamy sand 6 inches thick. The subsurface layer is light yellowish brown loamy sand and extends to a depth of 10 inches. The subsoil extends to a depth of 32 inches. It is yellowish red in the upper and middle parts and has red mottles in the middle part. It is mottled brown, red, and very pale brown in the lower part. The subsoil is clay in the upper part, sandy clay in the middle part, and clay loam in the lower part. The underlying material is mottled strong brown, light gray, and gray sandy loam and sandy clay loam to a depth of 48 inches. Hard rock is below a depth of 48 inches.

The minor soils in this map unit are the Chewacla, Congaree, Toccoa, and Georgeville soils. The nearly level Chewacla, Congaree, and Toccoa soils are on the adjacent flood plain. The very gently sloping and gently sloping Georgeville soils are on ridgetops adjacent to the major soils.

This map unit is mostly woodland. In a few areas the soils are in row crops or pasture. Their potential is poor for farming, fair for pasture plants, loblolly pine, and Virginia pine, and poor for urban uses. Low strength is a limitation to some uses. Slope is the main limitation. The clayey subsoil retards absorption of effluent and is a limitation to the use of the soils as septic tank absorption fields.

2. Wedowee-Cecil-Madison

Sloping and moderately steep, well drained soils that have a sandy or loamy surface layer and a clayey subsoil

The soils in this map unit are predominantly on convex and complex hillsides mainly in the west central and east central parts of the county. Slopes range from 10 to 25 percent.

This map unit makes up about 2 percent of the county. It consists of about 44 percent Wedowee soils, 26 percent Cecil soils, 8 percent Madison soils, and 22 percent minor soils.

Wedowee soils have a predominantly mottled, brownish or yellowish subsoil. Typically, the surface layer is grayish brown loamy sand 6 inches thick. The subsurface layer extends to a depth of 10 inches; it is light yellowish brown loamy sand. The subsoil extends to a depth of 32 inches. It is yellowish red clay in the upper part, reddish yellow sandy clay mottled with red in the middle part, and reddish yellow clay loam mottled with brown, red, and very pale brown in the lower part. The underlying material, to a depth of 48 inches, is mottled strong brown, light gray, and gray sandy loam and sandy clay loam. Hard rock is below a depth of 48 inches.

Cecil soils have a predominantly red subsoil. Typically, the surface layer is reddish brown sandy clay loam 5 inches thick. The subsoil extends to a depth of about 45 inches; it is sandy clay loam in the upper part, sandy clay in the middle part, and sandy clay loam mottled with strong brown in the lower part. The underlying material is mottled red, strong brown, and very pale brown clay loam to a depth of 60 inches or more.

Madison soils are high in content of mica and have a red subsoil. Typically, the surface layer is brown sandy loam 7 inches thick. The subsoil extends to a depth of about 37 inches; it is sandy clay loam in the upper part, clay in the middle part and sandy clay loam in the lower part. The underlying material, to a depth of 62 inches or more, is reddish brown and red sandy loam and sandy clay loam.

The minor soils in this map unit are the Cecil, Chewacla, Toccoa, and Wedowee soils. Cecil soils are on the same landscape as the major soils. The nearly level Chewacla and Toccoa soils are on adjacent flood plains. The very gently sloping and gently sloping Wedowee soils are on ridgetops adjacent to the major soils.

This map unit is mostly woodland. In a few small areas the soils are used for pasture and row crops. Their potential is poor for farming, fair for woodland production, and poor for urban uses. Slope is a limitation to most uses, and low strength is a limitation for some uses. The clayey subsoil retards absorption of effluent and is a limitation to the use of these soils as septic tank absorption fields.

Soils on ridgetops and hillsides of the Piedmont Upland

Three map units in Warren County consist of well drained soils on very gently sloping ridgetops and gently sloping ridgetops and hillsides. Slopes range from 2 to 10 percent. The soils have a mainly brownish, loamy surface layer and a mainly brownish or reddish, clayey subsoil.

3. Georgeville-Appling

Very gently sloping and gently sloping, well drained soils that have a loamy surface layer and a clayey subsoil; the silt content is medium or low

The soils in this map unit are on very gently sloping ridgetops and gently sloping ridgetops and hillsides in the northern part of the county. Slopes range from 2 to 10 percent and are mainly smooth and convex.

This map unit makes up about 17 percent of the county. It consists of about 51 percent Georgeville soils, 25 percent Appling soils, and 24 percent minor soils.

Georgeville soils are medium in content of silt. Typically, the surface layer is brown fine sandy loam 7 inches thick. The subsoil extends to a depth of about 56 inches; it is red throughout and has strong brown mottles in the lower part. It is silty clay loam in the upper part, clay in the middle part, and silty clay loam in the lower part. The underlying material is reddish yellow weathered slate.

Appling soils are low in content of silt. Typically, the surface layer is brown sandy loam about 9 inches thick. The subsoil extends to a depth of about 48 inches. In the upper part it is yellowish red sandy clay loam; in the middle part it is yellowish red sandy clay that has red and brownish yellow mottles; and in the lower part it is mottled red, reddish yellow, and brownish yellow clay loam. The underlying material to a depth of 72 inches or more is mottled red and strong brown sandy loam.

The minor soils in this map unit are the Chewacla, Georgeville, and Toccoa soils. The nearly level Chewacla and Toccoa soils are on long, narrow to moderately wide flood plains. The sloping and moderately steep Georgeville soils are on hillsides adjacent to the major soils.

This map unit is mostly woodland. In some small areas the soils are used for pasture and hay or for row crops. The very gently sloping soils have good potential for most uses, and the gently sloping soils have fair potential. All the soils have fair potential for most urban uses. Low strength is a limitation to some uses. The clayey subsoil retards absorption of effluent and is a limitation to use of the soils as septic tank absorption fields.

4. Grover-Madison-Appling

Very gently sloping and gently sloping, well drained soils that have a loamy surface layer and a loamy or clayey subsoil; Grover and Madison soils are high in content of mica

The soils in this map unit are on very gently sloping, broad ridgetops and gently sloping ridgetops and hillsides that are commonly dissected by small drainageways. These soils are mostly in the vicinity of Camak and east of Warrenton. Slopes range from 2 to 10 percent and are mainly smooth and convex.

This map unit makes up about 7 percent of the county. It consists of about 62 percent Grover soils, 15 percent Madison soils, 12 percent Appling soils, and 11 percent minor soils.

Grover soils are high in content of mica and have a yellowish brown, loamy subsoil. Typically, the surface layer is brown sandy loam 5 inches thick. The subsoil extends to a depth of 30 inches; it is sandy clay loam and has red and brown mottles below a depth of 10 inches. The underlying material, to a depth of 55 inches, is weathered mica schist.

Madison soils are high in content of mica and have a predominantly red, clayey subsoil. Typically, the surface layer is predominantly strong brown sandy loam 6 inches thick. The subsoil extends to a depth of about 32 inches. It is sandy clay loam in the upper part, clay in the middle part, and clay loam in the lower part. The underlying material is red and strong brown clay loam and loam to a depth of 62 inches or more.

Appling soils have a predominantly yellowish red subsoil that is mottled in the middle and lower parts. Typically, the surface layer is brown sandy loam about 9 inches thick. The subsoil extends to a depth of about 48 inches. In the upper part it is sandy clay loam; in the middle part it is sandy clay that has red and brownish yellow mottles; and in the lower part it is mottled red, reddish yellow, and brownish yellow clay loam. The underlying material, to a depth of 72 inches or more, is mottled red and strong brown sandy loam.

The minor soils in this map unit are the Chewacla, Congaree, and Toccoa soils. These nearly level soils are on long, narrow to moderately wide flood plains; they are somewhat poorly drained and well drained.

The soils in this map unit are used mainly for row crops. In some areas they are used for pasture and as woodland. The potential is good for these uses. The potential is fair for urban uses. Some of the soils have a clayey subsoil, which limits use for sanitary facilities.

5. Appling-Cecil-Wedowee

Very gently sloping and gently sloping, well drained soils that have a loamy or sandy surface layer and a clayey subsoil

The soils in this map unit are on very gently sloping ridgetops and gently sloping ridgetops and hillsides mainly in the central and southern parts of the county. Slopes range from 2 to 10 percent and are mainly smooth and convex.

This map unit makes up about 45 percent of the county. It consists of about 20 percent Appling soils, 18 percent Cecil soils, 14 percent Wedowee soils, and 48 percent minor soils.

Appling soils have a predominantly mottled yellowish red subsoil. Typically, the surface layer is brown sandy loam about 9 inches thick. The subsoil extends to a depth of about 48 inches. In the upper part it is sandy clay loam; in the middle part it is sandy clay that has red and brownish yellow mottles; and in the lower part it is mottled red, reddish yellow, and brownish yellow clay loam. The underlying material, to a depth of 72 inches or more, is mottled red and strong brown sandy loam.

Cecil soils have a predominantly red subsoil. Typically, the surface layer is reddish brown sandy clay loam 4 inches thick. The subsoil extends to a depth of about 59 inches. In the upper part it is clay, and in the lower part it is clay loam that has yellowish red mottles. The underlying material is weathered granite to a depth of 69 inches or more.

Wedowee soils have a predominantly strong brown subsoil that is mottled. Typically, the surface layer is pale brown loamy sand 6 inches thick. The subsurface layer is yellow sandy loam 4 inches thick. The subsoil extends to a depth of 36 inches; it has red and pale brown mottles in the upper part and is uniformly mottled very pale brown, strong brown, and red in the lower part. It is sandy clay loam in the upper part, clay in the middle part, and sandy clay loam in the lower part. The underlying material is mottled light brownish gray, yellowish red, and reddish yellow sandy clay loam to a depth of 60 inches.

The minor soils in this map unit are the Chewacla, Grover, Helena, and Madison soils. The somewhat poorly drained, nearly level Chewacla soils are on moderately broad flood plains. Grover and Madison soils are on the same ridgetop landscape as the major soils. The moderately well drained Helena soils are on low ridgetops and the adjacent hillsides.

The soils in this map unit are used mainly for row crops. In some areas they are used for pasture and as woodland. Most of the very gently sloping soils have good potential for row crops and pasture; the gently sloping soils have mostly fair potential. The potential is fair for woodland and urban uses. The clayey subsoil is a limitation to use of the soils for sanitary facilities.

Soils on ridgetops and hillsides of the Carolina and Georgia Sandhills

Two map units in Warren County consist of well drained soils that are on smooth and convex, very gently sloping ridgetops and smooth and convex, gently sloping ridgetops and hillsides. Slopes range from 2 to 10 percent. The soils have a brownish, loamy or sandy surface layer and a brown, yellow, or red, loamy or clayey subsoil.

6. Wagram-Troup-Norfolk

Very gently sloping and gently sloping, well drained soils that have a sandy surface layer and a loamy subsoil

The soils in this map unit are on very gently sloping ridgetops and gently sloping ridgetops and hillsides mainly in the southern part of the county. Slopes range from 2 to 10 percent.

This map unit makes up about 23 percent of the county. It consists of about 36 percent Wagram soils, 18 percent Troup soils, 15 percent Norfolk soils, and 31 percent minor soils.

Wagram soils have thick, sandy surface and subsurface layers. Typically, the surface layer is grayish brown loamy sand about 10 inches thick. The subsurface layer is loamy sand and extends to a depth of 35 inches; it is light yellowish brown in the upper part and very pale brown in the lower part. The subsoil is predominantly sandy clay loam and extends to a depth of 69 inches. It is brownish yellow throughout and has brown and red mottles in the lower part.

Troup soils have very thick sandy surface and subsurface layers. Typically, the surface layer is brown sand about 9 inches thick. The subsurface layer is loamy sand and extends to a depth of 58 inches; it is light yellowish brown in the upper part and yellowish brown in the lower part. The subsoil extends to a depth of 72 inches or more. The upper part is yellowish brown sandy loam, and the lower part is sandy clay loam that is predominantly yellowish brown and has red and brown mottles.

Norfolk soils have thin sandy surface and subsurface layers. Typically, the surface layer is yellowish brown loamy sand 6 inches thick. The subsurface layer is light yellowish brown sandy loam and extends to a depth of 9 inches. The subsoil to a depth of about 65 inches is yellowish brown in the upper and middle parts and yellow, brown, and red in the lower part. It is sandy loam in the upper part, sandy clay loam in the middle part, and clay loam in the lower part.

The minor soils in this map unit are the Bibb, Flomaton Variant, Orangeburg, and Tifton soils. The poorly drained Bibb soils are on long, narrow to moderately wide flood plains. The gravelly Flomaton Variant and the Orangeburg and Tifton soils are on the same landscape as the major soils.

These soils are used mainly for row crops and as woodland. In a few areas these soils are used for pasture. Most of these soils have fair potential for these uses; the soils that have a thin, sandy surface layer have good potential. The potential is good for urban uses. The soils that have thick and very thick, sandy surface and subsurface layers are subject to seepage, which limits their use for sanitary facilities. The thick sandy surface and subsurface layers are a limitation to recreation development.

7. Orangeburg-Faceville-Wagram

Very gently sloping and gently sloping, well drained soils that have a loamy or sandy surface layer and a loamy or clayey subsoil

The soils in this map unit are mainly on very gently sloping and gently sloping ridgetops and hillsides that are slightly convex. These soils are in an area west of Norwood and mainly south of U.S. Highway 278. Slopes range from 2 to 10 percent and are mainly smooth and convex.

This map unit makes up about 2 percent of the county. It consists of about 34 percent Orangeburg soils, 32 percent Faceville soils, 18 percent Wagram soils, and 16 percent minor soils.

Orangeburg soils are loamy throughout. Typically, the surface layer is dark yellowish brown sandy loam about 7 inches thick. The subsurface layer is yellowish brown sandy loam about 2 inches thick. The subsoil extends to a depth of 65 inches or more; it is strong brown sandy loam in the upper part, red sandy clay loam in the middle part, and red sandy clay loam mottled with yellowish brown in the lower part.

Faceville soils have a loamy surface layer and a clayey subsoil. Typically, the surface layer is reddish brown sandy loam about 7 inches thick. The subsoil extends to a depth of 70 inches or more; it is red sandy clay.

Wagram soils have thick, sandy surface and subsurface layers and a loamy subsoil. Typically, the surface layer is grayish brown loamy sand about 10 inches thick. The subsurface layer is loamy sand and extends to a depth of 35 inches; it is light yellowish brown in the upper part and very pale brown in the lower part. The subsoil extends to a depth of 69 inches; it is brownish yellow and has brown and red mottles in the lower part.

The minor soils in the map unit are the Norfolk, Tifton, and Wehadkee soils. Norfolk and Tifton soils are on the same landscape as the major soils. The poorly drained Wehadkee soils are in slight depressions on flood plains.

These soils are used mainly for row crops. In a few areas they are used for pasture and as woodland. These soils have good potential for those uses. Bare slopes need protection from erosion. The soils have good potential for urban uses. Some of the soils have a clayey subsoil, which limits their use for shallow excavations and sanitary facilities. Some soils have thick, sandy surface and subsurface layers, which limit their use for recreation development.

Soils on flood plains

One map unit in Warren County consists of poorly drained soils that are nearly level. Slopes are less than 2 percent. The soils have a mainly brownish, loamy surface layer and a grayish, loamy subsoil.

8. Roanoke

Nearly level, poorly drained soils that have a loamy surface layer and a loamy subsoil

The soils in this map unit are on low, narrow terraces along Little Brier and Big Brier Creeks in the southeastern part of the county. The probability of frequent flooding for brief periods is high in winter and spring. Slopes are less than 2 percent.

This map unit makes up about 1 percent of the county. It consists only of Roanoke soils.

Roanoke soils typically have a surface layer of dark grayish brown silt loam 3 inches thick. The subsurface layer is gray silt loam and extends to a depth of 9 inches. The subsoil is predominantly clay loam and extends to a depth of about 55 inches. It is mainly gray mottled with strong brown in the upper part and light gray mottled with reddish yellow in the lower part. The underlying material is mottled light gray and reddish yellow clay to a depth of 65 inches or more.

Roanoke soils are used as woodland. They have good potential for that use; however, equipment limitations and seedling mortality are problems. The soils have poor potential for farming and urban uses. Flooding and wetness are limitations.

Broad land use considerations

Considerable acreage in the survey area is being used as woodland, cropland, and pasture and for urban uses. The general soil map can be used in broad planning, but it cannot be used to locate the site for a specific structure. In general, the soils in the survey area that have good potential for cultivated crops also have good potential for urban development. The data about specific soils can be helpful in planning future land use patterns. Interpretations made from the general soil map for broad land use planning are specific for each county. The following broad land use considerations, however, apply to the entire survey area.

Woodland makes up more than 70 percent of the survey area, and the soils have fair or good potential for woodland production.

Pasture and cropland make up about 26 percent of the survey area. The soils have the potential for about double this percentage. Some of the soils are not suited to farming. These include the soils on the steeper hillsides in the Georgeville-Wedowee map unit, the Wedowee-Cecil unit, and the Wedowee-Cecil Madison unit. The wetter soils in the Chewacla-Toccoa-Wehadkee unit and the soils in the Roanoke unit need drainage before they can be used as cropland. The better drained soils in the Chewacla-Toccoa-Wehadkee unit are suited to vegetables and other specialty crops if drainage systems are installed. Water for irrigation is available.

The acreage of developed land is expected to increase mainly in the vicinity of Evans, Grovetown, Martinez, and Thomson. In general, about three-fourths of the survey area has fair or good potential for urban use. The rest has poor potential. It includes the soils on the steeper hillsides in the Georgeville-Wedowee unit, the Wedowee-Cecil unit, and the Wedowee-Cecil-Madison unit, the nearly level soils in the Chewacla-Toccoa-Wehadkee unit, and the soils on flood plains in the Roanoke unit.

The soils in the Georgeville-Wedowee unit, the Wedowee-Cecil unit, and the Wedowee-Cecil-Madison unit are on hillsides and have fair or good potential for parks and recreation areas. Hardwood and pine forests are common. In the Chewacla-Toccoa-Wehadkee unit and the Roanoke unit, undrained wet areas and areas ponded by beaver are suited to use as nature study areas. In all of these map units there is suitable habitat for many kinds of wildlife.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named.

Soils that have profiles that are almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying material, all the soils of a series have horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped.

Soils of one series can differ in texture of the surface layer or in the underlying material and in slope, erosion, stoniness, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Appling sandy loam, 2 to 6 percent slopes, is one of several phases within the Appling series.

Some map units are made up of two or more dominant kinds of soil. Such map units are called soil complexes and undifferentiated groups.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Madison-Grover complex, 6 to 15 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because there is little value in separating them. The pattern and proportion of the soils are not uniform. An area shown on the map has at least one of the dominant (named) soils or may have all of them. Chewacla and Congaree soils is an undifferentiated group in this survey area.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Pits, kaolin, is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 4, and information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

Soil descriptions

AkA—Altavista sandy loam, 0 to 2 percent slopes. This is a deep, moderately well drained, nearly level soil on stream terraces of the Piedmont Upland and stream terraces and low marine terraces of the Carolina and Georgia Sandhills. Slopes are smooth and slightly concave. There is a probability of occasional, very brief flooding in spring. The areas are 10 to 125 acres in size.

Typically, the surface layer is dark grayish brown sandy loam about 8 inches thick. The subsurface layer, to a depth of 11 inches, is light yellowish brown sandy loam. The subsoil extends to a depth of about 57 inches. The upper part is olive yellow sandy clay loam. The middle part is yellowish brown sandy clay loam that has yellowish red and light brownish gray mottles. The lower part is strong brown sandy loam that has yellowish red and gray mottles. The underlying material is mottled yellowish brown and light gray sandy loam to a depth of 65 inches or more.

This soil is low in natural fertility and organic matter content. It is very strongly acid to medium acid throughout except in limed areas. Permeability is moderate, and the available water capacity is medium. Tilth is good. Although the root zone is deep, root penetration is limited by the water table, which is commonly at a depth of 18 to 30 inches in winter and spring.

Included in mapping are small areas of Appling sandy loam and areas of clayey soils that have a combined surface layer and subsoil more than 60 inches thick. Also included are a few areas of soils that are similar to this Altavista soil except that the surface layer is loamy coarse sand, and the combined surface layer and subsoil are more than 60 inches thick. These included soils make up as much as 20 percent of the map unit; no single soil makes up as much as 10 percent.

This soil has good potential for local crops and pasture plants and responds well to good management, especially fertilization. Good tilth is easily maintained by returning crop residue to the soil.

This soil has good potential for loblolly pine, yellow-poplar, and sweetgum. Wetness is the main limitation to equipment use in managing and harvesting the tree crop. This limitation can be overcome by using equipment mainly in the drier seasons.

This soil has poor potential for most urban uses. Wetness and flooding are limitations, and they can be overcome only by major drainage and flood control measures.

This soil is in capability subclass IIw and woodland suitability group 2w.

AmB—Appling sandy loam, 2 to 6 percent slopes. This is a deep, well drained, very gently sloping soil on ridgetops of the Piedmont Upland. Slopes are smooth and convex. The areas are 5 to 500 acres in size.

Typically, the surface layer is brown sandy loam about 9 inches thick. The subsoil extends to a depth of about 48 inches. The upper part is yellowish red sandy clay loam, the middle part is yellowish red sandy clay that has red and brownish yellow mottles, and the lower part is mottled red, reddish yellow, and brownish yellow clay loam. The underlying material, to a depth of 72 inches or more, is mottled red and strong brown sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except in limed areas. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep.

Included with this soil in mapping are areas of clayey soils that are moderately well drained. Also included are small areas of Appling sandy clay. These included soils make up as much as 25 percent of the map unit; no single soil makes up as much as 10 percent.

This soil has good potential for crops and pasture plants. Crops respond well to good management, especially fertilization. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if this soil is cultivated and not protected. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine (fig. 2), yellow-poplar, and red oak. There are no significant problems in woodland use and management.

This soil has good potential for most urban and recreation uses. The clayey subsoil retards absorption of effluent and is a limitation to use of the soil as septic tank absorption fields. This limitation commonly can be overcome by good design and careful installation.

This soil is in capability subclass IIe and woodland suitability group 3o.

AmC—Appling sandy loam, 6 to 10 percent slopes. This is a deep, well drained, gently sloping soil on ridgetops and long hillsides of the Piedmont Upland. Slopes are smooth and convex. The areas are 5 to 50 acres in size.

Typically, the surface layer is pale brown sandy loam 4 inches thick. The subsurface layer is very pale brown sandy loam 10 inches thick. The subsoil extends to a depth of 48 inches. It is yellow sandy clay loam in the upper part, brownish yellow sandy clay mottled with red and pale brown in the middle part, and mottled brownish yellow, pale brown, and red sandy clay loam in the lower part. The underlying material, to a depth of 70 inches or more, is reddish yellow and light gray.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except in limed areas. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep.

Included in mapping are small areas of Appling sandy clay loam and small areas of Grover and Wedowee soils. Also included are a few areas of soils that have gray mottles below a depth of 30 inches. The included soils make up about 15 percent of the map unit; no single soil makes up as much as 10 percent.

This soil has good potential for all locally grown crops and pasture plants. Crops respond well to good manage-

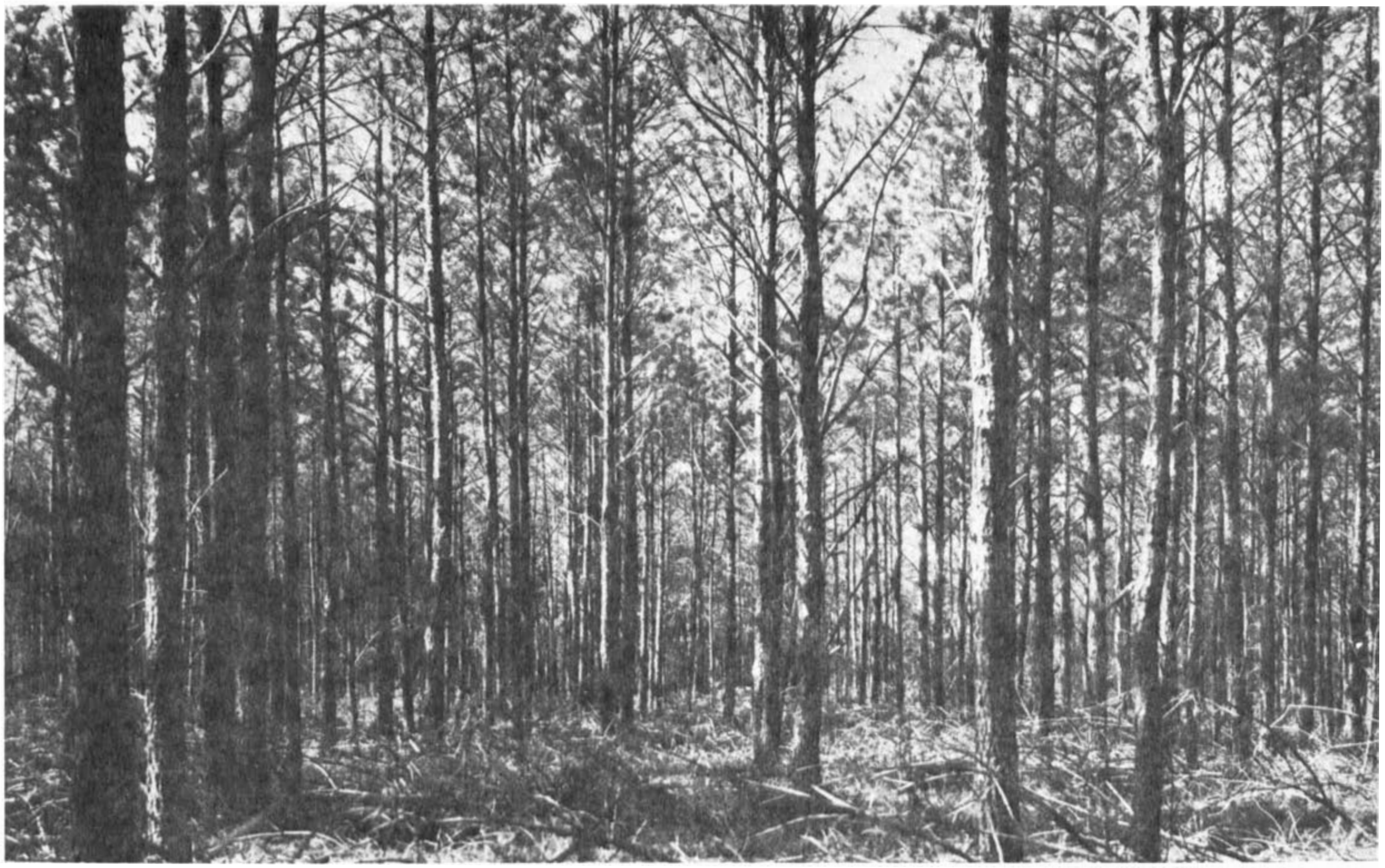


Figure 2.—Appling sandy loam, 2 to 6 percent slopes, has good potential for conifers. The loblolly pine shown here were planted.

ment, especially fertilization. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a severe hazard if the soil is cultivated and not protected. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help reduce runoff and control erosion.

This soil has good potential for loblolly pine, yellow-poplar, and red oak. There are no significant problems in woodland management.

This soil has fair potential for urban uses. The slope is a limitation to most uses. The clayey subsoil retards absorption of effluent and is a limitation to use of the soil as septic tank absorption fields. This limitation generally can be overcome by proper design and construction. Structures that are compatible with slope can be installed.

This soil is in capability subclass IIIe and woodland suitability group 3o.

Bh—Bibb silt loam. This is a deep, poorly drained, nearly level soil on flood plains of streams in the Carolina and Georgia Sandhills. There is a high probability of frequent, brief flooding in winter and spring. The areas are 10 to 150 acres in size.

Typically, the surface layer is dark grayish brown silt loam to a depth of about 5 inches and grayish brown sandy loam to a depth of 15 inches. The underlying material to a depth of 55 inches is stratified dark gray, grayish brown, and light gray sandy loam. Below that, to a depth of 60 inches or more, it is light gray sandy clay loam that has grayish brown and gray mottles.

This soil is low in natural fertility and organic matter content. It is strongly acid to very strongly acid throughout. Permeability is moderate, and the available water capacity is medium. Tilth is fair. The root zone is deep; however, root penetration is limited by the water table, which is commonly at a depth of 6 to 18 inches in winter and spring.

Included in mapping are areas of Roanoke and Worsham soils. Also included are soils that are more sandy throughout. These included soils make up as much as

25 percent of the map unit; no single soil makes up more than 10 percent.

This soil has good potential for loblolly pine, sweetgum, and yellow-poplar. However, equipment limitations and seedling mortality are problems in woodland use and management.

This soil has poor potential for farming and for urban or recreation use. The soil is wet most of the year and is frequently flooded for brief periods.

This soil is in capability subclass Vw and woodland suitability group 2w.

CfB2—Cecil sandy clay loam, 2 to 6 percent slopes, eroded. This is a deep, well drained, very gently sloping soil on ridgetops of the Piedmont Upland. The present surface layer is a mixture of the original surface layer and material from the upper part of the subsoil. Slopes are mostly smooth and convex; there are rills or galled spots, shallow gullies, and some deep gullies. The areas are less than 5 acres to 250 acres in size.

Typically, the surface layer is reddish brown sandy clay loam 4 inches thick. The subsoil is red and extends to a depth of about 59 inches. The upper part of the subsoil is clay, and the lower part is clay that has yellowish red mottles. The underlying material, to a depth of 69 inches or more, is weathered granite.

This soil is low in natural fertility and organic matter content. It is very strongly acid or strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is poor because the sandy clay loam surface layer is sticky when wet and hard when dry. The root zone is deep.

Included with this soil in mapping are areas of Cecil sandy clay loam, 6 to 10 percent slopes, and Cecil sandy loam, 2 to 6 percent slopes. Also included are small areas of soils that have a brown, plastic, clayey subsoil. The included soils make up as much as 15 percent of the map unit; no single soil makes up as much as 10 percent.

This soil has fair potential for local row crops, small grains, pasture grasses and legumes, and hay. The poor workability of the surface layer and the somewhat gullied landscape are the major limitations.

This soil has fair potential for loblolly pine, slash pine, sycamore, and yellow-poplar. The hazard of erosion, equipment limitations, and seedling mortality are management concerns. These commonly can be overcome by maintaining good ground cover, logging during drier seasons, and planting after good land preparation.

This soil has good potential for most urban uses. The gullies are a limitation, but the landscape can be easily smoothed or modified for most urban uses. Low strength is a limitation for local roads and streets. The clayey subsoil retards absorption of effluent and is a limitation to use of the soil as septic tank absorption fields. These limitations commonly can be overcome by good design and careful installation.

This soil is in capability subclass IIIe and woodland suitability group 4c.

CfC2—Cecil sandy clay loam, 6 to 10 percent slopes, eroded. This is a deep, well drained, gently sloping soil on narrow ridgetops and moderately long hillsides of the Piedmont Upland. The present surface layer is a mixture of the original surface layer and material from the upper part of the subsoil. Slopes are convex. Rills or galled spots, shallow gullies, and some deep gullies are common. The areas are less than 5 acres to 125 acres in size.

Typically, the surface layer is reddish brown sandy clay loam 5 inches thick. The subsoil is red and extends to a depth of 43 inches. The upper part is sandy clay loam, the middle part is clay, and the lower part is sandy clay loam that has reddish yellow splotches. The underlying material, to a depth of 62 inches or more, is reddish yellow and pink.

This soil is low in natural fertility and organic matter content. It is very strongly acid or strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is poor. The sandy clay loam surface layer is sticky when wet and hard when dry. The root zone is deep.

Included in mapping are small areas of soils that are severely eroded. These areas contain gullies that are mostly shallow and are less than 100 feet apart. Also included are a few areas of Cecil sandy loam, 6 to 10 percent slopes, and a few small areas of a soil that has a brown plastic subsoil. These included soils make up about 20 percent of the map unit; no single soil makes up as much as 10 percent.

This soil has poor potential for local row crops. It has fair potential for pasture plants, hay crops, and other close growing crops. Tillage is satisfactory only within a relatively narrow range of moisture content because of the sandy clay loam surface layer. Erosion is a severe hazard if this soil is cultivated and is not carefully managed.

This soil has fair potential for loblolly pine and Virginia pine. A moderate erosion hazard, equipment restrictions, and seedling mortality are limitations to the use and management of this soil. However, these limitations can be overcome by good management.

This soil has fair potential for urban development. The gullies are a limitation, but the landscape can be smoothed easily or modified for most urban uses. Slope is a limitation to most uses, and low strength is a limitation to use of the soil as sites for local roads and streets. The clayey subsoil retards absorption of effluent and is a limitation to use of the soil as septic tank absorption fields. These limitations generally can be overcome by good design and careful installation and management.

This soil is in capability subclass IVe and woodland suitability group 4c.

CfE2—Cecil sandy clay loam, 10 to 25 percent slopes, eroded. This is a deep, well drained, sloping or moderately steep soil on moderately long hillsides of the Piedmont Upland. The present surface layer is a mixture of the original surface layer and material from the upper part of the subsoil. Slopes are convex and commonly have rills or galled spots, shallow gullies, and some deep gullies. The areas are 5 to 100 acres in size.

Typically, the surface layer is reddish brown sandy clay loam 5 inches thick. The subsoil is red and extends to a depth of about 45 inches. The upper part of the subsoil is sandy clay loam, the middle part is sandy clay, and the lower part is sandy clay loam and has strong brown mottles. The underlying material, to a depth of 60 inches or more, is mottled red, strong brown, and very pale brown clay loam.

This soil is low in natural fertility and organic matter content. It is very strongly acid or strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is poor. The sandy clay loam surface layer is sticky when wet and hard when dry. The root zone is deep.

Included with this soil in mapping are areas of Madison and Wedowee soils. Also included are areas of Cecil soils that are less eroded. The included soils make up as much as 25 percent of the map unit, no single soil makes up as much as 10 percent.

This soil has poor potential for row crops because of the steepness of slopes and erosion. It has fair potential for permanent pasture if management is good. Erosion is a severe hazard if this soil is not protected.

This soil has fair potential for loblolly pine and Virginia pine. A severe erosion hazard, equipment restrictions, and seedling mortality are limitations to the use and management of the soil. These limitations generally can be overcome by maintaining good ground cover, logging during drier seasons, and planting after good land preparation.

This soil has poor potential for most urban uses. Steepness of slope is a limitation to most uses. Some structures may require reshaping of the soil.

This soil is in capability subclass VIe and woodland suitability group 4c.

CK—Chewacla and Congaree soils. This map unit consists of deep, somewhat poorly drained and well drained, nearly level soils on flood plains along perennial streams within the Piedmont Upland. These soils are commonly flooded for brief periods from late fall until early spring. Chewacla and Congaree soils are in an irregular pattern on the landscape. The individual areas of each soil are large enough to map separately, but because of present and predicted use they were mapped as one unit. Most mapped areas contain both soils, but a few areas contain only one of the soils.

The somewhat poorly drained Chewacla soils and closely similar soils make up about 53 percent of the map unit. Typically, the surface layer, to a depth of 6 inches, is brown silt loam that has very pale brown mottles. The subsoil extends to a depth of about 60 inches. The upper part of the subsoil is brown silt loam that has very pale brown mottles, the middle part is brown and light yellowish brown silt loam that has light gray mottles throughout, and the lower part is light yellowish brown clay loam that has reddish yellow and light gray mottles.

The Chewacla soils are slightly acid to strongly acid. Permeability is moderate, and the available water capacity is medium or high. The root zone is deep; however, root penetration is limited by the water table, which commonly is at a depth of 6 to 18 inches from late fall until early spring. Tilth is generally good.

The well drained Congaree soils and closely similar soils make up about 30 percent of the map unit. Typically, the surface layer is yellowish brown silt loam about 6 inches thick. The underlying material, to a depth of 33 inches, is stratified brown silt loam. Below that, a buried older soil that is reddish brown clay loam extends to a depth of 60 inches or more.

Congaree soils are neutral to strongly acid. Permeability is moderate, and the available water capacity is medium. The root zone is deep; however, root penetration is limited by the water table, which commonly is at a depth of 30 to 48 inches from late fall until early spring. Tilth is good.

Included in mapping are areas of moderately well drained Helena soils and small areas of well drained sandy loams that are near streambanks. Also included are poorly drained Roanoke soils on low stream terraces and swales adjacent to the uplands. No single included soil makes up more than 8 percent of the map unit.

Most of the acreage of this map unit is wooded. In a few areas, the soils are used for cultivated crops, hay, and pasture. The soils in this map unit are very productive and have good potential for farming (fig. 3). Flooding is commonly a hazard from late fall until early spring.

The soils in this map unit have good potential for loblolly pine, yellow-poplar, American sycamore, and sweetgum. Wetness and flooding are limitations to the use of equipment and to the growth of seedlings on these soils. Logging equipment should be used only during the drier seasons.

The soils in this map unit have poor potential for most urban uses. Wetness and flooding are limitations. Major flood control and drainage measures are needed.

These soils are in capability subclass IIIw. Chewacla soils are in woodland suitability group 1w; Congaree soils are in woodland suitability group 1o.

DgB—Davidson loam, 2 to 6 percent slopes. This is a deep, well drained, very gently sloping soil on broad

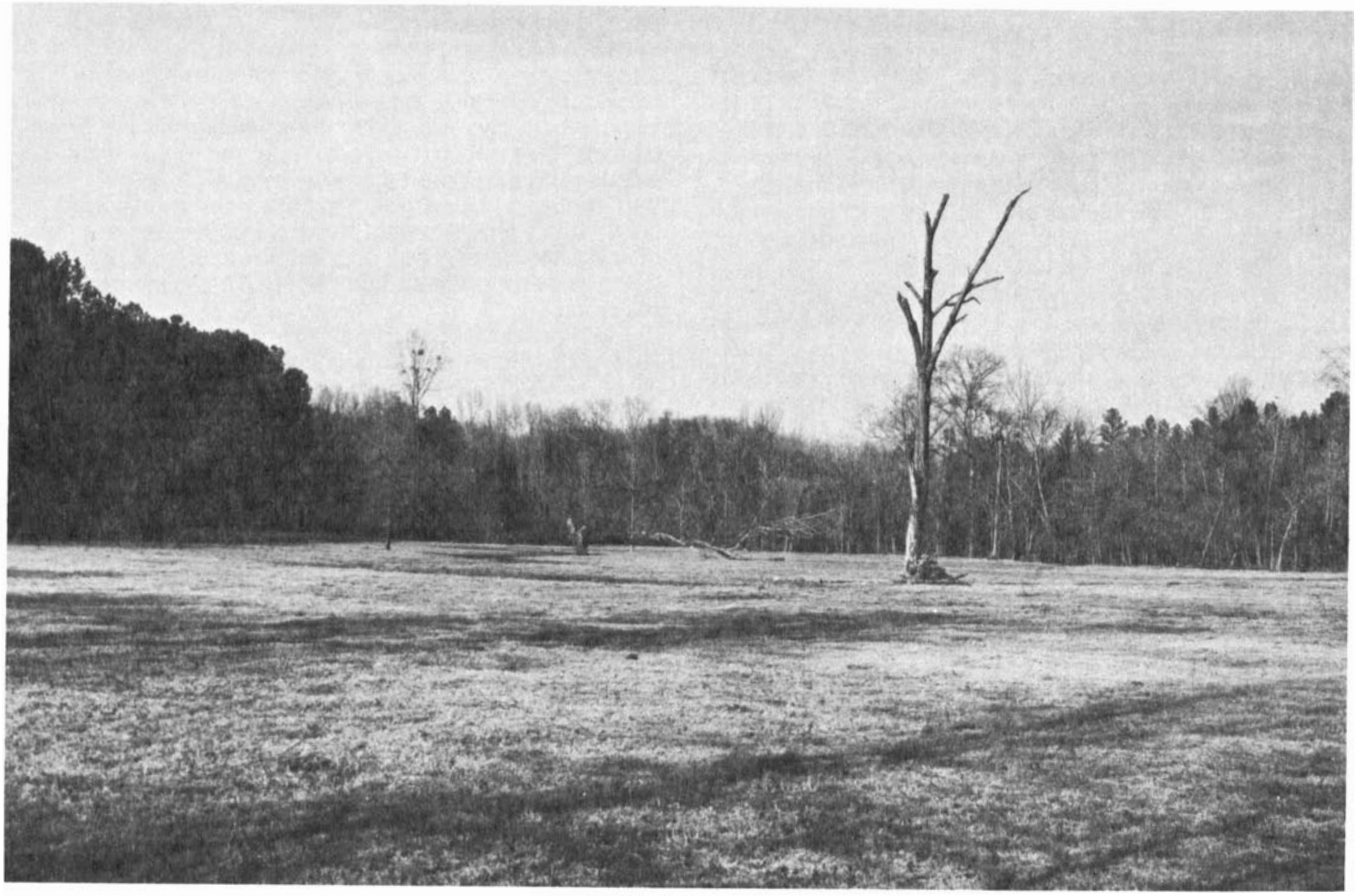


Figure 3.—An area of Chewacla and Congaree soils. These soils have good potential for farming.

ridgetops of the Piedmont Upland. Slopes are smooth and convex. The areas are 5 to 200 acres in size.

Typically, the surface layer is dark reddish brown loam 7 inches thick. The subsoil extends to a depth of 70 inches or more. It is dark reddish brown clay loam in the upper part, dark reddish brown and dark red clay in the middle part, and red clay in the lower part.

Natural fertility is medium, and the content of organic matter is low. The soil is very strongly acid to medium acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth generally is good, and the root zone is deep.

Included in mapping are small areas of Davidson clay loam that have rills or galled spots, shallow gullies, and some deep gullies. Also included are small areas of a soil that is similar to Davidson loam but has a thinner subsoil. The included soils make up about 30 percent of the map unit; no single soil makes up as much 10 percent.

This soil has good potential for many crops, and it can be cultivated intensively if it is well managed. It is also well suited to most pasture plants. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine, slash pine, sycamore, and yellow-poplar. There are no significant concerns in woodland management.

This soil has good potential for most urban uses. Low strength is a limitation for local roads and streets. The clayey subsoil retards absorption of effluent and is a limitation to use of the soil as septic tank absorption fields. These limitations generally can be overcome by good design and careful installation.

This soil is in capability subclass IIe and woodland suitability group 3o.

DhC2—Davidson clay loam, 6 to 10 percent slopes, eroded. This is a deep, well drained, gently sloping soil on hillsides of the Piedmont Upland. The present surface layer is a mixture of the original surface layer and material from the upper part of the subsoil. Slopes are convex. There are rills or galled spots, shallow gullies, and some deep gullies. The areas are 5 to 50 acres in size.

Typically, the surface layer is dark reddish brown clay loam about 5 inches thick. The upper part of the subsoil is dark red and dark reddish brown clay; it extends to a depth of 42 inches. The lower part is red clay loam; it extends to a depth of 60 inches or more.

Natural fertility is medium, and the content of organic matter is low. The soil is very strongly acid or medium acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is generally poor because of the amount of clay in the surface layer. The root zone is deep.

Included with this soil in mapping are small areas of a soil that is similar but has a thinner subsoil. Also included are severely eroded soils in small areas characterized by numerous shallow gullies and some deep gullies. The included soils make up as much as 20 percent of the map unit; no single soil makes up as much as 10 percent.

If well managed, this soil has fair potential for cultivated crops and pasture plants. Because of slope, runoff is rapid if the soil is cultivated, and the erosion hazard is severe. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine and Virginia pine. Erosion is a moderate hazard if this soil is used for trees. This limitation can be overcome by good management.

This soil has fair potential for most urban uses. Slope and low strength are limitations. The clayey subsoil retards absorption of effluent and is a limitation to use of the soil as septic tank absorption fields. These limitations generally can be overcome by good design and careful installation.

This soil is in capability subclass IVe and woodland suitability group 3c.

DhE2—Davidson clay loam, 10 to 25 percent slopes, eroded. This is a deep, well drained, sloping or moderately steep soil on hillsides of the Piedmont Upland. The present surface layer is a mixture of the original surface layer and material from the upper part of the subsoil. Slopes are complex. There are rills or galled spots, shallow gullies, and some deep gullies. The areas are 10 to 60 acres in size.

Typically, the surface layer is dark reddish brown clay loam about 4 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is dark red clay. The lower part is red clay loam that has strong brown mottles.

Natural fertility is medium, and the content of organic matter is low. The soil is very strongly acid to medium acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is poor because of the amount of clay in the surface layer, which is sticky when wet and hard when dry. The root zone is deep.

Included in mapping are areas of severely eroded soils that have a clay surface layer; shallow gullies and a few deep gullies are common. Also included are a few areas of a similar soil that has a thinner subsoil. The included soils make up as much as 25 percent of the map unit; no single soil makes up as much as 10 percent.

This soil has fair potential for most pasture plants common to the area, but it has poor potential for row crops because of the steepness of slopes and the erosion hazard. Because of the surface texture, this soil can be tilled satisfactorily only within a relatively narrow range in moisture content.

This soil has good potential for loblolly pine and Virginia pine. The moderate erosion hazard is a limitation to use and management of the soil, but this limitation can be overcome by good management.

This soil has poor potential for urban uses mainly because of the steepness of slope.

This soil is in capability subclass VIe and woodland suitability group 3r.

EnD—Enon sandy loam, 10 to 15 percent slopes. This is a well drained sloping soil on hillsides of the Piedmont Upland. Slopes are commonly short, complex, and convex. The areas are 5 to 150 acres in size.

Typically, the surface layer is grayish brown sandy loam 2 inches thick. The subsurface layer is brown sandy loam and extends to a depth of 9 inches. The subsoil extends to a depth of about 32 inches. It is reddish yellow sandy clay loam in the upper part, reddish yellow clay mottled with red in the middle part, and yellowish brown clay mottled with light brownish gray in the lower part. The underlying material, to a depth of 60 inches or more, is mottled strong brown, dark gray, pale brown, and brownish yellow clay loam and sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid to slightly acid; the underlying material is slightly acid or neutral. Permeability is slow, and the available water capacity is medium to high. Tilth is poor. The root zone is moderately deep.

Included in mapping are soils that have a gravelly sandy loam or gravelly loam surface layer and areas of soils similar to Enon soils except that bedrock is at a depth of about 29 inches. Also included are clayey soils that are moderately well drained. The included soils make up about 25 percent of the map unit; no single soil makes up as much as 10 percent.

This soil has poor potential for farming because of the steepness of slopes and the moderate depth of the root zone.

This soil has fair potential for loblolly pine, Virginia pine, and eastern redcedar. There are no significant limitations to woodland use or management.

This soil has poor potential for urban uses. Steepness of slope, slow permeability in the subsoil, high shrink-swell potential in the subsoil, and low strength are limitations.

This soil is in capability subclass IVe and woodland suitability group 4o.

FdB—Faceville sandy loam, 2 to 6 percent slopes. This is a deep, well drained, very gently sloping soil on broad ridgetops of the Carolina and Georgia Sandhills. Slopes are smooth and convex. The areas are 10 to 250 acres in size.

Typically, the surface layer is reddish brown sandy loam about 7 inches thick. The subsoil is red sandy clay and extends to a depth of 70 inches or more.

Natural fertility is medium, and the organic matter content is low. This soil is very strongly acid or strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. This soil has good tilth and can be worked throughout a wide range in moisture content. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are a few areas of Faceville fine sandy loam and Faceville sandy clay loam that is eroded. Also included are a few intermingled areas of Norfolk and Orangeburg soils. The included soils make up about 15 percent of this map unit; no single soil makes up as much as 10 percent.

This soil has good potential for row crops, small grains, hay, and pasture plants; yields can be high. Erosion is a moderate hazard if cultivated crops are grown. Good tilth is easily maintained by returning crop residue to the soil. Grasses and legumes in the cropping system help to conserve moisture and maintain the organic matter content of the soil.

This soil has good potential for loblolly pine and slash pine. There are no significant limitations to woodland use and management.

This soil has good potential for most urban uses. Low strength is a limitation for local roads and streets, and the poor workability of the clayey subsoil is a limitation for shallow excavations. These limitations generally can be overcome by good design and careful installation.

This soil is in capability subclass IIe and woodland suitability group 3o.

FmC—Flomaton Variant gravelly loamy sand, 2 to 10 percent slopes. This is a deep, well drained, very gently sloping or gently sloping, gravelly soil on ridgetops and sides of ridgetops in the Carolina and Georgia Sandhills. Slopes are smooth and convex. The areas are 10 to 75 acres in size.

Typically, the surface layer is dark grayish brown gravelly loamy sand about 6 inches thick. The subsurface layer extends to a depth of 35 inches. It is light yellowish brown gravelly sandy loam in the upper part and dark yellowish brown gravelly sandy loam in the lower part. The subsoil is strong brown gravelly sandy clay loam; it extends to a depth of 65 inches or more.

Figure 4.—A profile of Flomaton Variant gravelly loamy sand, 2 to 10 percent slopes. This gravelly soil has good potential for use as a source of roadfill.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout. Permeability is moderate, and the available water capacity is low. This soil is difficult to work because of the high gravel content. The root zone is deep and is easily penetrated by plant roots.

Included in mapping are soils that are similar but have a gravelly sandy loam surface layer and soils in which the subsurface layer extends to a depth of more than 40 inches. Also included are a few small areas of Troup and Wagram soils. The included soils make up about 10 to 15 percent of this map unit; no single soil makes up as much as 10 percent.

Most of the acreage of this map unit is wooded. In a few areas this soil is used for pasture. The soil has poor potential for row crops and small grains. It has fair potential for hay and pasture plants. The high gravel content throughout the soil, the low natural fertility, and the low available water capacity are limitations. If the soil is used for pasture, proper fertilization is necessary for satisfactory yields.

This soil has fair potential for loblolly pine, longleaf pine, and shortleaf pine. Equipment limitation and seedling mortality are limitations to the use of this soil as woodland. These limitations can be reduced by good management.

This soil has good potential for most urban uses. The high content of gravel makes shallow excavations difficult to dig. The soil has good potential for use as septic tank absorption fields, but seepage is a problem if the soil is used for sewage lagoons and sanitary landfill. This soil has good potential for use as a source of roadfill (fig. 4).

This soil is in capability subclass IVs and woodland suitability group 4f.

GcB—Georgeville fine sandy loam, 2 to 6 percent slopes. This is a deep, well drained, very gently sloping soil on broad ridgetops of the Piedmont Upland. Slopes are smooth and convex. The areas are 10 to 100 acres in size.

Typically, the surface layer is brown fine sandy loam 7 inches thick. The subsoil extends to a depth of about 56 inches; it is red throughout and has strong brown mottles in the lower part. It is silty clay loam in the upper part, clay in the middle part, and silty clay loam in the lower part. The underlying material is reddish yellow weathered slate (fig. 5).

Natural fertility is medium, and the content of organic matter is low. The soil is very strongly acid or strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep.

Included in mapping are small areas of Georgeville clay loam. The landscape in these areas is characterized by rills or galled spots, shallow gullies, and some deep gullies. Also included are a few areas of Georgeville fine sandy loam that is less than 40 inches deep and areas of Georgeville silt loam. The included soils make up about 15 percent of this map unit; no single soil makes up as much as 10 percent.

Figure 5.—A profile of Georgeville fine sandy loam, 2 to 6 percent slopes. This soil has good potential for farming, commercial wood production, and most urban and recreation uses.

This soil has good potential for many crops and pasture plants. If properly managed, it can be cultivated intensively. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine and yellow-poplar. There are no significant problems in woodland management.

This soil has good potential for most urban and recreation uses. Low strength is a limitation for local roads and streets. The clayey subsoil retards absorption of effluent and is a limitation to use of the soil as septic tank absorption fields. These limitations generally can be overcome by good design and careful installation.

This soil is in capability subclass IIe and woodland suitability 3o.

GdC2—Georgeville clay loam, 6 to 10 percent slopes, eroded. This is a deep, well drained, gently sloping soil on hillsides of the Piedmont Upland. The present surface layer is a mixture of the original surface layer and material from the upper part of the subsoil. Slopes are convex. The areas include rills or galled spots, shallow gullies, and some deep gullies. They are 5 to 75 acres in size.

Typically, the surface layer is yellowish red clay loam 4 inches thick. The subsoil extends to a depth of about 47 inches; it is red throughout and has reddish yellow mottles in the lower part. It is clay loam in the upper part, clay in the middle part, and silty clay loam in the lower part. The underlying material is weathered slate.

Natural fertility is medium, and the content of organic matter is low. The soil is very strongly acid or strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is generally poor because of the amount of clay in the surface layer. The root zone is deep.

Included with this soil in mapping are small areas of Georgeville silty clay loam. This soil makes up 15 percent of this map unit.

This soil has fair potential for cultivated crops and pasture plants. Because of the slope, runoff is rapid if the soil is cultivated, and the erosion hazard is severe. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine and Virginia pine. The hazard of erosion, equipment limitations, and seedling mortality are management problems. These problems can be overcome to some extent by good management.

This soil has fair potential for most urban uses. Low strength and slope are limitations to most uses. The clayey subsoil retards absorption of effluent and is a limitation to use of the soil as absorption fields. These limitations generally can be overcome by good design and careful installation.

This soil is in capability subclass IVe and woodland suitability group 4c.

GdE2—Georgeville clay loam, 10 to 25 percent slopes, eroded. This is a deep, well drained, sloping and moderately steep soil on hillsides of the Piedmont Upland. The present surface layer is a mixture of the original surface layer and material from the upper part of the subsoil. Slopes are complex. Rills or galled spots and shallow gullies are common. There are some deep gullies. The areas are 10 to 60 acres in size.

Typically, the surface layer is yellowish red clay loam about 6 inches thick. The subsoil extends to a depth of about 48 inches; it is red throughout and has reddish yellow mottles in the lower part. It is clay in the upper part and silty clay in the lower part. The underlying material is weathered slate.

Natural fertility is medium, and the content of organic matter is low. The soil is very strongly acid or strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is poor because of the amount of clay in the surface layer, which is sticky when wet and hard when dry. The root zone is deep.

Included with this soil in mapping are small areas of Georgeville silty clay loam, which makes up about 15 percent of the map unit.

This soil has fair potential for most pasture plants grown in the area, but it has poor potential for row crops because of the steepness of slopes and the hazard of erosion.

This soil has fair potential for loblolly pine and Virginia pine. The hazard of erosion, equipment limitations, and seedling mortality are problems, but they can be overcome to some extent by good management.

This soil has poor potential for urban uses. Slope is a limitation to most uses, and low strength is a limitation to some uses. The clayey subsoil retards effluent and is a limitation to use of the soil as septic tank absorption fields. Good design and careful installation can overcome some of these limitations.

This soil is in capability subclass VIe and woodland suitability group 4c.

GeB—Grover sandy loam, 2 to 6 percent slopes. This is a deep, well drained, micaceous, very gently sloping soil on moderately broad ridgetops of the Piedmont Upland. Slopes are smooth and convex. The areas are 5 to 125 acres or more in size.

Typically, the surface layer is brown sandy loam 5 inches thick. The subsoil extends to a depth of 30 inches; it is yellowish brown sandy clay loam and has red, strong brown, and yellowish brown mottles below a depth of 10 inches. The underlying material, to a depth of 55 inches, is weathered mica schist. There are mica flakes throughout the soil.

This soil is low in natural fertility and organic matter content. It is very strongly acid or strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep and is easily penetrated by plant roots.

Included in mapping are small areas of Grover sandy clay loam; the areas are characterized by rills or galled spots, shallow gullies, and some deep gullies. Also included are areas of a soil that has a clayey micaceous subsoil. The included soils make up about 15 percent of the map unit; no single soil makes up as much as 10 percent.

This soil has good potential for the locally adapted row crops, small grains, and pasture grasses. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if this soil is cultivated and not protected. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine, slash pine, sycamore, and yellow-poplar. There are no significant limitations to woodland use or management.

This soil has fair potential for most urban uses. Low strength is a limitation for houses and other buildings and for local roads and streets. This limitation commonly can be overcome by good design and careful installation.

This soil is in capability subclass IIe and woodland suitability group 3o.

GeC—Grover sandy loam, 6 to 10 percent slopes. This is a deep, well drained, micaceous, gently sloping soil on moderately long hillsides of the Piedmont Upland. Slopes are smooth and convex. The areas are 5 to 200 acres in size.

Typically, the surface layer is brown sandy loam 6 inches thick. The subsurface layer is light yellowish brown sandy loam 3 inches thick. The subsoil extends to a depth of 34 inches; it is predominantly strong brown and has yellowish red and red mottles in the lower part. It is sandy clay loam in the upper part and clay loam in the lower part. The underlying material, to a depth of 60 inches or more, is weathered mica schist.

This soil is low in natural fertility and organic matter content. It is very strongly acid or strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping is Grover sandy clay loam in small areas where rills or galled spots, shallow gullies, and some deep gullies are common. Also included are small areas of Madison soils. The included soils make up about 20 percent of the map unit; no single soil makes up as much as 10 percent.

This soil has good potential for all of the locally grown row crops, small grains, and pasture plants. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate to severe hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine, slash pine, sycamore, and yellow-poplar. There are no significant limitations to woodland use and management.

This soil has fair potential for urban uses. Low strength and slope are limitations. These limitations generally can be overcome by good design and careful installation. Structures that are compatible with the slope can be installed.

This soil is in capability subclass IIIe and woodland suitability group 3o.

GeD—Grover sandy loam, 10 to 15 percent slopes. This is a deep, well drained, micaceous, sloping soil on moderately long hillsides of the Piedmont Upland. Slopes are smooth and convex. The areas are 5 to 80 acres or more in size.

Typically, the surface layer is light yellowish brown sandy loam 4 inches thick. The subsoil extends to a depth of 30 inches. It is yellowish red clay loam in the upper part, strong brown clay loam in the middle part, and mottled red, very pale brown, and reddish yellow sandy loam in the lower part. The underlying material, to a depth of 40 inches or more, is reddish weathered mica schist.

This soil is low in natural fertility and organic matter content. It is very strongly acid or strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping is a similar but eroded soil in areas that are a few yards wide and several acres in size. In these areas, there are rills or galled spots, shallow gullies, and some deep gullies. Also included are small areas of Madison soils. The included soils make up about 20 percent of the mapped areas; no single soil makes up as much as 10 percent.

Under good management, this soil has fair potential for all of the locally grown row crops, small grains, and pasture plants. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine, slash pine, sycamore, and yellow-poplar. There are no significant limitations to woodland use and management.

This soil has fair potential for urban uses. Low strength and slope are limitations. These limitations generally can be overcome by good design and careful installation. Structures that are compatible with the slope can be installed.

This soil is in capability subclass IVe and woodland suitability group 3o.

HeB—Helena loamy coarse sand, 2 to 6 percent slopes. This is a deep, moderately well drained, very gently sloping soil on low ridgetops and the lower part of hillsides of the Piedmont Upland. Slopes are smooth and convex. The areas are 5 to 110 acres in size.

Typically, the surface layer is pale brown loamy coarse sand about 8 inches thick. The subsurface layer is light yellowish brown sandy loam and extends to a depth of 10 inches. The subsoil extends to a depth of about 34 inches. In the upper part, it is brownish yellow clay loam mottled with yellowish red; in the middle part, it is light yellowish brown clay mottled with red overlying strong brown clay mottled with gray; in the lower part, it is gray clay loam with strong brown mottles. The underlying material, to a depth of 61 inches or more, is pale brown sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is slow, and the available water capacity is medium. Tilth is good. This soil commonly has a perched water table between depths of 12 and 30 inches from January through March. Root growth is somewhat limited by the firm, plastic subsoil.

Included in mapping are similar soils that do not have a clayey, plastic subsoil and soils that have a higher silt content throughout. Also included are small areas of Appling, Grover, and Wedowee soils. The included soils make up as much as 20 percent of the map unit; no single included soil makes up more than 8 percent of the map unit.

This soil has fair potential for local crops and pasture plants. Its potential is limited because some areas are small and because a seasonally high water table delays spring planting in some places. Crops respond well to good management, especially fertilization. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if this soil is cultivated and not protected. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has fair potential for loblolly pine, yellow-poplar, and white oak. Wetness is the main limitation to equipment use, but this limitation can be overcome by logging during the drier seasons.

This soil has poor potential for most urban uses. The high shrink-swell potential of the clayey subsoil is a limitation that is difficult to overcome. Slow permeability in the subsoil is a limitation to use of the soil as septic tank absorption fields.

This soil is in capability subclass IIe and woodland suitability group 3w.

HeC—Helena loamy coarse sand, 6 to 10 percent slopes. This is a deep, moderately well drained, gently sloping soil on short hillsides of the Piedmont Upland. Slopes are smooth and convex. The areas are 5 to 60 acres in size.

Typically, the surface layer is pale brown loamy coarse sand 7 inches thick. The subsoil extends to a depth of about 30 inches. In the upper part, it is light yellowish brown sandy clay loam; in the middle part, it is clay that is brownish yellow mottled with yellowish red overlying clay that is strong brown mottled with gray; and in the lower part, it is mottled strong brown, gray, and pale yellow clay loam. The underlying material, to a depth of 60 inches or more, is pale yellow sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is slow, and the available water capacity is medium. Tilth is good. This soil commonly has a perched water table at a depth between 12 and 30 inches from January through March. Root growth is somewhat limited because of the firm, plastic subsoil.

Included in mapping are areas of a soil that is similar but is more shallow to the underlying material. Also included are small areas of Appling, Grover, and Wedowee soils. The included soils make up as much as 20 percent of the map unit; no single included soil makes up more than 8 percent of the map unit.

This soil has fair potential for most locally grown crops and pasture plants. Its potential is limited because some areas are small and because a seasonally high water table delays spring planting in places. Crops respond well to good management, especially fertilization. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate to severe hazard if the soil is cultivated and not protected. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has fair potential for loblolly pine, yellow-poplar, and white oak. Wetness is the main limitation to equipment use, but this limitation can be overcome by logging during the drier seasons.

This soil has poor potential for most urban uses. The high shrink-swell potential of the clayey subsoil is a limitation that is difficult to overcome. Slow permeability in the subsoil is a limitation to use of the soil as septic tank absorption fields.

This soil is in capability subclass IIIe and woodland suitability group 3w.

MdB—Madison sandy loam, 2 to 6 percent slopes. This is a deep, well drained, very gently sloping soil on ridgetops of the Piedmont Upland. Slopes are smooth and convex. The areas are 5 to 125 acres in size.

Typically, the surface layer is strong brown sandy loam 6 inches thick. The subsoil extends to a depth of about 32 inches. It is yellowish red sandy clay loam in the upper part, red clay in the middle part, and red clay loam in the lower part. The underlying material, to a depth of

62 inches or more, is red and strong brown clay loam and loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep.

Included with this soil in mapping is Madison sandy clay loam in areas where rills or galled spots, shallow gullies, and some deep gullies are common. Also included are small areas of Cecil, Georgeville, and Grover soils. The included soils make up as much as 20 percent of the map unit; no single soil makes up as much as 10 percent.

This soil has good potential for crops and pasture plants. Crops respond well to good management, especially fertilization. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if this soil is cultivated and not protected. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine, yellow-poplar, and red oak. There are no significant limitations to woodland use and management.

This soil has fair potential for most urban uses. Its use as septic tank absorption fields is limited because the clayey subsoil retards absorption of the effluent. Low strength is a limitation for local roads and streets. These limitations can be overcome by good design and careful installation.

This soil is in capability subclass IIe and woodland suitability group 3o.

MdC—Madison sandy loam, 6 to 10 percent slopes. This is a deep, well drained, gently sloping soil on narrow to broad ridgetops and short hillsides of the Piedmont Upland. Slopes are smooth and convex. The areas are 5 to 100 acres in size.

Typically, the surface layer is strong brown sandy loam 6 inches thick. The subsoil extends to a depth of about 31 inches. It is yellowish red sandy clay loam in the upper part and red clay loam in the lower part. The underlying material, to a depth of 60 inches or more, is mottled red and reddish yellow clay loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep.

Included with this soil in mapping are small areas of Georgeville and Grover soils and areas of Madison sandy clay loam that have rills or galled spots, shallow gullies, and some deep gullies. Also included are small areas of Madison gravelly sandy loam. The included soils make up about 15 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has good potential for crops and pasture plants. Crops respond well to good management, especially fertilization. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate to severe hazard if this soil is cultivated and not protected. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine, yellow-poplar, and red oak. There are no significant limitations to woodland use and management.

This soil has fair potential for most urban uses. Slope is a limitation for many uses. The use of this soil as septic tank absorption fields is limited because the clayey subsoil retards absorption of effluent. Low strength is a limitation for local roads and streets. These limitations can be overcome by good design and careful installation.

This soil is in capability subclass IIIe and woodland suitability group 3o.

MdE—Madison sandy loam, 10 to 25 percent slopes. This is a deep, well drained, sloping and moderately steep soil on short hillsides adjacent to streams of the Piedmont Upland. Slopes are generally short, complex, and convex. The areas are 5 to 100 acres in size.

Typically, the surface layer is brown sandy loam 7 inches thick. The subsoil is predominantly red and extends to a depth of about 37 inches. It is sandy clay loam in the upper part, clay in the middle part, and sandy clay loam in the lower part. The underlying material, to a depth of 62 inches or more, is reddish brown and red sandy clay loam and sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep.

Included in mapping are small areas of Georgeville and Grover soils and areas of Madison gravelly sandy loam. Also included are areas of Madison sandy clay loam that have rills or galled spots, shallow gullies, and some deep gullies. The included soils make up about 15 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has poor potential for row crops and fair potential for pasture plants. The steepness of slope limits the potential for crops and pasture. Good tilth is maintained by returning crop residue to the soil. Erosion is a severe hazard if this soil is cultivated and not protected. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine, yellow-poplar, and red oak. Equipment limitations and the erosion hazard can be overcome to some extent by good management.

This soil has poor potential for most urban uses. Steepness of slope is a limitation to use of the soil as septic tank absorption fields and as sites for local roads and streets and dwellings and other buildings. Slope also is a limitation to most recreation uses, but this limitation can be overcome by proper design and construction.

This soil is in capability subclass VIe and woodland suitability group 3r.

MgD—Madison-Grover complex, 6 to 15 percent slopes. This map unit consists of small areas of Madison and Grover soils that are so intermingled that they could not be separated at the scale selected for mapping. The soils are deep and well drained. They are gently sloping and sloping soils on ridgetops and hillsides of the Piedmont Upland. The mapped areas are 10 to 75 acres in size. The individual areas of each soil are 2 to 4 acres in size. The slopes are smooth.

Madison gravelly sandy loam makes up about 60 percent of each mapped area. Typically, the surface layer is brown gravelly sandy loam about 9 inches thick. The subsoil is predominantly red and extends to a depth of 30 inches. It is clay loam in the upper part, clay in the middle part, and clay loam in the lower part. The underlying material is weathered mica schist.

The Madison soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. The root zone is deep.

Grover gravelly sandy loam makes up about 32 percent of each mapped area. Typically, the surface layer is brown gravelly sandy loam about 4 inches thick. The subsurface layer is light yellowish brown gravelly sandy loam to a depth of 7 inches. The subsoil extends to a depth of about 38 inches. It is yellowish red clay loam in the upper part and strong brown loam in the lower part. The underlying material, to a depth of 50 inches, is brownish yellow loam.

The Grover soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout. Permeability is moderate, and the available water capacity is medium. The root zone is deep.

Included in mapping are small areas of soils that are stony and cobbly and a few small areas of shallow soils that have a very pale brown sandy clay loam subsoil. Also included are some areas of Rock outcrop. The included areas make up about 15 percent of the map unit.

The potential is poor for row crops and pasture. The gravelly surface layer and the stones or cobbles on the surface of the included soils are the major limitations. The rock outcrops are also a limitation.

The soils in this map unit are mostly in loblolly pine and mixed upland oaks. The potential is fair for these trees. The included soils that have stones or cobbles on the surface and the Rock outcrop restrict the use of logging equipment.

The soils in this map unit have fair potential for most urban uses. Steepness of slope is a limitation to use of the soils as septic tank absorption fields and as sites for local roads and streets and houses and other buildings. In the Madison soil, the clayey subsoil retards absorption of effluent and is an additional limitation to the use of this soil as septic tank absorption fields. Slope and the gravelly surface layer are limitations to most recreation uses on these soils, but these limitations can be overcome by proper design and construction.

These soils are in capability subclass VIe and woodland suitability group 3o.

NhB—Norfolk loamy sand, 2 to 6 percent slopes. This is a deep, well drained, very gently sloping soil on broad ridgetops of the Carolina and Georgia Sandhills. Slopes are smooth and convex. The areas are 5 to 100 acres in size.

Typically, the surface layer is yellowish brown loamy sand 6 inches thick. The subsurface layer is light yellowish brown sandy loam and extends to a depth of 9 inches. The subsoil extends to a depth of 65 inches; it is yellowish brown in the upper and middle parts and is mottled yellow, brown, and red in the lower part. It is sandy loam in the upper part, sandy clay loam in the middle part, and clay loam in the lower part.

Natural fertility is medium, and the content of organic matter is low. The soil is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range in moisture content. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are areas of a soil that is similar but is more than 5 percent plinthite and soils that have less clay in the lower part of the subsoil. Also included are small areas of Wagram and Orangeburg soils. The included soils make up about 25 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has good potential for local crops and pasture plants. Crops respond well to good management, especially fertilization. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if this soil is cultivated and not protected. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine and slash pine. There are no significant problems in woodland use and management.

This soil has good potential for most urban uses. It has fair potential for most recreation uses. The sandy surface layer is a limitation to recreation uses.

This soil is in capability subclass IIe and woodland suitability group 2o.

NhC—Norfolk loamy sand, 6 to 10 percent slopes. This is a deep, well drained, gently sloping soil on ridgetops and hillsides of the Carolina and Georgia Sandhills. Slopes are smooth and convex. The areas are 5 to 100 acres in size.

Typically, the surface layer is grayish brown loamy sand 6 inches thick. The subsurface layer is light yellowish brown sandy loam and extends to a depth of 9 inches. The subsoil is predominantly clay loam and extends to a depth of about 62 inches. It is yellowish brown in the upper part, strong brown mottled with brownish yellow and yellowish red in the middle part, and brownish yellow mottled with yellowish red in the lower part. The underlying material is mottled red, yellow, and brown clay loam.

Natural fertility is medium, and the content of organic matter is low. The soil is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. The soil has good tilth and can be worked throughout a wide range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are areas of a similar soil on more sloping hillsides and soils that have less clay in the lower part of the subsoil. Also included are small areas of Wagram and Orangeburg soils. These included soils make up about 25 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has fair potential for row crops and small grains. Slope and the size and shape of areas limit the potential. This soil has good potential for hay and pasture plants. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a severe hazard if cultivated crops are grown. Terracing, conservation tillage, and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine and slash pine. There are no significant limitations to woodland use and management.

This soil has fair potential for most urban uses. Slope is a limitation to use of the soil as septic tank absorption fields and as sites for sewage lagoons and dwellings and other buildings. This soil has fair potential for most recreation uses. Slope and the sandy surface layer are limitations to recreation uses.

This soil is in capability subclass IIIe and woodland suitability group 2o.

OcB—Orangeburg sandy loam, 2 to 6 percent slopes. This is a deep, well drained, very gently sloping soil on ridgetops and hillsides of the Carolina and Georgia Sandhills. Slopes are commonly smooth and convex. The areas are 5 to 90 acres in size.

Typically, the surface layer is dark yellowish brown sandy loam about 7 inches thick. The subsurface layer is yellowish brown sandy loam and extends to a depth of 9 inches. The subsoil extends to a depth of 65 inches or more. It is strong brown sandy loam in the upper part, red sandy clay loam in the middle part, and red sandy clay loam mottled with yellowish brown in the lower part.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

Included in mapping are a few small areas of a similar soil that is sandy loam at a depth of 33 to 42 inches and several areas of soil that has a few shallow gullies. Also included are a few areas of Orangeburg loamy sand. These included soils make up about 15 percent of the map unit.

This soil has good potential for row crops, small grains, hay, and pasture plants, and high yields can be obtained. Good tilth can be maintained easily by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine and slash pine. There are no significant limitations to woodland use or management.

This soil has good potential for most urban uses.

This soil is in capability subclass IIe and woodland suitability group 2o.

OcC—Orangeburg sandy loam, 6 to 10 percent slopes. This is a deep, well drained, gently sloping soil on hillsides between ridgetops and drainageways of the Carolina and Georgia Sandhills. Slopes are irregular and convex. The areas are 5 to 30 acres in size.

Typically, the surface layer is yellowish brown sandy loam about 5 inches thick. The subsurface layer is light yellowish brown sandy loam and extends to a depth of 10 inches. The subsoil extends to a depth of 62 inches. It is yellowish red sandy clay loam in the upper part, red sandy clay loam in the middle part, and red sandy clay loam mottled with brown in the lower part.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Faceville and Norfolk soils and a few areas of soils that are similar except that they are fine sandy loam at a depth of about 42 inches. Also included are several areas of soil that has some shallow gullies. The included soils make up about 20 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has fair potential for row crops and small grains. The size of the areas and the irregular slopes are limitations. This soil has good potential for hay and pasture plants. Good tilth commonly can be maintained by returning crop residue to the soil. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for slash pine and loblolly pine. There are no significant limitations to woodland use or management.

This soil has good potential for most urban uses. Slope is a limitation to most uses, but this commonly can be overcome by good design and careful installation.

This soil is in capability subclass IIIe and woodland suitability group 2o.

Pg—Pits, gravel. This map unit consists of gravel pits that were formed by the removal of gravelly soil material for use in road building. The individual areas are 5 to 25 acres in size and are in Warren County.

Gravel pits commonly are not deep, but some places within the pits are 5 to 20 feet or more in depth and range from 1 to 3 acres in size. Between the deep areas are uneven mounds of soil material that commonly form short, narrow ridges.

Most gravel pits have been smoothed and support a few loblolly pine or shortleaf pine trees. Some gravel pits are nearly barren. Additional vegetative cover is needed in most places to control erosion and stabilize the areas.

Pk—Pits, kaolin. This map unit consists of kaolin pits (fig. 6), 25 to 200 feet deep, that were formed by removing soil material that overlaid the kaolin. The individual areas are 10 to 140 acres in size. Most of the areas are in Warren County.

Most kaolin pits range from 200 to 500 feet or more in width. Piles of overburden material and settling basins are within these areas. Most kaolin pits are being mined and support very little vegetation.

Pm—Pits, quarries. This map unit consists of large granite quarries and clay pits. The areas, totaling about 300 acres, are in Columbia and Warren Counties.

These quarries range from 50 to 200 feet in depth. Granite bedrock, saprolite, and clay material are exposed within the quarries. Some crushed rock and overburden material are stockpiled in most of the areas.

Ro—Roanoke silt loam. This is a deep, poorly drained, nearly level soil on low stream terraces within the flood plains of the Carolina and Georgia Sandhills. These areas are frequently flooded for brief periods in winter and spring. Individual areas of this soil are slightly concave and are 25 to 200 acres in size.

Typically, the surface layer is dark grayish brown silt loam 3 inches thick. The subsurface layer is gray silt loam and extends to a depth of 9 inches. The subsoil is predominantly clay loam and extends to a depth of 55 inches. The upper part of the subsoil is mainly gray and has strong brown mottles, and the lower part is light gray and has reddish yellow mottles. The underlying material is mottled light gray and reddish yellow clay to a depth of 65 inches or more.

This soil is medium in natural fertility and organic matter content. It is very strongly acid or strongly acid throughout except where the surface layer has been limed. Permeability is slow, and the available water capacity is medium. Tilth is poor. Although the root zone is deep, root penetration is limited by a water table that is at a depth of less than 12 inches in winter and spring.

Included in mapping are areas of Bibb and Worsham soils. The included soils make up as much as 20 percent of the map unit; no single included soil makes up more than 8 percent of the map unit.

Most areas of this soil are wooded; a few small areas are in pasture. This soil has poor potential for row crops and small grains because of wetness and flooding. It has fair potential for hay and pasture plants.

This soil has good potential for loblolly pine, sycamore, and sweetgum. Wetness and flooding are the main limitations to equipment use in managing and harvesting the tree crops. These limitations can be overcome by restricting logging and the use of equipment to the drier seasons. In addition, artificial drainage is needed to overcome high seedling mortality.

This soil has poor potential for urban uses. Wetness and flooding are limitations that are difficult to overcome.

This soil is in capability subclass Vw and woodland suitability group 2w.

Rx—Rock outcrop. This map unit is about 90 percent exposed granite bedrock. Rock outcrop is on ridgetops and hillsides of the Piedmont Upland in Columbia County. The areas total about 260 acres. Individual areas are 10 to 150 acres in size.

Included in mapping are small areas of a black loamy soil that ranges from 1 to 15 inches in thickness. These areas are 25 to 150 feet apart. This included soil makes up about 10 percent of the map unit.

Because there is little or no soil overburden, areas of Rock outcrop are excellent sources of granite (fig. 7). These areas have poor potential for other uses.

Figure 6.—This kaolin pit is in the panhandle of Warren County.

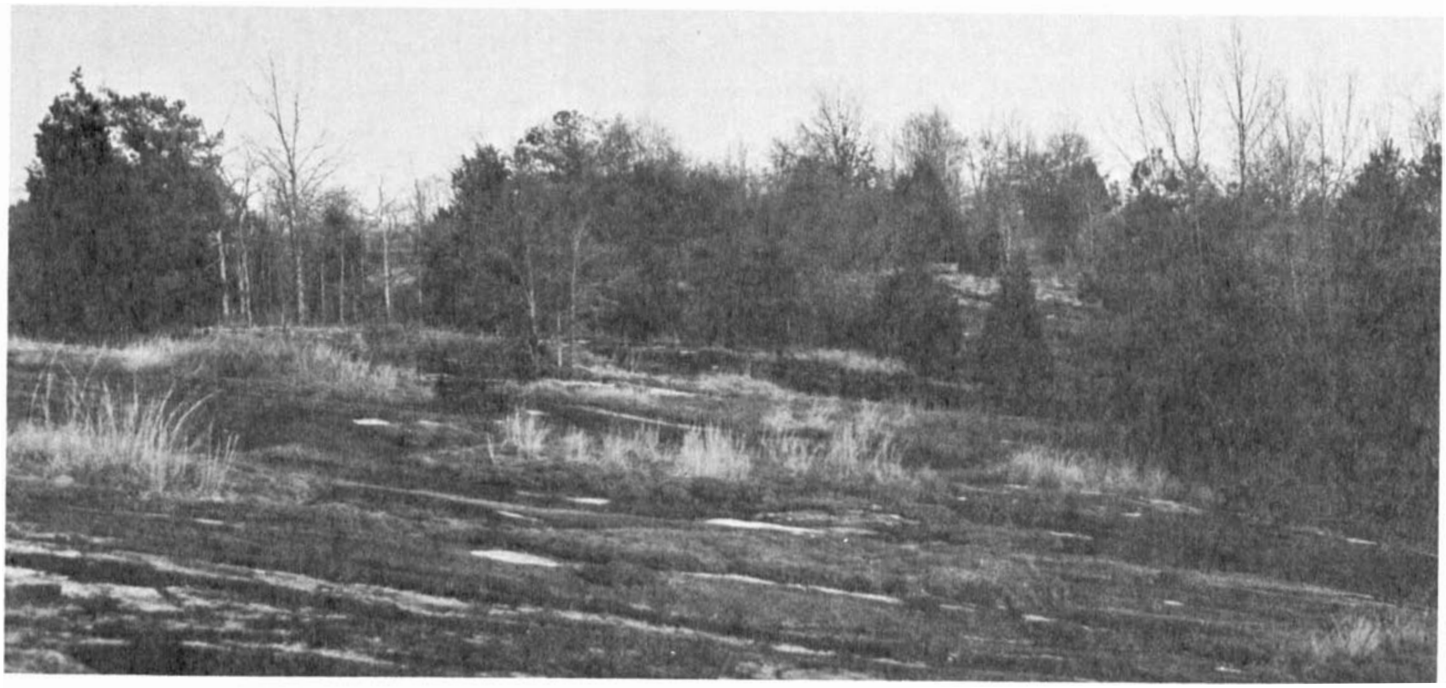


Figure 7.—This area of Rock outcrop is an excellent source of granite because there is little or no soil overburden.

TfB—Tifton loamy sand, 2 to 6 percent slopes. This is a deep, well drained, very gently sloping soil predominantly on ridgetops of the Carolina and Georgia Sandhills. Slopes commonly are smooth and convex. The areas are 5 to 150 acres in size.

Typically, the surface layer is predominantly dark grayish brown loamy sand about 8 inches thick. The subsoil is sandy clay loam and extends to a depth of 72 inches or more. It is yellowish brown in the upper part, yellowish brown mottled with yellowish red and yellow in the middle part, and yellowish brown mottled with yellowish red and very pale brown in the lower part. Plinthite makes up 5 to 20 percent of the soil material below a depth of 36 inches. Nodules of ironstone are throughout the soil.

This soil is low in natural fertility and in content of organic matter. It is very strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. This soil can be worked throughout a wide range of moisture conditions. The root zone is deep and is easily penetrated by plant roots.

Included in mapping are a few small areas of Faceville, Norfolk, and Orangeburg soils. These included soils make up about 15 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has good potential for row crops, small grains, and pasture plants; yields can be high. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine and slash pine. There are no significant limitations to woodland use or management.

This soil has good potential for most urban uses. It is limited, however, for use as septic tank absorption fields because the subsoil retards absorption of effluent. This limitation commonly can be overcome by increasing the size of the absorption field or by modifying the design in some other way. Slope and seepage are limitations if this soil is used for sewage lagoons.

This soil is in capability subclass IIe and woodland suitability group 2o.

TsC—Tifton sandy loam, 6 to 10 percent slopes. This is a deep, well drained, gently sloping soil on hillsides between ridgetops and drainageways of the Carolina and Georgia Sandhills. Slopes are irregular and convex. The areas are 5 to 25 acres in size.

Typically, the surface layer is very dark gray sandy loam about 4 inches thick. The subsurface layer is light yellowish brown sandy loam and extends to a depth of 12 inches. The subsoil is sandy clay loam to a depth of 65 inches or more. It is strong brown throughout and has yellowish red and light gray mottles in the middle part and light gray mottles in the lower part. Plinthite makes up 5 to 20 percent of the soil material below a depth of 32 inches. There are nodules of ironstone throughout the soil.

This soil is low in natural fertility and organic matter content. It is very strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep and is easily penetrated by plant roots.

Included in mapping are a few small areas of Norfolk and Orangeburg soils and a few areas of Tifton loamy sand. Also included are Tifton soils in a few areas where shallow gullies are stabilized. The included soils make up about 10 to 20 percent of this map unit, but areas of the individual soils commonly are less than 1 acre in size.

This soil has fair potential for row crops and small grains. The irregular landscape and the size of the areas are limitations. This soil has good potential for hay and pasture plants. Good tilth can be maintained by returning crop residue to the soil. Erosion is a hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has good potential for loblolly pine and slash pine. There are no significant limitations to woodland use and management.

This soil has fair potential for most urban uses. The subsoil retards absorption of effluent and thus limits the use of this soil as septic tank absorption fields. Slope and seepage are limitations if the soil is used for sewage lagoons. Slope is a limitation if this soil is used as a site for small commercial buildings.

This soil is in capability subclass IIIe and woodland suitability group 2o.

Tv—Toccoa loam. This is a deep, nearly level, well drained soil commonly in higher lying areas on the flood plains. There is a high probability of occasional brief flooding in winter and early in spring. The areas are 20 to 200 acres in size.

Typically, the surface layer is brown loam about 8 inches thick. The underlying material, to a depth of 60 inches, is stratified loamy sand and fine sandy loam that is predominantly brown. Below that, a buried soil that is mottled yellowish brown, dusky red, and light gray sandy loam extends to a depth of 70 inches or more.

This soil is slightly acid to strongly acid throughout. Permeability is moderately rapid, and the available water capacity is medium. The water table is seasonally high and is within about 36 inches of the surface in winter and early in spring. This soil is medium in natural fertility and low in content of organic matter. Tilth is good. The root zone is deep and is easily penetrated by plant roots.

Included with this soil in mapping are areas of Altavista, Chewacla, and Congaree soils that are too small to be mapped separately. Also included are small areas of a poorly drained soil that has a sandy subsoil. These included soils make up about 15 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has good potential for row crops, hay, and pasture; however, flooding is a concern from late winter until early spring. Good tilth is easily maintained by returning crop residue to the soil. In addition, the use of grasses and legumes in the cropping system helps to maintain the fertility level and the organic matter content.

This soil has good potential for loblolly pine, sweetgum, black walnut, and yellow-poplar. There are no significant problems in management.

This soil has poor potential for urban uses. Flooding is the main limitation, and it can be overcome only by major flood control measures. This soil has fair potential for recreation uses such as picnic areas and playgrounds. The occasional flooding is a limitation.

This soil is in capability subclass IIw and woodland suitability group 1o.

TwC—Troup sand, 2 to 10 percent slopes. This is a deep, well drained, very gently sloping and gently sloping soil on broad ridgetops and long, broad hillsides of the Carolina and Georgia Sandhills. Slopes are commonly smooth and convex. The areas are 10 to 250 acres or more in size.

Typically, the surface layer is brown sand about 9 inches thick. The subsurface layer is loamy sand to a depth of 58 inches; the upper part is light yellowish brown, and the lower part is yellowish brown. The subsoil extends to a depth of 72 inches or more. The upper part is yellowish brown sandy loam, and the lower part is sandy clay loam that is yellowish brown and has red and yellowish brown mottles.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderate in the subsoil and rapid in the thick sandy surface and subsurface layers. The available water capacity is low. Tilth is good. The root zone is deep.

Included in mapping are areas of a soil that is similar except that it has a seasonal water table at a depth of 40 to 60 inches. Also included are areas of a soil in which the sandy surface and subsurface layers combined are more than 75 inches thick. The included soils make up as much as 15 percent of the map unit; no single included soil makes up as much as 10 percent of the map unit.

Because of its low available water capacity, this soil has fair potential for local crops and pasture plants in years of high rainfall and poor potential in years of low rainfall. Crops and pasture plants respond well to management that includes sprinkler irrigation, if needed. Organic matter in the surface layer is rapidly depleted. Returning crop residue to the soil and using a cropping system that includes perennial grasses can help to increase the content of organic matter, thereby increasing the available water capacity.

This soil has fair potential for loblolly pine, longleaf pine, and slash pine. Equipment limitations and seedling mortality are problems that can be overcome with good management.

This soil has good potential for most urban uses. Seepage is a limitation for most sanitary facilities. A sealing material of clay or asphalt can be used to overcome this limitation. The sandy surface layer is a limitation for most recreation uses.

This soil is in capability subclass IIIs and woodland suitability group 3s.

TwE—Troup sand, 10 to 25 percent slopes. This is a deep, well drained, sloping and moderately steep soil on short hillsides of the Carolina and Georgia Sandhills. Slopes are complex and convex. The areas are 10 to 50 acres in size.

Typically, the surface layer is brown sand about 8 inches thick. The subsurface layer, to a depth of 44 inches, is light yellowish brown sand overlying yellowish brown loamy sand. The subsoil is sandy clay loam to a depth of 72 inches or more. The upper part of the subsoil is yellowish brown, and the lower part is yellowish red and has brown mottles.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderate in the subsoil and rapid in the thick, sandy surface and subsurface layers. The available water capacity is low. Tilth is good. The root zone is deep.

Included in mapping are areas of a soil that is similar except that it has layers of sandy clay in the subsoil. This included soil makes up less than 10 percent of the map unit.

This map unit is mainly in mixed oak and longleaf pine. It has poor potential for local crops because of the slope and the low available water capacity. It has fair potential for the common pasture grasses. The hazard of erosion, slope, plant selection, moisture content, and fertility needs are concerns in good pasture management.

This soil has fair potential for loblolly pine, longleaf pine, and slash pine. Equipment limitations and seedling mortality are problems, but they can be overcome with good management.

This soil has poor potential for most urban uses. It is too sandy for many recreation uses. Seepage is a limitation for most sanitary facilities, and slope is a limitation for most uses.

This soil is capability subclass VIIs and woodland suitability group 3s.

VeB—Vaucluse loamy coarse sand, 2 to 6 percent slopes. This is a moderately deep, well drained soil on narrow, irregular ridgetops of the Carolina and Georgia

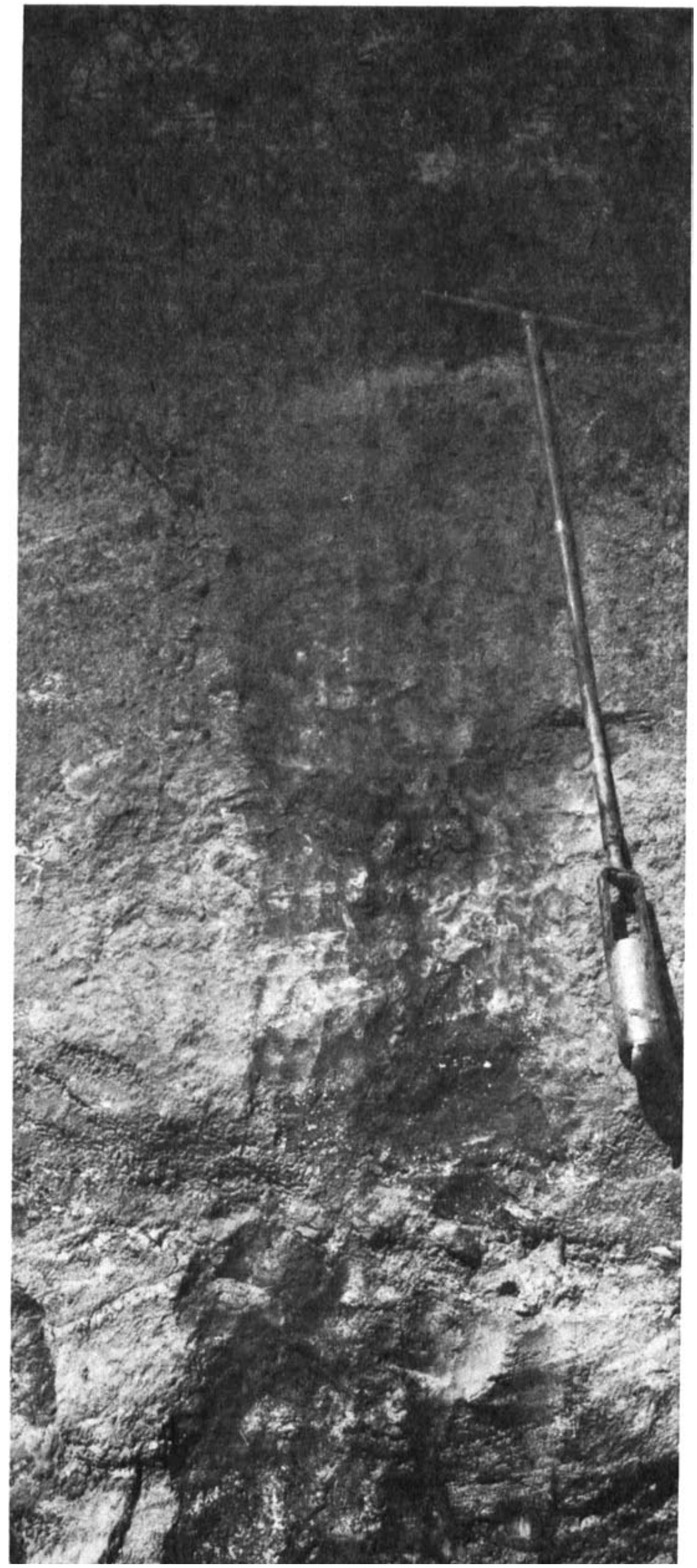


Figure 8.—A profile of Vaucluse loamy coarse sand, 2 to 6 percent slopes. This soil has a compact, hard, and brittle fragipan.

Sandhills. Slopes are short, broken, and convex. The areas commonly are 5 to 25 acres in size.

Typically, the surface layer is brown loamy coarse sand about 8 inches thick. The subsurface layer is brownish yellow sandy loam and extends to a depth of 12 inches. The subsoil extends to a depth of 60 inches or more. The upper part, to a depth of 20 inches, is reddish yellow sandy clay loam and has brownish yellow mottles. The lower part is a compact, hard, and brittle fragipan of red sandy loam that has vertical veins of brownish yellow sandy clay (fig. 8).

This soil is low in natural fertility and organic matter content. It is strongly acid to extremely acid throughout except where the surface layer has been limed. Permeability is slow, and the available water capacity is low. Tilth is good. Root penetration is limited because of the compact, brittle fragipan in the subsoil.

Included in mapping are areas of similar soils that have an eroded sandy loam surface layer. These areas are characterized by rills or galled spots, shallow gullies, and some deep gullies. Also included are similar soils in which the sandy surface and subsurface layers combined are 20 to 30 inches thick. The included soils make up as much as 20 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has fair potential for local crops and pasture plants. The low available water capacity and the compact, brittle fragipan are the major limitations.

This soil has fair potential for loblolly pine and slash pine. There are no significant limitations to woodland use or management. Because the fragipan in the subsoil restricts the taproots of trees, in some places tall trees are uprooted by strong wind after an extended wet season.

This soil has good potential for most urban uses. The slow permeability of the fragipan is a limitation to use of the soil as septic tank absorption fields. The sandy surface layer is a limitation to most recreation uses.

This soil is in capability subclass IIIe and woodland suitability group 3o.

VeD—Vaucluse loamy coarse sand, 6 to 15 percent slopes. This is a moderately deep, well drained, gently sloping to sloping soil on narrow, irregular hillsides of the Carolina and Georgia Sandhills. Slopes are short, broken, and convex. The areas commonly are 5 to 50 acres in size.

Typically, the surface layer is yellowish brown loamy coarse sand about 9 inches thick. The subsoil extends to a depth of 70 inches or more. The upper part, to a depth of 20 inches, is strong brown sandy clay loam. The lower part is a compact, hard, and brittle fragipan of red coarse sandy loam that has vertical veins of brownish yellow sandy clay.

This soil is low in natural fertility and organic matter content. It is strongly acid to extremely acid throughout except where the surface layer has been limed. Permeability is slow, and the available water capacity is low. Tilth is good. Root penetration is restricted by the compact, brittle fragipan in the subsoil.

Included in mapping are areas of similar soils that have an eroded sandy loam surface layer. These areas are characterized by rills or galled spots, shallow gullies, and some deep gullies. Also included are similar soils in which the sandy surface and subsurface layers combined are 20 to 30 inches thick. The included soils make up as much as 15 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has fair potential for pasture. The low available water capacity and the compact, brittle fragipan are the major limitations.

This soil has good potential for loblolly pine and slash pine. There are no significant limitations to woodland use or management. Because the fragipan in the subsoil restricts the taproots of trees, in some places tall trees are uprooted by strong wind after an extended wet season.

This soil has poor potential for farming. It has fair potential for most urban uses. The slow permeability of the fragipan is a limitation to use of the soil as septic tank absorption fields. Slope is a limitation if this soil is used for farming, sanitary facilities, community development, or playgrounds. Good design and construction or modification of the slope can overcome some of these limitations. The sandy surface layer is a limitation to most recreation uses.

This soil is in capability subclass VIe and woodland suitability group 3o.

WaB—Wagram loamy sand, 2 to 6 percent slopes. This is a deep, well drained, very gently sloping soil on broad ridgetops of the Carolina and Georgia Sandhills. Slopes are commonly smooth and convex. The areas are commonly 10 to 250 acres in size.

Typically, the surface layer is grayish brown loamy sand about 10 inches thick. The subsurface layer is loamy sand throughout and extends to a depth of 35 inches; it is light yellowish brown in the upper part and very pale brown in the lower part. The subsoil is brownish yellow sandy loam in the upper part, brownish yellow sandy clay loam in the middle part, and brownish yellow sandy clay loam that has brown and red mottles in the lower part.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderately rapid, and the available water capacity is low. Tilth is good. The root zone is deep.

Included with this soil in mapping are areas of soils that are similar except that they have properties that cause slower permeability. Also included are soils that are similar except that they have a redder subsoil. In several areas, soils that have a seasonal water table at a depth of 40 to 60 inches are included. The included soils make up about 40 percent of the map unit.

This soil has fair potential for local crops and pasture plants. The low available water capacity is a limitation. Crops and pasture respond well to proper management, including sprinkler irrigation if needed. Organic matter is rapidly depleted from the surface layer. Returning crop residue to the soil and using a cropping system that includes perennial grasses help to increase the content of organic matter, thereby increasing the available water capacity.

This soil has fair potential for loblolly pine and slash pine. Equipment limitations and seedling mortality are management concerns. These limitations can be overcome with good management.

This soil has good potential for most urban uses. Seepage is a limitation for sanitary landfills and sewage lagoons. This soil has only fair potential for most recreation uses because of the sandy surface layer.

This soil is in capability subclass IIs and woodland suitability group 3s.

WaC—Wagram loamy sand, 6 to 10 percent slopes. This is a deep, well drained, gently sloping soil on narrow ridgetops and long hillsides of the Carolina and Georgia Sandhills. Slopes are smooth and convex. The areas are 10 to 50 acres in size.

Typically, the surface layer is grayish brown loamy sand 9 inches thick. The subsurface layer is loamy sand and extends to a depth of 36 inches; it is light yellowish brown in the upper part and very pale brown in the lower part. The subsoil extends to a depth of 68 inches. The upper part is brownish yellow sandy loam; the middle part is brownish yellow sandy clay loam over strong brown sandy clay loam that is mottled with red; and the lower part is strong brown sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderately rapid, and the available water capacity is low. Tilth is good. The root zone is deep.

Included in mapping are areas of a similar soil that has a thinner subsoil than is typical of Wagram soils. Also included are areas of a similar soil that has a redder subsoil. These included soils make up about 45 percent of the map unit.

This soil has fair potential for local crops and pasture plants. The hazard of erosion, rapid leaching, the low available water capacity, and rapid depletion of organic matter are concerns in farming. Conservation cropping systems that include contour operations and close-growing crops that produce large amounts of residue help reduce runoff and control erosion.

This soil has fair potential for loblolly pine and slash pine. Equipment limitations and seedling mortality are management concerns. These limitations can be overcome with good management.

This soil has fair potential for most urban uses. Slope is the main limitation. The hazard of seepage is a limitation for sewage lagoons and sanitary landfills. These limitations commonly can be overcome by good design and careful installation or by modification of the slope. This soil is too sandy for recreation uses.

This soil is in capability subclass IIIs and woodland suitability group 3s.

WaD—Wagram loamy sand, 10 to 15 percent slopes. This is a deep, well drained, sloping soil on hillsides of the Carolina and Georgia Sandhills. Slopes are complex and convex. The areas are 10 to 50 acres in size.

Typically, the surface layer is grayish brown loamy sand about 8 inches thick. The subsurface layer is loamy sand and extends to a depth of 33 inches; it is light yellowish brown in the upper part and very pale brown in the lower part. The subsoil extends to a depth of 70 inches. The upper part is strong brown sandy loam and has light yellowish brown mottles, the middle part is strong brown and brownish yellow sandy clay loam, and the lower part is brownish yellow sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface has been limed. Permeability is moderately rapid, and the available water capacity is low. Tilth is good. The root zone is deep.

Included in mapping are areas of a similar soil that has a thinner subsoil than is typical of Wagram soils. Also included are areas of a similar soil that has a redder subsoil. These included soils make up about 45 percent of the map unit.

This soil has poor potential for local crops. It has fair potential for pasture. Slopes, the low available water capacity, the hazard of erosion, plant selection, moisture content, and fertility needs are concerns in good pasture management.

This soil has fair potential for loblolly pine and slash pine. Equipment limitations and seedling mortality are management concerns. These limitations can be overcome with good management.

This soil has fair potential for most urban uses. Slope is the main limitation. The hazard of seepage is a limitation for sewage lagoons and sanitary landfills. These limitations commonly can be overcome by good design and careful installation or by modification of the slope. This soil is too sandy for recreation uses.

This soil is in capability subclass IVs and woodland suitability group 3s.

WeB—Wedowee loamy sand, 2 to 6 percent slopes. This is a deep, well drained, very gently sloping soil on ridgetops of the Piedmont Upland. Slopes are smooth and convex. The areas are 5 to 150 acres in size.

Typically, the surface layer is brown loamy sand 6 inches thick. The subsurface layer is yellow loamy sand and extends to a depth of 11 inches. The subsoil extends to a depth of about 35 inches; it is brownish yellow throughout and has strong brown and red mottles mainly in the lower part. It is sandy clay loam in the upper part, clay in the middle part, and sandy clay loam in the lower part. The underlying material, to a depth of 60 inches or more, is mottled brownish yellow, red, and light gray sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep.

Included in mapping are areas of soils high in content of mica and soils that have a loamy subsoil. Also included are small areas of Helena soils. These included soils make up as much as 20 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has good potential for local crops and pasture plants. Crops respond well to good management, especially fertilization. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if this soil is cultivated and not protected. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has fair potential for loblolly pine, yellow-poplar, and red oak. There are no significant problems in woodland use and management.

This soil has fair potential for most urban uses. It is limited, however, for use as septic tank absorption fields because the clayey subsoil retards absorption of the effluent. This limitation commonly can be overcome by good design and careful installation. Low strength and moderate shrink-swell potential are limitations if this soil is used for community development.

This soil is in capability subclass IIe and woodland suitability group 3o.

WeC—Wedowee loamy sand, 6 to 10 percent slopes. This is a deep, well drained, gently sloping soil on ridgetops and long hillsides of the Piedmont Upland. Slopes are smooth and convex. The areas are 5 to 90 acres in size.

Typically, the surface layer is pale brown loamy sand 6 inches thick. The subsurface layer is yellow sandy loam 4 inches thick. The subsoil extends to a depth of 36 inches; it is mainly strong brown mottled with red and pale brown. However, the lower part is uniformly mottled very pale brown, strong brown, and red. The subsoil is sandy clay loam in the upper part, sandy clay in the middle part, and sandy clay loam in the lower part. The underlying material, to a depth of 60 inches, is mottled light brownish gray, yellowish red, and reddish yellow sandy clay loam.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep.

Included with this soil in mapping are areas of soils that have a loamy subsoil and small areas of Helena soils. These included soils make up as much as 20 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has fair potential for local crops and pasture plants. Crops respond well to good management, especially fertilization. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate to severe hazard if the soil is cultivated and not protected. Minimum tillage and the use of cover crops, including grasses and legumes, in the cropping system help to reduce runoff and control erosion.

This soil has fair potential for loblolly pine, yellow-poplar, and red oak. There are no significant concerns in woodland management.

This soil has fair potential for urban uses. Slope is a limitation to some uses. Because the clayey subsoil retards absorption of effluent, it is a limitation to use of the soil as septic tank absorption fields. This limitation generally can be overcome by proper design and installation. Structures that are compatible with slope can be installed. Low strength and the moderate shrink-swell potential are limitations if this soil is used for community development.

This soil is in capability subclass IIIe and woodland suitability group 3o.

WeD—Wedowee loamy sand, 10 to 15 percent slopes. This is a deep, well drained, sloping soil on narrow, moderately long hillsides of the Piedmont Upland. Slopes are complex and convex. The areas are 10 to 45 acres in size.

Typically, the surface layer is grayish brown loamy sand 6 inches thick. The subsurface layer is light yellowish brown loamy sand and extends to a depth of 10 inches. The subsoil extends to a depth of 32 inches; it is yellowish red. The middle part has red mottles, and the lower part has brown, red, and very pale brown mottles. The subsoil is clay in the upper part, sandy clay in the middle part, and clay loam in the lower part. The underlying material is mottled strong brown, light gray, and gray sandy loam and sandy clay loam. It extends to a depth of 48 inches. Hard rock is at a depth of 48 inches.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep.

Included with this soil in mapping are areas of soils that have a loamy subsoil and small areas of Enon soils. These included soils make up as much as 20 percent of the map unit, no single included soil makes up as much as 10 percent.

This soil has poor potential for row crops because of slope and a severe erosion hazard. It has fair potential for pasture plants.

This soil has fair potential for loblolly pine, yellow-poplar, and red oak. There are no significant management problems in woodland use.

This soil has fair potential for most urban uses. Slope is a limitation to most uses. Because the clayey subsoil retards absorption of effluent, it is a limitation to use of the soil as septic tank absorption fields. Low strength and moderate shrink-swell potential are limitations if this soil is used for community development. Structures that are compatible with the landscape can be installed. Shaping and smoothing are needed to overcome slope limitations.

This soil is in capability subclass IVe and woodland suitability group 3o.

WeE—Wedowee loamy sand, 15 to 25 percent slopes. This is a deep, well drained, moderately steep soil on hillsides of the Piedmont Upland. Slopes are complex and convex. The areas are 5 to 100 acres in size.

Typically, the surface layer is predominantly grayish brown loamy sand 6 inches thick. The subsoil extends to a depth of about 37 inches. The upper part is reddish yellow sandy clay loam and has light yellowish brown mottles; the middle part is yellowish red sandy clay and has reddish yellow and brownish yellow mottles; and the lower part is reddish yellow clay loam and has brownish yellow mottles. The underlying material is mottled brownish yellow, pinkish white, and reddish yellow sandy clay loam to a depth of 60 inches or more.

This soil is low in natural fertility and organic matter content. It is very strongly acid or strongly acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep.

Included in mapping are areas of soils that have a high content of mica. Also included are soils that have a loamy subsoil. These included soils make up as much as 15 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has poor potential for farming and fair potential for pasture. Slope is the major limitation.

This soil has fair potential for loblolly pine, yellow-poplar, and red oak. Equipment limitations and a hazard of erosion are limitations, but good management can help to overcome these limitations.

This soil has poor potential for most urban and recreation uses. Slope is the main limitation. This limitation can be overcome in some places with proper design and construction.

This soil is in capability subclass VIe and woodland suitability group 3r.

Wf—Wehadkee silt loam. This is a deep, nearly level, poorly drained soil in slight depressions on flood plains within the Piedmont Upland. This soil is commonly flooded for brief periods in winter and spring.

Typically, the surface layer is grayish brown silt loam. It has yellowish brown mottles about 8 inches thick. The subsoil extends to a depth of 42 inches; it is gray and has yellowish brown mottles. It is silty clay loam in the upper part and clay loam in the lower part. The underlying material, to a depth of 60 inches, is gray loamy fine sand; it has brown mottles.

This soil is medium in natural fertility and organic matter content. It is slightly acid or medium acid throughout. Permeability is moderate, and the available water capacity is high. The root zone is deep, but the water table is commonly within 30 inches of the surface in winter and spring.

Included in mapping are small areas of Chewacla and Roanoke soils. These included soils make up less than 15 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has good potential for loblolly pine, American sycamore, and yellow-poplar. Wetness and flooding are limitations to the use of equipment, and they affect seedling survival. Planting and harvesting should be done during dry periods.

This soil has poor potential for farming and for urban and recreation uses. Flooding and wetness are limitations that can be overcome only by major flood control and drainage measures.

This soil is in capability subclass VIw and woodland suitability group 1w.

WhB—Wickham fine sandy loam, 2 to 6 percent slopes. This is a deep, well drained, very gently sloping soil on stream terraces of the Piedmont Upland. Slopes are smooth and convex. The areas are 5 to 85 acres in size.

Typically, the surface layer is reddish brown fine sandy loam 6 inches thick. The subsoil extends to a depth of 62 inches or more. It is reddish brown sandy clay loam in the upper part, red clay loam in the middle part, and yellowish red sandy clay loam in the lower part.

This soil is low in natural fertility and organic matter content. It is strongly acid to medium acid throughout except where the surface layer has been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep. A few areas are subject to rare flooding.

Included in mapping are areas of Cecil soils and small areas of soils that are similar to the Wickham soil except that they are more sloping. The areas range from 2 to 4 acres in size. The included soils make up about 15 percent of the map unit; no single included soil makes up as much as 10 percent.

This soil has good potential for local crops and pasture plants. Crops respond well to good management, especially fertilization. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if this soil is cultivated and not protected.

This soil has good potential for loblolly pine, yellow-poplar, and red oak. There are no significant problems in woodland use and management.

This soil has good potential for most urban uses. There are no significant limitations that cannot be overcome by good design and careful installation.

This soil is in capability subclass IIe and woodland suitability group 2o.

Wo—Worsham sandy loam. This is a deep, poorly drained, nearly level soil in depressions, at the base of slopes, and at the head of draws within the Piedmont Upland. The areas are slightly concave and are 10 to 45 acres in size.

Typically, the surface layer is dark gray sandy loam about 5 inches thick. The subsurface layer, to a depth of 8 inches, is light brownish gray sandy loam and has brownish yellow mottles. The subsoil extends to a depth of 42 inches. The upper part is light gray sandy clay and has brownish yellow mottles; the middle part is gray sandy clay and has brownish yellow mottles; and the lower part is mixed light gray sandy clay and white sandy clay loam. The underlying material, to a depth of 62 inches or more, is white sandy clay loam and has yellow mottles.

This soil is medium in natural fertility and organic matter content. It is very strongly acid or strongly acid throughout except where the surface layer has been limed. Permeability is slow to moderately slow, and the available water capacity is medium. Tilth is commonly poor. Although the root zone is deep, the water table is at a depth of less than 12 inches from late in fall until spring, and thus limits root penetration.

Included in mapping are areas of Altavista soils. These soils make up about 8 percent of the map unit.

Most areas of this soil are wooded, but a few small areas are in pasture. This soil has poor potential for row crops and small grains because of wetness and flooding. It has fair potential for hay and pasture plants.

This soil has fair potential for loblolly pine, sycamore, and sweetgum. Wetness is the main limitation to the use of equipment, but this limitation can be overcome by using equipment during the drier seasons. In addition, drainage is needed to overcome the high mortality of seedlings.

This soil has poor potential for urban uses. Wetness is the main limitation, and it is difficult to overcome.

This soil is in capability subclass Vw and woodland suitability group 2w.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture and woodland; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities; and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the predicted yields of the main crops and hay and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

Soil erosion is the major concern on about three-fifths of the cropland and pasture in the survey area. Where the slope is more than 2 percent, erosion is a hazard.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Appling, Cecil, Davidson, Enon, Faceville, Helena, Georgeville, Madison, and Wedowee soils, and on soils that have a layer in or below the subsoil that limits the depth of the root zone. Such layers include a fragipan, as in Vaucluse soils. Erosion also reduces productivity on soils that tend to be droughty, such as Flomaton, Troup, and Wagram soils. Second, soil erosion on farmland results in sedimentation of streams. Control of erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

In many sloping fields, tilling or preparing a good seedbed is difficult because the original friable surface soil has been eroded away, leaving clayey spots. Such spots are common in areas of moderately eroded Cecil, Davidson, and Georgeville soils.

Erosion control practices provide protective surface cover, reduce runoff, and increase infiltration. A cropping system that keeps vegetative cover on the soil for extended periods can hold soil erosion losses to amounts that will not reduce the productive capacity of the soils. On livestock farms, which require pasture and hay, the legume and grass forage crops in the cropping system reduce erosion on sloping land, also provide nitrogen, and improve tilth for the following crop.

In most areas of soils that have slopes of more than 6 percent, contour tillage and terraces are not practical because the slopes are so short and irregular. On these soils, a cropping system that provides substantial vegetative cover is required to control erosion unless minimum tillage is practiced. Minimum tillage and crop residue on the surface help increase infiltration and reduce the hazards of runoff and erosion. These practices can be adapted to most soils in the survey area, but they are more difficult to use sucessfully on, for example, the eroded Cecil, Davidson, and Georgeville soils. No-tillage for corn, grain sorghum, and soybeans, which is a common practice on an increasing acreage, is effective in reducing erosion on sloping soils. It is more difficult to practice successfully, however, on the soils that have a sandy clay loam or clay loam surface layer.

Terraces and diversions reduce the length of the slope and reduce runoff and erosion. They are most practical on deep, well drained, gently sloping soils on smooth, convex ridgetops. The sloping and moderately steep soils are less suitable for terraces and diversions.

Contouring is a widespread erosion control practice in the survey area. It is best adapted to soils that have smooth, uniform slopes, including, in most areas, the very gently sloping Appling, Cecil, Davidson, Georgeville, Grover, Helena, Madison, Norfolk, Orangeburg, Tifton, Troup, Vaucluse, Wagram, and Wedowee soils.

Information for the design of erosion control practices for each kind of soil can be obtained in local offices of the Soil Conservation Service.

Soil drainage is the major management need on about 3 percent of the acreage used for crops and pasture in the survey area. Some soils are so wet that the production of crops common to the area is generally not possible. These are the poorly drained Bibb, Roanoke, Wehadkee, and Worsham soils, which make up about 16,200 acres in the survey area.

Unless artificially drained, the somewhat poorly drained soils are so wet that crops are damaged during most years. In this category are the Chewacla soils, which make up about 8,700 acres.

Small areas of wetter soils along drainageways and in swales are commonly included in areas of the moderately well drained Altavista soils. Artificial drainage is needed in some of these wetter areas.

The design of both surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and tile drainage is needed in most areas of the poorly drained soils if they are used for intensive row cropping. Drains have to be more closely spaced in slowly permeable soils than in more permeable soils. Tile drainage is very slow in Roanoke, Wehadkee, and Worsham soils. Finding adequate outlets for tile drainage systems is difficult in many areas of Bibb and Chewacla soils. Information on drainage systems for each kind of soil can be obtained in local offices of the Soil Conservation Service.

Soil fertility is naturally low in most soils on uplands in the survey area, but crops on these soils respond well to good management. All of the soils are naturally acid. The soils on flood plains, such as Bibb, Chewacla, Roanoke, and Worsham soils, range from slightly acid to very strongly acid and are naturally higher in plant nutrients than most soils on uplands. Congaree soils, along drainageways, are strongly acid to neutral.

Many soils on uplands are naturally very strongly acid. If the soils have never been limed, applications of ground limestone are required to raise the pH level sufficiently for good growth of most legumes, alfalfa, and other crops that grow only on nearly neutral soils. Available phosphorus and potash levels are naturally low in most of these soils. On all soils, additions of lime and fertilizer should be based on the results of soil tests, on the need of the crop, and on the expected level of yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime to apply.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils with good tilth are granular and porous. The soils in the survey area commonly have good tilth; however, tilth is poor on soils that have a sandy clay loam or clay loam surface layer.

Most of the soils used for crops in the survey area have a surface layer of fine sandy loam, loam, or loamy sand that is light in color and low in content of organic matter. Generally the structure of such soils is weak, and intense rainfall causes the formation of a crust on the surface in places. The crust is hard when dry. Once the crust forms, it reduces infiltration and increases runoff. Regular additions of crop residue, manure, and other organic material can help improve soil structure and to reduce crust formation.

Fall plowing is generally not a good practice in the survey area. Most of the cropland consists of sloping soils that are subject to damaging erosion if they are plowed in the fall.

Norfolk, Wagram, and Troup soils have a sandy surface layer, so tilth is not a concern. These soils dry out early in spring, and they can be plowed at a fairly high moisture content without clodding. Fall plowing generally results in good tilth in spring, but it also makes the loose surface layer more susceptible to wind erosion.

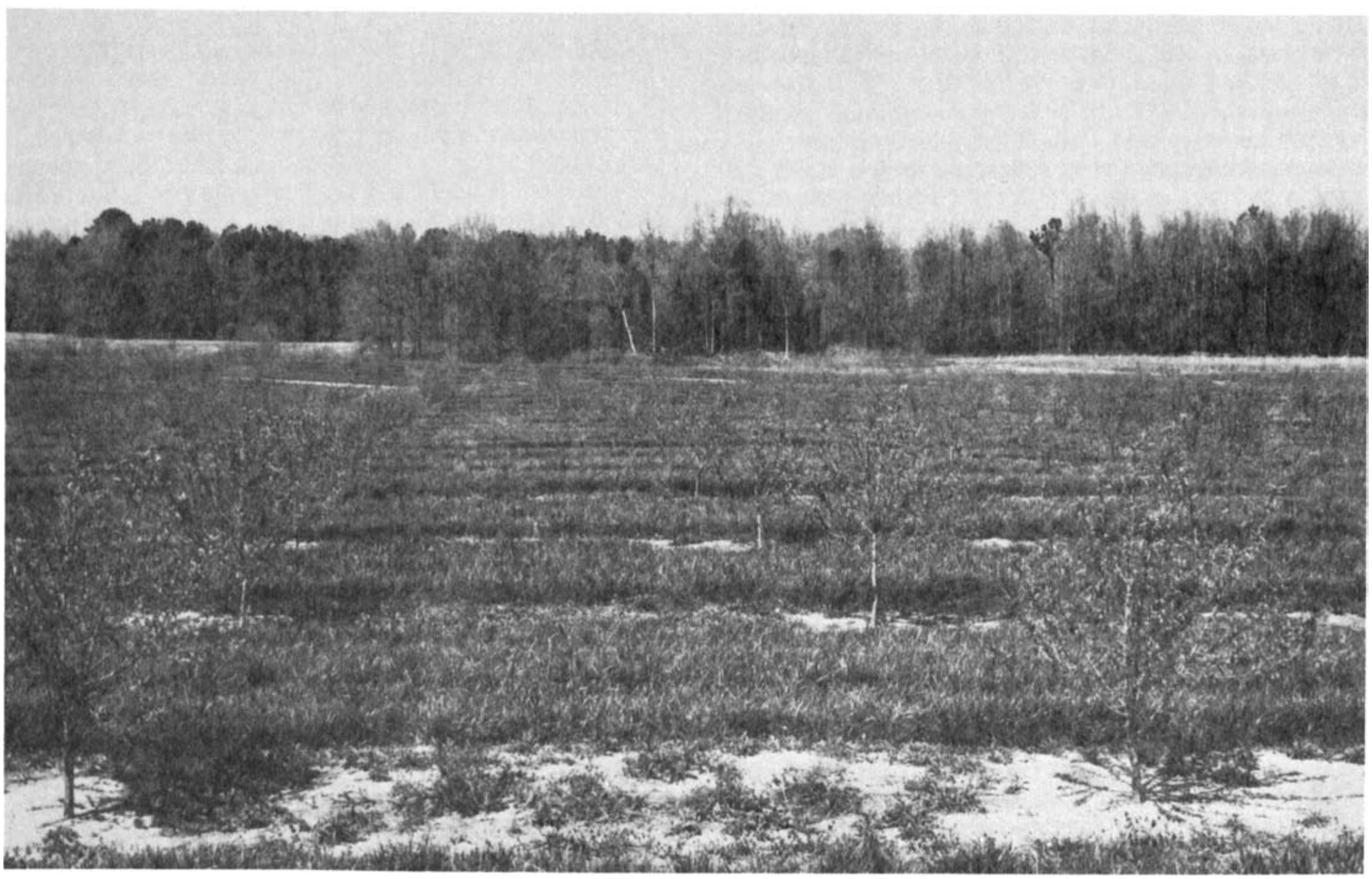


Figure 9.—These young peach trees are on Cecil sandy clay loam, 2 to 6 percent slopes, eroded. Tall fescue has been interplanted.

Field crops suited to the soils and climate of the survey area include many that are not now commonly grown. Corn, cotton, and soybeans are the main row crops. Grain sorghum, vegetables, peanuts, potatoes, and similar crops can be grown if economic conditions are favorable.

Wheat and oats are the common close-growing crops. Improved bermudagrass and tall fescue are commonly grown for pasture. Rye and barley could be grown, and grass seed could be produced from fescue.

Special crops grown commercially in the survey area are apples and peaches (fig. 9). These crops are grown only in McDuffie County.

Most of the well drained soils in the survey area are suitable for orchards and nursery plants. Soils in low positions where frost is frequent and air drainage is poor, however, generally are poorly suited to early vegetables, small fruits, and orchards.

Latest information and suggestions for growing special crops can be obtained from local offices of the Cooperative Extension Service and the Soil Conservation Service.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the soil is not suited to the crop or the crop is not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 5.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; timeliness of all fieldwork; and favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop. Accurate fertilizer recommendations for a particular soil and a particular crop can only be accomplished by soil testing. In the absence of a soil test, general fertilizer recommendations are available in Agriculture Circular 639 (*4*).

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

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not included because the acreage of these crops is small. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the management concerns and productivity of the soils for these crops.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forest trees or for engineering purposes.

In the capability system, all kinds of soil are grouped at three levels: capability class, subclass, and unit. Only the levels class and subclass were used in this soil survey. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class; they are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main 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 only some parts of the United States, 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 contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is indicated in table 6. All land in the survey area except gravel pits, kaolin pits, quarries, and rock outcrop is included. Some of the soils that are well suited to crops and pasture may be in low-intensity use, for example, soils in capability class II. Data in this table can be used to determine the farming potential of such soils.

The capability subclass is identified in the description of each soil map unit in the section "Soil maps for detailed planning."

Woodland management and productivity

Virgin forest originally covered 97 percent of the land in Columbia, McDuffie, and Warren Counties. About 70 percent of the total land area is now in commercial forest.

Good stands of trees are growing on the forest lands of these counties. Loblolly pine, along with mixed upland hardwoods, grows on the ridges and lower slopes. Hardwoods, consisting of yellow-poplar, sycamore, gum, maple, and several species of oak including red oak and white oak, grow on the bottom lands.

The value of the wood products is substantial, though it is below its potential. Woodland has other values that are related to wildlife, recreation, natural beauty, and conservation of soil and water. This section explains how soils affect tree growth and woodland management in the survey area.

Table 7 contains information useful to woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, t, d, c, s, f, and r.

In table 7 the soils are also rated for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of the major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

The *potential productivity* of merchantable or *important trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Important trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Engineering

Stephen A. Daniels, civil engineer, Soil Conservation Service, helped prepare this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational areas; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the large scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil are included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 8 shows, for each kind of soil, the degree and kind of limitations for building site development; table 9, for sanitary facilities; and table 11, for water management. Table 10 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

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

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 8. A *slight* limitation indicates that soil properties generally are favorable for the specified use and that limitations are minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 8 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 8 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 9 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good*, *fair*, and *poor*, which mean about the same as *slight*, *moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard if the seasonal high water table is above the level of the lagoon floor. If the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 9 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

If it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the site should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 10 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material below the A horizon to a depth of 5 or 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 14 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low frost action potential, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 10 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can restrict plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils or very firm clayey soils; soils that have suitable layers less than 8 inches thick; soils that have large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 11 the degree of soil limitation and soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Soil and site limitations are expressed as slight, moderate, and severe. *Slight* means that the soil properties and site features are generally favorable for the specified use and that any limitation is minor and easily overcome. *Moderate* means that some soil properties or site features are unfavorable for the specified use but can be overcome or modified by special planning and design. *Severe* means that the soil properties and site features are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance is required.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of the soil for use in embankments, dikes, and levees.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as susceptibility to flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, availability of potential water impoundment sites, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

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

The information in table 12 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 9, and interpretations for dwellings without basements and for local roads and streets, given in table 8.

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

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

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They have moderate slopes and have few or no stones or boulders on the surface.

Wildlife habitat

Jesse Mercer, Jr., biologist, Soil Conservation Service, helped prepare this section.

The survey area provides habitat for a variety of wildlife species. Deer, turkey, raccoon, squirrel, and many songbirds and nongame animals are common in the woodland areas. Quail, rabbit, and dove are common on cropland. Fish are abundant in the Savannah, Little, and Ogeechee Rivers, in Clarke Hill Lake, in beaver ponds, and in about 2,300 farm ponds. About 250 acres in the survey area are covered with beaver ponds, and these ponds support a variety of fish and wildlife, especially wood ducks.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 13, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of habitat are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

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

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, sorghum, wheat, oats, barley, millet, cowpeas, soybeans, and sunflowers.

Grasses and legumes are domestic grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, oats, millet, cowpeas, soybeans, lovegrass, rescuegrass, rye, and clover.

Wild herbaceous plants are native or naturally established grasses and forbs that provide food and cover for wildlife. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, indiangrass, goldenrod, beggarweed, pokeweed, partridgepea, ragweed, croton, and lespedeza.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of hardwood plants are oak, poplar, cherry, sweetgum, hawthorn, dogwood, persimmon, sassafras, sumac, hickory, hazelnut, black walnut, blackberry, grape, blackhaw, viburnum, blueberry, bayberry, and briers. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated good are Russian-olive, autumn-olive, and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, hemlock, fir, yew, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, rushes, sedges, reeds, wildrice, saltgrass, cordgrass, and cattail.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are muskrat marshes, waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, killdeer, cottontail rabbit, red fox, and woodchuck.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Examples of wildlife attracted to this habitat are wild turkey, ruffed grouse, woodcock, thrushes, vireos, woodpeckers, tree squirrels, gray fox, raccoon, deer, and black bear.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Examples of wildlife attracted to this habitat are ducks, geese, herons, shore birds, rails, kingfishers, muskrat, mink, and beaver (fig. 10).

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present

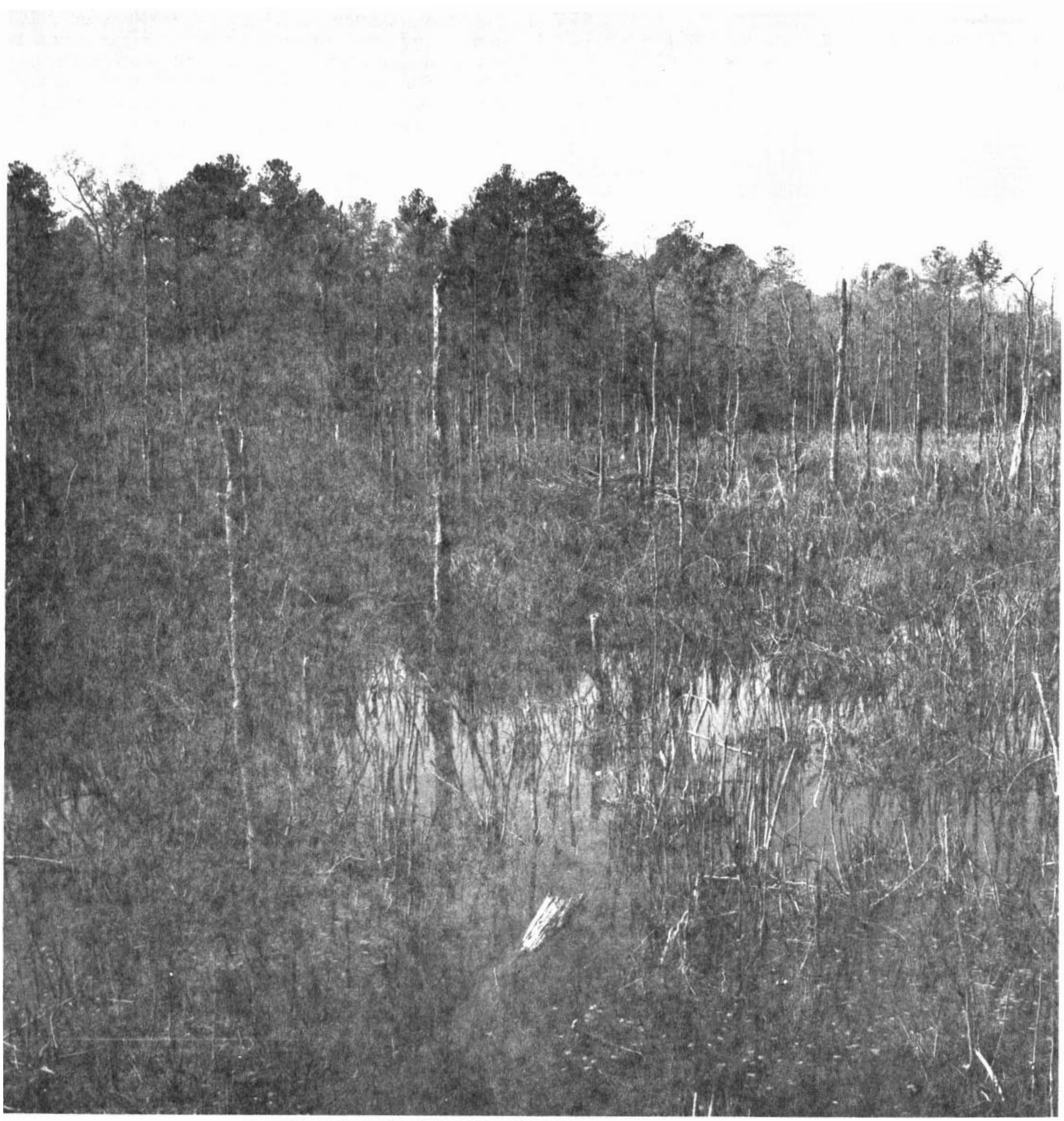


Figure 10.—This wetland habitat was created by beavers. It is in an area of Roanoke soils.

data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 14 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 14 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 14 in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (*3*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*2*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 17. The estimated classification, without group index numbers, is given in table 14. Also in table 14 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and in plasticity index is estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 15 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 16 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 16 are the depth to the water table; the kind of water table, that is, perched or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Engineering test data

The results of analyses of engineering properties of several typical soils of the survey area are given in table 17.

The data presented are for soil samples that were collected from carefully selected sites. The soil profiles sampled are typical of the series discussed in the section "Soil series and morphology." The soil samples were analyzed by Department of Transportation, State of Georgia, Office of Materials and Research.

The methods used in obtaining the data are listed by code in the next paragraph. Most of the codes, in parentheses, refer to the methods assigned by the American Association of State Highway and Transportation Officials. The code for the Unified classification was assigned by the American Society for Testing and Materials.

The methods and codes are AASHTO classification (M-145); Unified classification (D-2487); mechanical analysis (T88); liquid limit (T89); plasticity index (T90); moisture-density, method A (T99); volume change (ABER) (*1*).

Classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*7*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 18, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Haplaquents (*Hapl*, meaning simple horizons, plus *aquent*, the suborder of Entisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, nonacid, mesic, Typic Haplaquents.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*6*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or map units, of each soil series are described in the section "Soil maps for detailed planning."

Altavista series

The Altavista series consists of deep, moderately well drained, moderately permeable soils that formed in fluvial and marine sediments. These soils are on stream terraces of the Piedmont Upland and on stream terraces and low marine terraces of the Carolina and Georgia Sandhills. Late in winter and early in spring, the water table is at a depth of 18 to 30 inches. There is a probability of occasional, very brief flooding during spring. Slope ranges from 0 to 2 percent.

Altavista soils are on the same landscape as Chewacla, Congaree, Toccoa, and Wickham soils. Unlike Altavista soils, Chewacla, Congaree, and Toccoa soils do not have an argillic horizon and are on the flood plains. Wickham soils are redder and are better drained than Altavista soils.

Typical pedon of Altavista sandy loam, 0 to 2 percent slopes, in a wooded area, 1,095 feet northeast of the southern city limits of Thomson, on Georgia Highway 17, in McDuffie County:

O2—2 inches to 0; partly decomposed hardwood and pine leaves and needles.

A11—0 to 4 inches; dark grayish brown (2.5Y 4/2) sandy loam; moderate medium granular structure; friable; many very fine and medium roots; very strongly acid; abrupt smooth boundary.

A12—4 to 8 inches; dark grayish brown (2.5Y 4/2) sandy loam; common fine distinct dark grayish brown mottles; moderate medium granular structure; friable; many very fine and fine roots; very strongly acid; abrupt wavy boundary.

A2—8 to 11 inches; light yellowish brown (2.5Y 6/4) sandy loam; moderate medium granular structure; friable; common very fine roots; common very fine pores; very strongly acid; abrupt wavy boundary.

B1—11 to 15 inches; olive yellow (2.5Y 6/6) sandy clay loam; weak medium subangular blocky structure; friable; common very fine and fine roots; common very fine pores; strongly acid; clear wavy boundary.

B21t—15 to 33 inches; yellowish brown (10YR 5/6) sandy clay loam; few medium distinct yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; few patchy light yellowish brown clay films on faces of peds; strongly acid; gradual wavy boundary.

B22t—33 to 51 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct light brownish gray (2.5Y 6/2) and yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; friable; few coarse roots in gray areas; few very fine pores; few patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B3—51 to 57 inches; strong brown (7.5YR 5/6) sandy loam; common medium distinct yellowish red (5YR 4/6) and gray (10YR 6/1) mottles; weak fine subangular blocky structure; firm; few pebbles; strongly acid; clear wavy boundary.

C—57 to 65 inches; mottled yellowish brown (10YR 5/6) and light gray (10YR 7/1) sandy loam; massive; friable; few pebbles; strongly acid.

The solum is 47 to 57 inches thick. Bedrock is at a depth of 5 feet or more; in some areas it is at a depth of 15 feet or more. In unlimed areas, the soil is very strongly acid to medium acid throughout.

The A horizon is 10 to 14 inches thick. It has hue of 10YR and 2.5Y, value of 4 to 7, and chroma of 2 to 4.

The B1 horizon is 3 to 5 inches thick. It has hue of 10YR and 2.5Y, value of 6 or 7, and chroma of 3, 4, or 6. In some places there are mottles. The mottles are few or common, fine or medium, and brown or yellow.

The Bt horizon is 19 to 36 inches thick. The B21t horizon has hue of 10YR, value of 5 to 7, and chroma of 3, 4, 6, or 8. The B22t horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 2, 3, 4, 6, or 8. The mottles are common or many, medium or coarse, red, gray, and brown throughout the horizon.

The B3 horizon has hue of 7.5YR and 10YR, value of 4 to 6, and chroma of 1, 2, 3, 4, 6, or 8. In some pedons it has gray, brown, and yellow mottles. This horizon is sandy loam or sandy clay loam.

Appling series

The Appling series consists of deep, well drained, moderately permeable soils that formed in material that weathered from granite, gneiss, and coarse-grained schist. These soils are on ridgetops and hillsides of the Piedmont Upland. Slope ranges from 2 to 10 percent but is mainly 2 to 6 percent.

Appling soils are on the same landscape as Cecil, Grover, Georgeville, Madison, and Wedowee soils. Cecil, Georgeville, and Madison soils have a B horizon that is redder than that of Appling soils. Georgeville soils have a higher content of silt, and Madison soils have a higher content of mica than Appling soils. Grover soils have a more micaceous and less clayey B horizon than Appling soils, and Wedowee soils have a thinner solum.

Typical pedon of Appling sandy loam, 2 to 6 percent slopes, in an area of temporary pasture, 2.2 miles east of Ogeechee River highway bridge near Mayfield, 780 feet south of paved road, in Warren County:

Ap—0 to 9 inches; brown (7.5YR 5/4) sandy loam; weak fine granular structure; very friable; few very fine roots; few coarse quartz pebbles; slightly acid; clear wavy boundary.

B1—9 to 15 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium granular structure; friable; few very fine roots; few coarse quartz pebbles; strongly acid; gradual wavy boundary.

B21t—15 to 24 inches; yellowish red (5YR 5/6) sandy clay; moderate medium blocky structure; firm; few very fine roots; continuous clay films on faces of peds; strongly acid; gradual wavy boundary.

B22t—24 to 38 inches; yellowish red (5YR 5/6) sandy clay; common medium distinct red (2.5YR 5/8) and few medium distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; continuous clay films on faces of peds; very strongly acid; gradual wavy boundary.

B3—38 to 48 inches; mottled red (2.5YR 4/8), reddish yellow (5YR 6/8), and brownish yellow (10YR 6/6) clay loam; weak medium subangular blocky structure; friable; few very fine roots; few discontinuous clay films on faces of peds; common fine flakes of mica; very strongly acid; clear wavy boundary.

C—48 to 72 inches; mottled red (2.5YR 5/8) and strong brown (7.5YR 5/6) saprolite that crushes to sandy loam; rock structure; very friable; common fine flakes of mica; strongly acid.

The solum is 40 to 60 inches thick. Bedrock is at a depth of more than 7 feet; it is at a depth of 40 feet or more in some areas. In unlimed areas, the soil is very strongly acid or strongly acid throughout.

The A horizon is 6 to 14 inches thick. It has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 2, 3, 4, or 6.

The B1 horizon, if present, is 4 to 6 inches thick. It has hue of 5YR to 10YR, value of 5 to 7, and chroma of 6.

The Bt horizon is 18 to 23 inches thick. It has hue of 5YR, 7.5YR, and 10YR, value of 5 or 6, and chroma of 6. In some places there are mottles. The mottles are few to many; they have value of 4 to 8 and chroma of 4, 6, or 8.

The B3 horizon, if present, is 10 to 20 inches thick and is mottled. Mottles have hue of 2.5YR, 5YR, and 10YR; value of 4 to 6; and chroma of 3, 4, 6, or 8. This horizon is clay loam or sandy clay.

The C horizon is weathered granite, schist, or gneiss and, if crushed, is sandy loam or sandy clay loam.

Bibb series

The Bibb series consists of deep, poorly drained, moderately permeable soils that formed in loamy alluvial sediments. These soils are on flood plains of streams in the Carolina and Georgia Sandhills. They are commonly saturated for 6 to 11 months each year. There is a high probability of frequent, brief flooding in winter and spring. Slope ranges from 0 to 2 percent.

Bibb soils are on the same landscape as Roanoke and Worsham soils. Unlike Bibb soils, Roanoke and Worsham soils have an argillic horizon and commonly are in slightly higher lying areas.

Typical pedon of Bibb silt loam, in a wooded area, 1.2 miles southeast of Beall Springs, 0.5 mile east, 300 feet south of road, in Warren County:

A11—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many very fine, fine, and medium roots; strongly acid; clear smooth boundary.

A12g—5 to 15 inches; grayish brown (10YR 5/2) sandy loam; few fine faint light brownish gray mottles; weak fine granular structure; very friable; common fine and medium roots; strongly acid; clear smooth boundary.

C1g—15 to 25 inches; dark gray (10YR 4/1) loam; massive; friable; few fine and medium roots; very strongly acid; clear smooth boundary.

C2g—25 to 30 inches; dark gray (10YR 4/1) sandy loam; massive; very friable; few medium and coarse roots; very strongly acid; gradual wavy boundary.

C3g—30 to 45 inches; grayish brown (10YR 4/2) sandy loam; common fine faint dark brown (7.5YR 4/2) mottles; massive; very friable; few coarse roots; very strongly acid; gradual smooth boundary.

C4g—45 to 55 inches; light gray (10YR 7/2) sandy loam; common fine faint grayish brown mottles; massive; very friable; few coarse roots; very strongly acid; clear smooth boundary.

IIB2tg—55 to 60 inches; light gray (10YR 7/2) sandy clay loam; common fine faint grayish brown and common coarse faint gray (10YR 6/1) mottles; moderate medium subangular blocky structure; slightly sticky, friable; few coarse roots; very strongly acid.

The sediments are 60 inches or more thick. In unlimed areas, the soil is strongly acid or very strongly acid.

The A horizon is 12 to 18 inches thick. It has hue of 10YR, value of 4 to 7, and chroma of 1 to 3. In some places there are mottles. The mottles have hue of 7.5YR and 10YR, value of 5 to 8, and chroma of 2, 3, 4, or 6. They are few or common in the A12g horizon.

The C horizon is 22 to 48 inches or more thick. It has hue of 10YR, value of 4 to 7, and chroma of 1 or 2. In some places there are mottles. The mottles are few to many, fine or medium, and red, brown, and yellow. This horizon is loamy fine sand, sandy loam, loam, or silt loam.

The IIB horizon has hue of 7.5YR to 2.5Y, value of 5 or 7, and chroma of 0 to 4 or 6. In some places there are mottles. The mottles are few to many, fine to coarse, and brown, yellow, or gray. This horizon is sandy clay loam or sandy clay.

Cecil series

The Cecil series consists of deep, well drained, moderately permeable soils that formed in material that weathered from granite, gneiss, and schist. These soils are on ridgetops and hillsides of the Piedmont Upland. Slope ranges from 2 to 25 percent, but is mainly 2 to 6 percent.

Cecil soils are on the same landscape as Appling, Davidson, Georgeville, Grover, Helena, Madison, and Wedowee soils. Appling, Grover, and Wedowee soils are more yellow throughout than Cecil soils. Unlike Cecil soils, Grover soils are micaceous, and they have less clay in the B horizon. Wedowee soils have a thinner solum than Cecil soils. Davidson soils have a redder and thicker B horizon than Cecil soils. Georgeville soils have a higher content of silt than Cecil soils. Helena soils are moderately well drained, and have a more plastic B horizon than Cecil soils. Madison soils have a higher content of mica flakes than Cecil soils.

Typical pedon of Cecil sandy clay loam, 2 to 6 percent slopes, eroded, in a wooded area, 2.0 miles west of Howell's on Georgia Highway 47, 0.4 mile south, 100 feet southeast of road, in Columbia County:

Ap—0 to 4 inches; reddish brown (5YR 4/4) sandy clay loam; weak medium granular structure; friable; many fine and medium roots; few quartz pebbles; strongly acid; clear wavy boundary.

B21t—4 to 24 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; common fine and medium roots; few quartz pebbles; continuous clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

B22t—24 to 40 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; friable; few medium roots; continuous clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual wavy boundary.

B3—40 to 59 inches; red (2.5YR 4/6) clay loam; common coarse distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few medium roots; discontinuous clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual wavy boundary.

C—59 to 69 inches; red (2.5YR 5/8) highly weathered granite mixed with loam; massive; very friable; few medium roots; many fine flakes of mica; very strongly acid.

The solum is 40 to 60 inches or more thick. Bedrock is at a depth of more than 7 feet; it is at a depth of as much as 40 feet or more in some areas. The soil is very strongly acid or strongly acid throughout, except in limed areas.

The A horizon is 3 to 5 inches thick. It has hue of 2.5YR or 5YR, value of 4, and chroma of 3, 4, or 6.

The B1 horizon, if present, has hue of 2.5YR or 5YR, value of 4, and chroma of 6 or 8.

The Bt horizon is 24 to 36 inches thick. It has hue of 2.5YR or 10R, value of 4 or 5, and chroma of 6 or 8. It is sandy clay or clay.

The B3 horizon is 7 to 19 inches thick. It has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. In some places there are mottles. The mottles are few or common, fine or medium, and red or brown. This horizon is sandy clay loam or clay loam.

The C horizon is weathered granite that, if crushed, is loam or clay loam.

Chewacla series

The Chewacla series consists of deep, somewhat poorly drained, moderately permeable loamy soils that formed in thick alluvial sediments. These soils are mainly on moderately broad flood plains along perennial streams in the Piedmont Upland. They are saturated with water from late in fall to early in spring. There is a high probability of occasional or frequent flooding during this period. Slope ranges from 0 to 2 percent.

Chewacla soils are associated with Altavista, Congaree, Roanoke, Toccoa, Wehadkee, and Wickham soils. Congaree, Toccoa, and Wehadkee soils are on the same landscape as Chewacla soils. Congaree and Toccoa soils are better drained than Chewacla soils; they have not developed evident soil horizons below the A horizon. Wehadkee soils are poorly drained. Unlike Chewacla soils, poorly drained Roanoke soils, moderately well drained Altavista soils, and well drained Wickham soils have an argillic horizon and commonly are on higher lying stream terraces.

Typical pedon of Chewacla silt loam, in a wooded area, 2.0 miles northwest of junction of Georgia Highway 223 and Williams Creek Road, in front of Ebenezer Church, 1,320 feet north along Williams Creek, 100 feet west of east side of flood plain, in Warren County:

A1—0 to 6 inches; brown (7.5YR 5/4) silt loam; common fine faint very pale brown mottles; weak fine granular structure; very friable; common very fine and fine roots; few fine flakes of mica; strongly acid; gradual smooth boundary.

B1—6 to 14 inches; brown (7.5YR 5/4) silt loam; common medium faint very pale brown (10YR 7/3) mottles; weak medium granular structure; friable; common fine roots; few fine flakes of mica; strongly acid; gradual smooth boundary.

B21—14 to 24 inches; brown (7.5YR 5/4) silt loam; common medium distinct light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable; few medium roots; few fine flakes of mica; strongly acid; clear smooth boundary.

B22—24 to 40 inches; light yellowish brown (10YR 6/4) silt loam; many fine distinct light gray mottles; weak medium subangular blocky structure; friable; few medium roots; common fine flakes of mica; common fine black concretions; slightly acid; clear smooth boundary.

B23—40 to 60 inches; light yellowish brown (10YR 6/4) clay loam; common fine distinct reddish yellow and common medium distinct light gray (10YR 7/1) mottles; moderate medium subangular blocky structure; firm; few medium roots; few fine flakes of mica; slightly acid.

The solum is 63 to 70 inches or more thick. Bedrock is at a depth of more than 7 feet; the depth ranges to 20 feet or more in some areas. In unlimed areas the soil is slightly acid to strongly acid throughout.

The A horizon is 6 to 10 inches thick. It has hue of 7.5YR or 10YR, value of 5, and chroma of 3 or 4. In some places there are few or common mottles.

The B1 horizon is 6 to 8 inches thick. It has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 or 4. In some places there are mottles. The mottles are few or common, have hue of 10YR, value of 5 or 7, and chroma of 1 to 3. This horizon is silt loam or sandy loam.

The B2 horizon is 24 to 26 inches thick. It has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 3 or 4. Mottles are few to many and have hue of 10YR, value of 5 to 7, and chroma of 1 to 4. This horizon is silt loam, clay loam, or sandy loam.

Congaree series

The Congaree series consists of deep, well drained, moderately permeable loamy soils that formed in thick alluvial sediments. These soils are mainly on moderately broad flood plains along perennial streams in the Piedmont Upland. The water table is 30 to 48 inches from the surface from late in fall until early in spring. There is a high probability of frequent flooding during this period. Slope ranges from 0 to 2 percent.

Congaree soils are associated with Altavista, Chewacla, Roanoke, Toccoa, Wehadkee, and Wickham soils. Poorly drained Wehadkee soils, somewhat poorly drained Chewacla soils, and well drained Toccoa soils are on the same landscape as Congaree soils. Wehadkee soils and Chewacla soils have developed evident soil horizons below the A horizon, and Toccoa soils have more sand than Congaree soils. Unlike Congaree soils, poorly drained Roanoke soils, moderately well drained Altavista soils, and well drained Wickham soils have an argillic horizon and commonly are on higher lying stream terraces.

Typical pedon of Congaree silt loam, in a wooded area, 2.0 miles northwest of junction of Georgia Highway 223 and Williams Creek Road, in front of Ebenezer Church, 1,320 feet north along Williams Creek, 550 feet west of east side of flood plain, in Warren County:

A1—0 to 6 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; very friable; many very fine and fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.

C1—6 to 19 inches; brown (10YR 5/3) silt loam; massive; friable; common very fine and fine roots; few fine flakes of mica; strongly acid; gradual smooth boundary.

C2—19 to 30 inches; brown (7.5YR 5/4) silt loam; massive; friable; few fine roots; common fine flakes of mica; few thin lenses of loamy fine sand; strongly acid; clear smooth boundary.

C3—30 to 33 inches; reddish brown (5YR 4/4) loamy sand; single grained; very friable; few medium roots; common fine flakes of mica; common thin lenses of loam and clay loam; medium acid; clear smooth boundary.

B2b—33 to 60 inches; reddish brown (5YR 5/4) clay loam; moderate medium subangular blocky structure; firm; few medium roots; common fine flakes of mica; medium acid.

The alluvium is 60 inches or more thick. Bedrock is at a depth of more than 5 feet; the depth ranges to 20 feet or more. In unlimed areas the soil is neutral to strongly acid throughout.

The A horizon is 6 to 10 inches thick. It has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4.

The C horizon is stratified and is 21 to 50 inches or more thick. It has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 3, 4, or 6. In some places there are mottles. The mottles are few or common, fine or medium, and gray. The stratified layers include loam, fine sandy loam, and silt loam. Strata of loamy sand, loam, or clay loam are common.

Davidson series

The Davidson series consists of deep, well drained, moderately permeable soils that formed in material that weathered from diorite and similar rocks. These soils are on ridgetops and hillsides of the Piedmont Upland. Slope ranges from 2 to 25 percent but is mainly 2 to 6 percent.

Davidson soils are on the same landscape as Cecil, Georgeville, and Madison soils. Cecil, Georgeville, and Madison soils are less red than Davidson soils. Georgeville soils have a higher content of silt than Davidson soils, and Madison soils have a higher content of mica.

Typical pedon of Davidson loam, 2 to 6 percent slopes, in an area of permanent pasture, 1.0 mile north of Pine Grove Church on U.S. Highway 78, 0.3 mile northeast on subdivision road, 100 feet north, in McDuffie County:

Ap—0 to 7 inches; dark reddish brown (5YR 3/3) loam; weak medium granular structure; very friable; many very fine grass roots; common fine black concretions; medium acid; clear smooth boundary.

B1—7 to 14 inches; dark reddish brown (2.5YR 3/4) clay loam; moderate medium granular structure; friable; common very fine grass roots; common fine black concretions; thin patchy clay films on faces of peds; medium acid; gradual wavy boundary.

B21t—14 to 27 inches; dark reddish brown (2.5YR 3/4) clay; moderate medium granular and subangular blocky structure; friable; few very fine grass roots; few fine black concretions; patchy clay films on faces of peds; medium acid; gradual wavy boundary.

B22t—27 to 64 inches; dark red (2.5YR 3/6) clay; moderate medium blocky structure; firm; few very fine grass roots; common fine black concretions; continuous clay films on faces of peds; medium acid; gradual wavy boundary.

B23t—64 to 70 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; few very fine grass roots; common fine black concretions; continuous clay films on faces of peds; medium acid.

The solum is 60 to 70 inches or more thick. Bedrock is at a depth of 10 feet or more. In unlimed areas the soil is very strongly acid to medium acid throughout.

If the A horizon is not eroded, it is loam about 6 or 7 inches thick. If it is eroded, it is clay loam about 3 to 5 inches thick. It has hue of 10R, 2.5YR, or 5YR, value of 3, and chroma of 3 or 4.

The B1 horizon, if present, is 2 to 7 inches thick. It has hue of 10R or 2.5YR, value of 3, and chroma of 4 or 6.

The Bt horizon is 46 to 60 inches or more thick. The upper part of the Bt horizon has hue of 10R or 2.5YR, value of 3, and chroma of 4 or 6. The lower part of the Bt horizon has hue of 10R or 2.5YR, value of 3 or 4, and chroma of 6. In some places there are mottles. The mottles are few or common; they have hue of 7.5YR, value of 5, and chroma of 8. The lower part of the Bt horizon is clay or clay loam.

Enon series

The Enon series consists of moderately deep, well drained, slowly permeable soils that formed in material that weathered from diorite, gabbro, quartz, and related acidic and basic rocks. Enon soils are on hillsides of the Piedmont Upland. Slope ranges from 10 to 15 percent.

Enon soils are on the same landscape as Cecil, Madison, and Wedowee soils. Cecil and Madison soils are redder in color than Enon soils. Cecil soils have a thicker solum than Enon soils, and Madison soils have a higher content of mica flakes. Unlike Enon soils, Wedowee soils do not have mottles of chroma of 2 or less in the Bt horizon, and they are less plastic and sticky than Enon soils.

Typical pedon of Enon sandy loam, 10 to 15 percent slopes, in a wooded area, 1.4 miles northeast of Gospel Water Church on Georgia Highway 28, 0.7 mile west along high-tension cross-country powerline, 270 feet south of high-tension powerline, in Columbia County:

A1—0 to 2 inches; grayish brown (10YR 5/2) sandy loam; weak fine granular structure; very friable; common very fine and fine roots; strongly acid; clear smooth boundary.

A21—2 to 4 inches; brown (10YR 5/3) sandy loam; weak fine granular structure; very friable; few very fine and fine roots; few fine black concretions; strongly acid; gradual wavy boundary.

A22—4 to 9 inches; brown (7.5YR 5/4) sandy loam; weak fine granular structure; very friable; few fine roots; strongly acid; gradual wavy boundary.

B1—9 to 14 inches; reddish yellow (7.5YR 6/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B21t—14 to 22 inches; reddish yellow (7.5YR 6/6) clay; many medium prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm, sticky and very plastic; few fine roots; few fine flakes of mica; continuous clay films on faces of peds; slightly acid; abrupt wavy boundary.

B22t—22 to 32 inches; yellowish brown (10YR 5/6) clay; common medium distinct light brownish gray (2.5Y 6/2) mottles; strong medium blocky structure; very firm, sticky and very plastic; common fine flakes of mica; continuous clay films on faces of peds; common fine black concretions; slightly acid; abrupt wavy boundary.

C1—32 to 55 inches; mottled strong brown (7.5YR 5/8) and very dark gray (N 3/0) saprolite that crushes to clay loam; massive; friable; many fine flakes of mica; neutral.

C2—55 to 60 inches; mottled pale brown (10YR 6/3) and brownish yellow (10YR 6/6) saprolite that crushes to sandy loam; massive; very friable; many fine flakes of mica; neutral.

The solum is 22 to 32 inches thick. Saprolite is at a depth of 30 inches or more. In unlimed areas the solum is strongly acid to slightly acid throughout; the C horizon is slightly acid or neutral.

The A horizon is 7 to 9 inches thick. It has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4.

The Bt horizon is 14 to 18 inches thick. It has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 or 8. Mottles are common or many and have hue of 2.5YR, 10YR, or 2.5Y, value of 4 or 6, and chroma of 2, 3, 4, 6, or 8.

The C horizon is saprolite that weathered from acidic and basic rock and that crushes to sandy loam or clay loam.

Faceville series

The Faceville series consists of deep, well drained, moderately permeable soils that formed in dominantly clayey marine sediments. These soils are on ridgetops of the Carolina and Georgia Sandhills. Slope ranges from 2 to 6 percent.

Faceville soils are on the same landscape as Norfolk, Orangeburg, and Wagram soils. Norfolk and Orangeburg soils have a B horizon that has a lower clay content than that of Faceville soils, and Norfolk soils are less red in color. Unlike Faceville soils, Wagram soils are arenic and have a brownish yellow loamy B horizon.

Typical pedon of Faceville sandy loam, 2 to 6 percent slopes, in a cultivated field, 5.4 miles west of Norwood on U.S. Highway 278, 2.6 miles south on county paved road, 50 feet west, in Warren County:

Ap1—0 to 5 inches; reddish brown (5YR 4/4) sandy loam; weak fine granular structure; very friable; few fine roots; common pieces of crop residue; few small pebbles; strongly acid; clear wavy boundary.

Ap2—5 to 7 inches; reddish brown (5YR 4/4) sandy loam; few splotches of red (2.5YR 5/6) subsoil; weak fine granular structure; very friable; few fine roots; few pieces of crop residue; strongly acid; abrupt wavy boundary.

B21t—7 to 45 inches; red (2.5YR 4/6) sandy clay; moderate medium subangular blocky structure; friable; many old root channels and insect holes; thin continuous clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22t—45 to 70 inches; red (2.5YR 4/6) sandy clay; moderate medium subangular blocky structure; friable; few fine nodules of ironstone; thin discontinuous clay films on faces of peds; very strongly acid.

The solum is 65 to 72 inches or more thick. In unlimed areas the soil is strongly acid or very strongly acid throughout.

The A horizon is 6 to 8 inches thick. It has hue of 5YR or 10YR, value of 4, and chroma of 3 or 4.

The B1 horizon, if present, has hue of 2.5YR, value of 4 or 6, and chroma of 6 or 8.

The Bt horizon is 46 to 63 inches or more thick. It has hue of 2.5YR, value of 4, and chroma of 6 or 8. Mottles, if present, are in the middle and lower parts of the Bt horizon. They are few, fine or medium, and red or brown. The Bt horizon is sandy clay, clay, or clay loam.

The B3 horizon, if present, is at a depth of 60 to 75 inches. It is commonly mottled with red, brown, and pinkish gray. In some places the matrix is red and has brown, pink, and red mottles. The B3 horizon is sandy clay loam or clay loam.

Flomaton Variant

The Flomaton Variant consists of deep, well drained, moderately permeable soils that formed in very gravelly loamy sediments. These soils are on old, high stream terraces of the Carolina and Georgia Sandhills. Slope ranges from 2 to 10 percent.

Flomaton Variant soils are on the same landscape as Norfolk, Troup, and Wagram soils. Unlike Flomaton Variant soils, the associated soils are not gravelly. Norfolk soils have an A horizon that is less than 20 inches thick, and Troup and Wagram soils have an A horizon that is more sandy than Flomaton Variant soils.

Typical pedon of Flomaton Variant gravelly loamy sand, 2 to 10 percent slopes, 4.0 miles west of Warrenton, Georgia, on Elam Church Road, 900 feet north of highway, in Warren County:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) gravelly loamy sand; weak fine granular structure; loose; many fine and very fine roots; about 50 percent pebbles, by volume; very strongly acid; clear smooth boundary.

A21—6 to 21 inches; light yellowish brown (10YR 6/4) gravelly sandy loam; weak fine granular structure; loose; many fine roots; about 75 percent pebbles, by volume; very strongly acid; gradual smooth boundary.

A11—21 to 35 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak fine granular structure; loose; common fine roots; about 75 percent pebbles, by volume; very strongly acid; gradual smooth boundary.

B21t—35 to 55 inches; strong brown (7.5YR 5/6) gravelly sandy clay loam; weak medium granular structure; very friable; few fine roots; about 80 percent pebbles, by volume; very strongly acid; gradual smooth boundary.

B22t—55 to 65 inches; strong brown (7.5YR 5/6) gravelly sandy clay loam; weak medium granular structure; very friable; about 50 percent pebbles, by volume; very strongly acid.

The solum is 60 inches or more thick. The soil is very strongly acid or strongly acid throughout. Coarse fragments range from 35 to 80 percent throughout.

The A horizon is 26 to 35 inches thick. It has hue of 2.5Y to 7.5YR, value of 4 to 6, and chroma of 2 to 4.

The Bt horizon is 25 to 35 inches or more thick. It has hue of 7.5YR, value of 5, and chroma of 6 or 8. Mottles, if present, have hue of 7.5YR to 2.5YR, value of 4 to 6, and chroma of 6 or 8. In some pedons there are gray mottles in the lower part of this horizon. The Bt horizon is gravelly clay loam. If a B1 horizon and B3 horizon are present, they are gravelly sandy clay loam or gravelly sandy loam.

These soils are considered a variant because they differ from soils in the Flomaton series in the texture of the control section. These soils have a gravelly sandy loam B2t horizon and contain more clay than defined in the sandy-skeletal family of the Flomaton series.

Georgeville series

The Georgeville series consists of deep, well drained, moderately permeable soils that formed in material that weathered from fine grained Carolina slate. These soils are on ridgetops and hillsides of the Piedmont Upland. The slope ranges from 2 to 25 percent but is mainly 2 to 10 percent.

Georgeville soils are on the same landscape as Appling, Cecil, Davidson, Grover, Madison, and Wedowee soils. Unlike Georgeville soils, these associated soils are less than 30 percent silt throughout, and the Appling, Grover, and Wedowee soils have hue of 5YR or yellower. Wedowee soils have a thinner solum than Georgeville soils, Madison and Grover soils have a higher content of mica, and Davidson soils are darker red in color.

Typical pedon of Georgeville fine sandy loam, 2 to 6 percent slopes, in an area of loblolly pine, 1.3 miles northwest of the intersection of Georgia Highways 80 and 223, 50 feet west of road, in Warren County:

Ap—0 to 7 inches; brown (7.5YR 4/4) fine sandy loam; moderate medium granular structure; friable; many fine and medium roots; few quartz pebbles; slightly acid; clear smooth boundary.

B1—7 to 11 inches; red (2.5YR 4/8) silty clay loam; weak medium subangular blocky structure; friable; common medium roots; few quartz pebbles; thin clay films on faces of peds; strongly acid; gradual wavy boundary.

B21t—11 to 31 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm; few fine and medium roots; few quartz pebbles; thin clay films on faces of peds; slightly acid; gradual wavy boundary.

B22t—31 to 46 inches; red (2.5YR 4/6) clay; common fine faint yellowish red mottles; weak medium subangular blocky structure; firm; few fine roots; few patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B3—46 to 56 inches; red (2.5YR 4/6) silty clay loam; many medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; many fragments of slate; strongly acid; gradual wavy boundary.

C—56 to 64 inches; reddish yellow (7.5YR 6/6) saprolite; rock-controlled structure that crushes to friable silt loam; strongly acid.

The solum is 42 to 70 inches or more thick. Bedrock is at a depth of 6 to 10 feet or more. In unlimed areas the soil is very strongly acid or strongly acid throughout.

If the A horizon is not eroded, it is fine sandy loam 5 to 7 inches thick. It has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. If the A horizon is eroded, it is clay loam 2 to 4 inches thick and has hue of 5YR, value of 4 to 6, and chroma of 4, 6, or 8.

The B1 horizon, if present, is 2 to 8 inches thick. It has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8.

The Bt horizon is 15 to 40 inches thick. It has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is clay or silty clay. If the lower part of the Bt horizon is mottled, the mottles are few or common and red or brown.

The B3 horizon is 10 to 26 inches thick. It has hue of 10R, 2.5YR, or 5YR, value of 4 or 5, and chroma of 6 or 8. In some places there are mottles throughout the horizon. The mottles are few or common, fine or medium, and red, brown, or yellow. This horizon is silty clay loam or silt loam.

The C horizon is saprolite that weathered from slate. It is mottled yellowish red, reddish yellow, light red, red, strong brown, and dark red. The saprolite is silt loam, silty clay loam, silty clay, or loam.

In this survey area, Georgeville soils that have 2 to 6 percent slopes have a fine sandy loam A horizon that is not defined in the range for the series. This difference does not greatly affect the use and behavior of these soils.

Grover series

The Grover series consists of deep, well drained, moderately permeable soils that formed in material that weathered from mica gneiss and mica schist. Grover soils are on ridgetops and hillsides of the Piedmont Upland. Slope ranges from 2 to 15 percent but is mainly 2 to 10 percent.

Grover soils are on the same landscape as Appling, Cecil, Georgeville, Madison, and Wedowee soils. The associated soils have more clay in the Bt horizon than Grover soils. Appling, Cecil, and Georgeville soils have less mica throughout than Grover soils. Cecil, Georgeville, and Madison soils have a Bt horizon that is redder in color than that of Grover soils.

Typical pedon of Grover sandy loam, 2 to 6 percent slopes, in a cultivated field, 2.3 miles west of Lody Grove Church on county paved road, 1.1 miles south on county dirt road, 50 feet west of road, in Warren County:

Ap—0 to 5 inches; brown (10YR 5/3) sandy loam; weak fine granular structure; very friable; common fine and medium flakes of mica; common angular quartz pebbles; few fine roots; strongly acid; clear smooth boundary.

B21t—5 to 10 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate medium subangular blocky structure; firm; common fine and medium flakes of mica; few fine roots; thin continuous clay films on faces of peds; strongly acid; gradual wavy boundary.

B22t—10 to 22 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine distinct strong brown mottles; moderate medium subangular blocky structure; firm; many small and medium flakes of mica that give a greasy feel; few fine roots; thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B3—22 to 30 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium faint yellowish brown (10YR 5/6) mottles and few fine distinct red mottles; weak medium subangular blocky structure; friable; many fine medium and large flakes of mica that give a greasy feel; 12 to 15 percent quartz pebbles, by volume; strongly acid; gradual wavy boundary.

C1—30 to 34 inches; brownish yellow (10YR 6/8) sandy clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; massive; friable; many fine medium and large flakes of mica that give a very greasy feel; strongly acid; gradual wavy boundary.

C2—34 to 55 inches; yellow (10YR 7/6) saprolite that weathered from mica gneiss and mica schist and crushes to sandy loam; massive; rock-controlled structure; very friable; many fine and medium flakes of mica; gradual wavy boundary.

The solum is 22 to 40 inches thick. Bedrock is at a depth of more than 6 feet. The soil is strongly acid or very strongly acid in unlimed areas. Coarse fragments, if present, are few or common.

The Ap horizon and A1 horizon are 4 to 9 inches thick. They have hue of 7.5YR, 10YR, or 2.5Y, value of 4 to 6, and chroma of 2 to 4. These horizons are sandy loam or gravelly sandy loam. Flakes of mica are few or common.

The A2 horizon, if present, is 2 to 3 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 3, 4, or 6. It is sandy loam or coarse sandy loam. Flakes of mica are few or common.

The B1 horizon, if present, is 3 or 4 inches thick. It has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 or 6. It is sandy clay loam or sandy loam. Flakes of mica are few or common.

The Bt horizon is 11 to 26 inches thick. It has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 4, 6, or 8. In some places there are few to many red or yellow mottles. The Bt horizon is sandy clay loam or clay loam. Flakes of mica are common or many.

The B3 horizon is 5 to 8 inches thick. It has hue of 5YR, 7.5YR, or 10YR, value of 5 or 7, and chroma of 4, 6, or 8. There are common or many red, brown, or yellow mottles throughout. The B3 horizon is sandy loam, sandy clay loam, or clay loam. Flakes of mica are common or many.

The C horizon is saprolite that weathered from mica gneiss and mica schist. It ranges from yellowish red to reddish yellow.

Helena series

The Helena series consists of moderately well drained, slowly permeable soils that formed in material that weathered from gneiss and granite. These soils are on low ridgetops and the lower part of hillsides of the Piedmont Upland. Slope ranges from 2 to 10 percent.

Helena soils are on the same landscape as Appling, Grover, and Wedowee soils. Appling and Wedowee soils, unlike Helena soils, do not have low chroma mottles in the upper 24 inches of the Bt horizon, and they are less firm and sticky. Unlike Helena soils, Grover soils are in a fine-loamy family and have a high content of mica.

Typical pedon of Helena loamy coarse sand, 2 to 6 percent slopes, in a wooded area, 0.4 mile south of Mount Carmel Church, 2.0 miles east on county dirt road, 0.2 mile south on woods road, 25 feet east, in Columbia County:

Ap—0 to 8 inches; pale brown (10YR 6/3) loamy coarse sand; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

A2—8 to 10 inches; light yellowish brown (10YR 6/4) sandy loam; weak medium granular structure; friable;

few fine and medium roots; very strongly acid; clear wavy boundary.

B1—10 to 17 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; few medium roots; few quartz pebbles; very strongly acid; clear wavy boundary.

B21t—17 to 25 inches; light yellowish brown (10YR 6/4) clay; many medium prominent red (10R 5/8) mottles; moderate coarse blocky structure; very firm, sticky and plastic; few medium roots; continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B22t—25 to 30 inches; strong brown (7.5YR 5/6) clay; common medium distinct gray (5Y 6/1) mottles; strong coarse blocky structure; very firm, very sticky and very plastic; few medium roots; continuous clay films on faces of peds; very strongly acid; clear wavy boundary.

B3g—30 to 34 inches; gray (5Y 6/1) clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; very firm, sticky and plastic; few medium roots; few splotches of mixed weathered acidic and basic rock; strongly acid; abrupt wavy boundary.

C—34 to 61 inches; pale brown (2.5Y 7/4) sandy loam; massive; very friable; mixed acidic and basic rocks that are highly weathered; strongly acid.

The solum is 31 to 42 inches thick. Bedrock is at a depth of more than 48 inches. In unlimed areas the soil is strongly acid or very strongly acid throughout.

The A horizon is 6 to 11 inches thick. It has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or 4.

The B1 horizon, if present, is 3 to 7 inches thick. It has hue of 10YR, value of 5 to 7, and chroma of 4 or 6.

The Bt horizon is 13 to 19 inches thick. It has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 or 6. Mottles are few to many and have hue of 10R to 5Y, value of 5 to 7, and chroma of 1 to 4, 6, or 8.

The B3 horizon is 4 to 8 inches thick. It has hue of 7.5YR to 5Y, value of 5 or 6, and chroma of 1 to 4, 6, or 8. Mottles are common or many and have hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 1 to 4 or 6.

The C horizon is weathered acidic and basic rock that crushes to sandy loam and clay loam.

Madison series

The Madison series consists of deep, well drained, moderately permeable soils that formed in material that weathered from mica schist, mica gneiss, or other micaceous metamorphic rocks. These soils are on fairly smooth ridgetops and irregular hillsides of the Piedmont Upland. Slope ranges from 2 to 25 percent but is mainly 2 to 10 percent.

Madison soils are on the same landscape as Appling, Cecil, Georgeville, Grover, and Wedowee soils. Appling, Grover, and Wedowee soils are more yellow throughout. In addition, Appling and Wedowee soils have a lower content of mica, and Appling soils have a thicker solum than that of Madison soils; Cecil soils have a lower content of mica and have a thicker solum; and Georgeville soils have a higher content of silt.

Typical pedon of Madison sandy loam, 2 to 6 percent slopes, in a wooded area, 0.5 mile south of Norwood on county paved road, 1.6 miles southwest on county dirt road, 25 feet north of road, in Warren County:

Ap1—0 to 1 inch; dark brown (7.5YR 4/4) sandy loam; weak fine granular structure; very friable; many very fine and medium roots; 10 percent fine pebbles; common fine and very fine pores; few fine flakes of mica; very strongly acid; abrupt smooth boundary.

Ap2—1 inch to 6 inches; strong brown (7.5YR 5/6) sandy loam; weak fine granular structure; friable; many very fine and medium roots; 10 percent fine pebbles; common very fine pores; few fine flakes of mica; very strongly acid; clear wavy boundary.

B1—6 to 8 inches; yellowish red (5YR 5/8) sandy clay loam; moderate medium subangular blocky structure; firm; many very fine and medium roots; common fine flakes of mica; patchy reddish yellow clay films on faces of peds; strongly acid; clear wavy boundary.

B2t—8 to 26 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; common medium roots; few very fine pores; many fine flakes of mica; continuous clay films on faces of peds; strongly acid; gradual irregular boundary.

B3—26 to 32 inches; red (2.5YR 5/8) clay loam; weak medium platy structure; friable; few medium roots; many fine flakes of mica; patchy clay films on faces of peds; very strongly acid; gradual irregular boundary.

C1—32 to 48 inches; red (2.5YR 5/8) weathered mica schist mixed with clay loam; massive; friable; few medium roots; many fine flakes of mica; very strongly acid; gradual irregular boundary.

C2—48 to 62 inches; strong brown (7.5YR 5/6) weathered mica schist mixed with loam; massive; very friable; many fine flakes of mica; very strongly acid.

The solum is 29 to 37 inches thick. Hard rock is at a depth of 3 to 6 feet or more. In unlimed areas the soil is very strongly acid or strongly acid throughout.

The Ap horizon is 5 to 7 inches thick. It has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is sandy loam or gravelly sandy loam.

The Bt horizon is 10 to 20 inches thick. It has hue of 10R, 2.5YR, and 5YR, value of 4 to 6, and chroma of 6 or 8. In some places, mottles are common and have hue of 10R, value of 4, and chroma of 6.

The C horizon is weathered granite, schist, and mica schist that crushes to sandy loam, loam, sandy clay loam, or clay loam.

Norfolk series

The Norfolk series consists of deep, well drained, moderately permeable soils that formed in loamy, unconsolidated, stratified marine sediments. These soils are on the Carolina and Georgia Sandhills. Slope ranges from 2 to 10 percent but is mainly 2 to 6 percent.

Norfolk soils are on the same landscape as Faceville, Orangeburg, Troup, and Wagram soils. Faceville and Orangeburg soils have a redder B horizon than Norfolk soils, and Faceville soils have a clayey control section. Unlike Norfolk soils, Troup and Wagram soils have a sandy A horizon more than 20 inches thick.

Typical pedon of Norfolk loamy sand, 2 to 6 percent slopes, in a pasture 0.7 mile north of Little Brier Creek Baptist Church, 1.4 miles west, 0.2 mile south on field road, 150 feet southeast, in Warren County:

Ap—0 to 6 inches; yellowish brown (10YR 5/4) loamy sand; weak fine granular structure; very friable; common very fine roots; few fine and medium nodules of ironstone; very strongly acid; clear smooth boundary.

A2—6 to 9 inches; light yellowish brown (10YR 6/4) sandy loam; weak fine granular structure; very friable; few very fine roots; very strongly acid; clear smooth boundary.

B1—9 to 13 inches; yellowish brown (10YR 5/4) sandy loam; moderate fine granular and subangular blocky structure; friable; common very fine roots; few medium nodules of ironstone; very strongly acid; clear smooth boundary.

B21t—13 to 28 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; few very fine roots; few medium nodules of ironstone; common very fine pores; very strongly acid; gradual wavy boundary.

B22t—28 to 53 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct yellowish red (5YR 5/8) mottles, and few fine faint very pale brown mottles; moderate medium subangular blocky structure; friable; few fine nodules of ironstone; 1 percent plinthite; very strongly acid; gradual wavy boundary.

B3—53 to 65 inches; mottled reddish yellow (7.5YR 6/8), very pale brown (10YR 7/3), and red (2.5YR 4/6) clay loam; weak medium subangular blocky structure; friable; 3 percent plinthite; very strongly acid.

The solum is 60 to 70 inches or more thick. In unlimed areas, the soil is strongly acid or very strongly acid throughout.

The A horizon is 7 to 19 inches thick. It has hue of 10YR or 2.5Y, value of 5 or 7, and chroma of 2 to 4.

The B1 horizon is 3 to 5 inches thick. It has hue of 10 YR or 2.5Y, value of 5 or 6, and chroma of 4, 6, or 8. It is sandy loam or sandy clay loam.

The Bt horizon is 40 to 54 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 6 or 8. Few or common, fine or medium, brown, red, or yellow mottles are in the lower part of the horizon. This horizon is sandy clay loam or clay loam.

The B3 horizon, if present, is mottled in hue of 2.5YR, 5YR, or 10YR, value of 4 to 6, and chroma of 3 or 8.

Orangeburg series

The Orangeburg series consists of deep, well drained, moderately permeable soils that formed mostly in loamy marine sediments. These soils are on the Carolina and Georgia Sandhills. Slope is dominantly 2 to 6 percent but ranges from 2 to 10 percent.

Orangeburg soils are on the same landscape as Faceville, Norfolk, Tifton, and Wagram soils. Unlike Orangeburg soils, Faceville soils have a clayey control section. Norfolk soils have a browner B horizon than Orangeburg soils. Unlike Orangeburg soils, Tifton soils are more than 5 percent plinthite between depths of 24 and 50 inches, and Wagram soils are arenic.

Typical pedon of Orangeburg sandy loam, 2 to 6 percent slopes, in a cultivated field, 2.4 miles west of Norwood city limits on U.S. Highway 278, 0.6 mile south on dirt road, 375 feet west into field, in Warren County:

Ap—0 to 7 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; very friable; common very fine and fine roots; strongly acid; abrupt smooth boundary.

A2—7 to 9 inches; yellowish brown (10YR 5/6) sandy loam; weak fine granular structure; very friable; few fine roots; few pebbles; strongly acid; abrupt wavy boundary.

B1—9 to 13 inches; strong brown (7.5YR 5/6) sandy loam; weak fine subangular blocky structure; very friable; common fine roots; strongly acid; clear wavy boundary.

B21t—13 to 25 inches; red (2.5YR 4/6) sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots in upper part; many fine and medium pores; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22t—25 to 40 inches; red (2.5YR 4/6) sandy clay loam; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; few pebbles; very strongly acid; gradual wavy boundary.

B23t—40 to 65 inches; red (2.5YR 4/8) sandy clay loam; common fine distinct yellowish brown mottles; weak medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; very strongly acid.

The solum is 60 to 72 inches or more thick. In unlimed areas it is very strongly acid or strongly acid throughout.

The A horizon is 7 to 13 inches thick. The Ap horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3, 4, or 6. The A2 horizon, if present, has hue of 10YR, value of 5 or 6, and chroma of 4 or 6. The A horizon in some pedons has a few pebbles and nodules of ironstone.

The B1 horizon is 3 to 6 inches thick. It has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 or 6.

The Bt horizon is 40 to 50 inches or more thick. It has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. The lower part of the Bt horizon has common mottles in shades of brown.

Roanoke series

The Roanoke series consists of deep, poorly drained, slowly permeable soils that formed in stratified loamy and clayey sediments. These soils are mainly on low terraces along the larger perennial streams in the Carolina and Georgia Sandhills. They are frequently flooded for brief periods in winter and spring. The water table is at a depth of less than 12 inches for about 6 months each year. Slope ranges from 0 to 2 percent.

Roanoke soils are on the same landscape as Bibb, Wehadkee, and Worsham soils. Unlike Roanoke soils, Bibb soils have a coarse-loamy control section and siliceous mineralogy; Wehadkee soils are in a fine-loamy family and have mixed mineralogy; and Worsham soils contain less than 30 percent silt throughout and have a low probability of flooding.

Typical pedon of Roanoke silt loam, in a wooded area, 500 feet north of Big Brier Creek and 1,000 feet west of Lucky's Bridge on U.S. Highway 221, in McDuffie County:

A1—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam; moderate medium granular structure; friable; many very fine and fine roots; few very fine flakes of mica; strongly acid; clear wavy boundary.

A2—3 to 9 inches; gray (10YR 5/1) silt loam; moderate medium granular structure; friable; many very fine and fine roots; few very fine flakes of mica; strongly acid; clear wavy boundary.

B1g—9 to 12 inches; gray (10YR 5/1) silty clay loam; common medium prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable; common fine roots; few very fine flakes of mica; few fine pores; strongly acid; abrupt wavy boundary.

B21tg—12 to 35 inches; gray (5Y 6/1) clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine and medium roots; few very fine flakes of mica; common very fine and fine pores; strongly acid; gradual wavy boundary.

B22tg—35 to 55 inches; light gray (5Y 7/1) clay loam; common medium prominent reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; firm; few medium roots; few very fine flakes of mica; common very fine and fine pores; strongly acid; gradual wavy boundary.

C—55 to 65 inches; mottled light gray (5Y 7/1) and reddish yellow (7.5YR 6/8) clay; massive; very firm; few very fine flakes of mica; few very fine pores; very strongly acid.

The solum is 50 to 60 inches thick. Bedrock is at a depth of 7 feet or more. In unlimed areas, the soil is very strongly acid or strongly acid throughout.

The A horizon is 8 or 9 inches thick. It has hue of 10YR, value of 3 to 6, and chroma of 1 or 2.

The B1g horizon, if present, is 3 or 4 inches thick. It has hue of 10YR, value of 5 or 6, and chroma of 1. In some places there are few or common medium red mottles.

The Btg horizon is 38 to 43 inches thick. It has neutral colors or hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. In some places there are mottles. The mottles are few or common and yellow or brown.

The B3 horizon, if present, is 6 to 10 inches thick. It is mottled in hue of 7.5YR to 2.5Y, value of 6, and chroma of 8 or less. It is silty clay loam or clay loam.

The C horizon is mottled in hue of 7.5Y to 5Y, value of 5 to 7, and chroma of 1 to 4, 6, or 8.

Tifton series

The Tifton series consists of deep, well drained, moderately permeable soils that formed in loamy marine sediments. Tifton soils are on ridgetops and hillsides of the Carolina and Georgia Sandhills. Slope is dominantly 3 percent, but it ranges from 0 to 10 percent.

Tifton soils are on the same landscape as Faceville, Norfolk, and Orangeburg soils. Unlike Tifton soils, these associated soils are less than 5 percent plinthite throughout, and Faceville soils have a clayey Bt horizon, Norfolk soils contain fewer nodules of ironstone, and Orangeburg soils have a redder B horizon.

Typical pedon of Tifton loamy sand, 2 to 6 percent slopes, in a cultivated field, 0.3 mile west of intersection of Georgia Highway 17 and Georgia Highway 16 connector, 0.6 mile south on dirt road, 200 feet east into field, in Warren County:

Ap1cn—0 to 6 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; very friable; few fine roots; 15 percent small nodules of ironstone 1/8 to 1/2 inch in diameter; strongly acid; gradual smooth boundary.

Ap2cn—6 to 8 inches; yellowish brown (10YR 5/6) loamy sand; common dark grayish brown (10YR 4/2) splotches; weak fine granular structure; very friable; 15 percent nodules of ironstone; few very fine and medium roots; strongly acid; abrupt smooth boundary.

B21tcn—8 to 29 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; sand grains coated and bridged with clay; patchy clay films on faces of peds; 10 percent small nodules of ironstone; very strongly acid; gradual wavy boundary.

B22tcn—29 to 36 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium distinct yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; firm; thin patchy clay films on faces of peds; 12 percent small nodules of ironstone; 3 percent plinthite; few very fine roots; very strongly acid; gradual wavy boundary.

B23tcn—36 to 54 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium distinct yellowish red (5YR 5/8) mottles, and common medium faint yellow (10YR 7/8) mottles; moderate medium subangular blocky structure; firm; patchy clay films on faces of peds; 10 percent nodules of ironstone; 10 percent plinthite; very strongly acid.

B24t—54 to 72 inches; yellowish brown (10YR 5/8) sandy clay loam; many medium distinct yellowish red (5YR 5/8) mottles, and few fine faint very pale brown mottles; weak medium subangular blocky structure; friable; 5 percent plinthite; 3 percent nodules of ironstone; patchy clay films on faces of peds; very strongly acid.

The solum is 60 to 72 inches or more thick. The soil is very strongly acid or strongly acid throughout except where the surface layer has been limed.

The Ap horizon is 6 to 10 inches thick. It has hue of 10YR, value of 4, and chroma of 2 or 3. The A2 horizon, if present, is 4 to 8 inches thick. It has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 or 6. Nodules of ironstone range from 10 to 25 percent, by volume.

The Bt horizon is 50 to 60 inches or more thick. The B21tcn horizon and the B22tcn horizon have hue of 10YR or 7.5YR, value of 5, and chroma of 4, 6, or 8. The B22tcn horizon has few or common red mottles. The B23tcn horizon and the B24t horizon have reticulate mottles that are red, brown, and gray; or these horizons have hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4, 6, or 8. Content of plinthite ranges from 5 to 20 percent between depths of 36 and 60 inches. Nodules of ironstone range from 10 to 20 percent in the upper part of the Bt horizon, and, if present, from 0 to 10 percent in the middle and lower parts.

Toccoa series

The Toccoa series consists of deep, well drained, moderately rapidly permeable soils that formed in predominantly loamy sediments on flood plains. These soils are near streams that drain from the plain. The water table is at a depth of 30 to 60 inches late in winter to early in spring. There is a high probability of occasional or frequent flooding during this period. Slope is dominantly less than 1 percent but ranges to 2 percent.

Toccoa soils are associated with Altavista, Chewacla, and Congaree soils. Unlike Toccoa soils, these associated soils have a fine-loamy control section. And, unlike Toccoa soils, the Altavista soils are moderately well drained and are on low stream terraces adjacent to flood plains, and Chewacla soils are somewhat poorly drained.

Typical pedon of Toccoa loam, in woodland, 2.0 miles west of Howell's crossroad on White Oak Road, 2.5 miles south on county dirt road, 330 feet north and adjacent to Whiteoak Branch, in Columbia County:

A1—0 to 8 inches; brown (10YR 5/3) loam; weak fine granular structure; very friable; many small and medium roots; common fine flakes of mica; medium acid; clear smooth boundary.

C1—8 to 15 inches; reddish brown (5YR 4/4) sandy loam; weak medium granular structure; friable; common fine and medium roots; common fine flakes of mica; few angular quartz pebbles; bedding planes and thin strata of loamy fine sand; medium acid; clear smooth boundary.

C2—15 to 27 inches; brown (2.5YR 4/4) fine sandy loam; common coarse faint reddish yellow (7.5YR 6/6) mottles; massive; very friable; few fine roots; common fine flakes of mica; thin strata of loamy sand and clay loam; medium acid; gradual wavy boundary.

C3—27 to 37 inches; strong brown (7.5YR 5/6) loamy sand; common medium faint brown (7.5YR 5/4) mottles; single grained; very friable; few fine roots; few fine and medium flakes of mica; thin bedding planes of clay loam; slightly acid; gradual wavy boundary.

C4—37 to 49 inches; brown (10YR 5/3) loamy sand; common fine faint very pale brown mottles; single grained; very friable; few fine flakes of mica; few fine roots; slightly acid; gradual wavy boundary.

C5—49 to 60 inches; brown (10YR 5/3) loamy sand; common medium distinct light gray (2.5Y 7/2) mottles; single grained; very friable; few fine roots; few fine flakes of mica; slightly acid; clear wavy boundary.

IIB—60 to 70 inches; mottled yellowish brown (10YR 5/6), dusky red (2.5YR 3/2), and light gray (10YR 7/2) sandy loam; weak medium granular structure; friable; few fine roots; few fine flakes of mica; slightly acid.

The alluvium is 5 to 10 feet or more thick. The soil is strongly acid to slightly acid throughout. In some pedons, there is no buried B horizon.

The A horizon is 8 to 12 inches thick. It has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3, 4, or 6.

The C horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3, 4, or 6. In some pedons, the C horizon has few or common gray, grayish brown, or light brownish gray mottles below a depth of 20 inches. The C horizon is mainly sandy loam, and layers of loamy sand, fine sandy loam, or sand are common.

Troup series

The Troup series consists of deep, well drained soils that have a moderately permeable subsoil. Troup soils formed in thick, sandy and loamy, marine sediments. These soils are on broad ridgetops and short hillsides of the Carolina and Georgia Sandhills. Slope ranges from 2 to 25 percent, but it is mainly 2 to 10 percent.

Troup soils are on the same landscape as Norfolk, Orangeburg, and Wagram soils. Norfolk and Orangeburg soils have an A horizon, 20 inches thick or less, that is thinner than that of Troup soils. Unlike Troup soils, Wagram soils are arenic.

Typical pedon of Troup sand, 2 to 10 percent slopes, in a pine plantation, 0.6 mile northwest on paved county road from railroad tracks at Boneville, 1.4 miles east on county dirt road, 0.4 mile north on county dirt road, 25 feet west, in McDuffie County:

Ap—0 to 9 inches; brown (10YR 5/3) sand; weak fine granular structure; very friable; many very fine and medium roots; few gray splotches that contain clean sand grains; very strongly acid; abrupt smooth boundary.

A21—9 to 25 inches; light yellowish brown (10YR 6/4) loamy sand; weak fine granular structure; very friable; common very fine and medium roots; few gray splotches that contain clean sand grains; very strongly acid; gradual wavy boundary.

A22—25 to 58 inches; yellowish brown (10YR 5/4) loamy sand; weak fine granular structure; very friable; few fine roots; few gray splotches that contain clean sand grains; very strongly acid; gradual wavy boundary.

B1—58 to 62 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; strongly acid; clear wavy boundary.

B21t—62 to 66 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few large concretions of ironstone; strongly acid; clear wavy boundary.

B22t—66 to 72 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium prominent red (2.5YR 5/6) mottles and common medium distinct light yellowish brown (2.5Y 6/4) mottles; moderate medium subangular blocky structure; friable; strongly acid.

The solum is 72 to 120 inches or more thick. In unlimed areas the soil is strongly acid or very strongly acid throughout.

The A horizon is 44 to 74 inches thick. It has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2, 4, 6, or 8.

The B1 horizon, if present, is 4 to 12 inches thick. It has hue of 10YR, value of 5, and chroma of 6 or 8. In some places there are few or common fine or medium strong brown mottles. The B1 horizon is loamy sand or sandy loam.

The Bt horizon is commonly 20 inches or more thick. It has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 6 or 8. In some places there are few to many, fine or medium, red and brown mottles. The Bt horizon is sandy loam or sandy clay loam.

Vaucluse series

The Vaucluse series consists of moderately deep, well drained, slowly permeable soils that formed in sandy and loamy marine sediments. These soils are on narrow, irregular ridgetops and on hillsides of the Carolina and Georgia Sandhills. Slope ranges from 2 to 15 percent but is mainly 6 to 15 percent.

Vaucluse soils are on the same landscape as Orangeburg, Troup, and Wagram soils. Unlike Vaucluse soils, these associated soils do not have a fragipan; in addition, Troup soils are grossarenic, and Wagram soils are arenic.

Typical pedon of Vaucluse loamy coarse sand, 6 to 15 percent slopes, along edge of pasture, 1.2 miles east of Thomson Moose Club on paved county road, 0.4 mile south on county dirt road, 15 feet east of road, in McDuffie County:

Ap—0 to 9 inches; yellowish brown (10YR 5/4) loamy coarse sand; single grained; very friable; many very fine roots; few concretions of ironstone; very strongly acid; gradual wavy boundary.

B1—9 to 11 inches; strong brown (7.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; common fine roots; few fine quartz pebbles; very strongly acid; clear wavy boundary.

B2t—11 to 20 inches; strong brown (7.5YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; few very fine roots; very strongly acid; abrupt smooth boundary.

Bx—20 to 70 inches; red (2.5YR 5/8) coarse sandy loam; common white balls and thin stratification of kaolin; massive; compact, hard, and brittle; few fine flakes of mica; brownish yellow (10YR 6/8) and pale yellow (2.5YR 7/4) sandy clay material that has vertical veins 1/2 inch to 3 inches across and 5 to 10 feet apart; very strongly acid.

The solum is 40 to 70 inches or more thick. In unlimed areas the soil is strongly acid to extremely acid throughout.

The A horizon is 6 to 12 inches thick. The Ap horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 4. The A2 horizon, if present, has hue of 10YR, value of 5 to 7, and chroma of 4 or 6.

The B1 horizon, if present, is 1 to 7 inches thick. It has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 6 or 8.

The Bt horizon is 6 to 10 inches thick. It has hue of 7.5YR to 2.5YR, value of 4 to 6, and chroma of 4, 6, or 8. In some places this horizon has few to many fine or medium red, yellow, and brown mottles. The Bt horizon is sandy loam or sandy clay loam.

The Bx horizon is 15 to 50 inches or more thick. The range in color is the same as that of the Bt horizon. The Bx horizon is sandy loam, sandy clay loam, or coarse sandy loam.

Wagram series

The Wagram series consists of deep, well drained soils that formed in loamy marine sediments. These soils are on broad ridgetops and hillsides of the Carolina and Georgia Sandhills. Slope ranges from 2 to 15 percent but is mainly 2 to 10 percent.

Wagram soils are on the same landscape as Norfolk, Troup, and Vaucluse soils. Unlike Wagram soils, Norfolk and Vaucluse soils have a sandy or loamy A horizon that is less than 20 inches thick. Vaucluse soils have a fragipan, and Troup soils are grossarenic.

Typical pedon of Wagram loamy sand, 2 to 6 percent slopes, in an area of permanent pasture, 6.3 miles south of Thomson on Georgia Highway 17, 1 mile east on county paved road, 50 feet south of road, in McDuffie county:

A1—0 to 10 inches; grayish brown (10YR 5/2) loamy sand; weak fine granular structure; very friable; many very fine and fine roots; few fine pebbles; strongly acid; abrupt smooth boundary.

A21—10 to 23 inches; light yellowish brown (10YR 6/4) loamy sand; single grained; very friable; few fine roots; few fine iron concretions; strongly acid; gradual wavy boundary.

A22—23 to 35 inches; very pale brown (10YR 7/4) loamy sand; single grained; very friable; few fine roots; few fine iron concretions; strongly acid; gradual wavy boundary.

B1—35 to 41 inches; brownish yellow (10YR 6/6) sandy loam; weak fine granular structure; friable; few fine roots; very strongly acid; gradual wavy boundary.

B21t—41 to 53 inches; brownish yellow (10YR 6/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; very strongly acid; gradual wavy boundary.

B22t—53 to 66 inches; brownish yellow (10YR 6/8) sandy clay loam; many medium faint very pale brown mottles and common medium distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky and weak fine platy structure; friable; discontinuous clay films on faces of mottled peds; very strongly acid; gradual wavy boundary.

B23t—66 to 69 inches; brownish yellow (10YR 6/8) sandy clay loam; common medium faint very pale brown mottles and common medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; discontinuous clay films on faces of mottled peds; 3 percent soft plinthite; very strongly acid.

The solum is 64 to 69 inches or more thick. In unlimed areas the soil is strongly acid or very strongly acid.

The A horizon is 22 to 37 inches thick. It has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 4.

The B1 horizon is 2 to 6 inches thick. It has hue of 10YR or 2.5Y, value of 6, and chroma of 4, 6, or 8.

The Bt horizon is 25 to 38 inches or more thick. It has hue of 10YR, value of 5 or 6, and chroma of 4, 6, or 8. In some places there are mottles. The mottles are few to many, and they have hue of 2.5YR to 10YR, value of 5 to 7, and chroma of 3, 4, 6, or 8.

Wedowee series

The Wedowee series consists of deep, well drained, moderately permeable soils that formed in material that weathered from granite, gneiss, and coarse-grained schist. These soils are on ridgetops and hillsides of the Piedmont Upland. Slope ranges from 2 to 25 percent.

Wedowee soils are on the same landscape as Appling, Cecil, Georgeville, Grover, and Helena soils. Appling, Cecil, and Georgeville soils have a thicker solum than Wedowee soils, and Cecil and Georgeville soils have a redder B horizon. Georgeville soils have a higher content of silt, Grover soils have a more micaceous and less clayey B horizon, and Helena soils have a more plastic B horizon. Helena soils have mottles that have chroma of 2 in the upper 24 inches of the Bt horizon.

Typical pedon of Wedowee loamy sand, 6 to 10 percent slopes, in an idle field, 1.4 miles northeast of Gospel Water Church on Georgia Highway 28, 0.7 mile east along high-tension cross-country power line, in Columbia County:

Ap—0 to 6 inches; pale brown (10YR 6/3) loamy sand; weak fine granular structure; very friable; common very fine and fine roots; strongly acid; clear smooth boundary.

A2—6 to 10 inches; yellow (10YR 7/6) sandy loam; weak fine granular structure; very friable; common very fine and fine roots; strongly acid; clear smooth boundary.

B1—10 to 15 inches; strong brown (7.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; strongly acid; gradual wavy boundary.

B21t—15 to 26 inches; strong brown (7.5YR 5/8) sandy clay; many medium distinct red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; thin discontinuous clay films on faces of peds; strongly acid; gradual wavy boundary.

B22t—26 to 30 inches; strong brown (7.5YR 5/6) sandy clay; many medium distinct red (2.5YR 4/8) mottles and common medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; friable; few medium roots; few fine flakes of mica; continuous clay films on faces of peds; strongly acid; gradual wavy boundary.

B3—30 to 36 inches; mottled very pale brown (10YR 8/3), strong brown (7.5YR 5/6), and red (2.5YR 4/8) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; thin discontinuous clay films on faces of peds; strongly acid; clear wavy boundary.

Cr—36 to 60 inches; mottled light brownish gray (10YR 6/2), yellowish red (5YR 5/8), and reddish yellow (7.5YR 6/6) sandy clay loam saprolite; massive; friable; few fine flakes of mica; strongly acid; gradual wavy boundary.

The solum is 30 to 37 inches thick. Bedrock is at a depth of more than 4 feet. In unlimed areas the soil is very strongly acid or strongly acid throughout.

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

The B1 horizon, if present, is 3 to 5 inches thick. It has hue of 5YR to 10YR, value of 5 to 7, and chroma of 6 or 8. In some places there are mottles. The mottles are few and have hue of 7.5YR, value of 6, and chroma of 6.

The Bt horizon is 12 to 16 inches thick. It has hue of 5YR to 10YR, value of 5 or 6, and chroma of 6 or 8. In some places there are mottles. The mottles are few to many and have hue of 2.5YR, 5YR, and 10YR, value of 4 to 6, and chroma of 3, 4, 6, or 8.

The B3 horizon is 6 to 10 inches thick. It is mottled in hue of 2.5YR to 10YR, value of 4 to 8, and chroma of 3, 4, 6, or 8.

The C horizon is granite, schist, or gneiss saprolite that crushes to sandy loam, sandy clay loam, or clay loam.

Wehadkee series

The Wehadkee series consists of deep, poorly drained, moderately permeable soils that formed in thick loamy sediments. These are nearly level soils in slight depressions on flood plains within the Piedmont Upland. They are commonly saturated with water in winter and spring, and they are commonly flooded during this period. Slope is less than 1 percent.

Wehadkee soils are on the same landscape as Chewacla, Congaree, and Toccoa soils. Chewacla, Congaree, and Toccoa soils are on somewhat higher bottom lands and are better drained than Wehadkee soils. Toccoa soils are sandier throughout than Wehadkee soils.

Typical pedon of Wehadkee silt loam, in a wooded area, 1.6 miles northeast of Pine Grove Church on Georgia Highway 43, 2.0 miles east on dirt road, 0.4 mile south, 300 feet east of road, in McDuffie County:

A1—0 to 8 inches; grayish brown (2.5Y 5/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak fine granular structure; friable; many fine roots; medium acid; gradual wavy boundary.

B1g—8 to 18 inches; gray (10YR 5/1) silty clay loam; common medium distinct light yellowish brown (10YR 6/4) mottles; weak fine and medium subangular blocky structure; friable; few fine roots; medium acid; clear smooth boundary.

B21g—18 to 28 inches; gray (10YR 5/1) clay loam; common medium faint yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; medium acid; gradual wavy boundary.

B22g—28 to 42 inches; gray (10YR 5/1) clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak fine and medium subangular blocky structure; friable; slightly acid; gradual wavy boundary.

Cg—42 to 60 inches; gray (10YR 5/1) loamy fine sand; few medium distinct brown (10YR 5/3) mottles; single grained; loose; medium acid.

The solum is 40 to 55 inches thick. The soil is slightly acid or medium acid.

The A horizon is 6 to 10 inches thick. It has hue of 2.5Y to 7.5YR, value of 4 to 6, and chroma of 1 to 4.

The B horizon is 34 to 50 inches thick. It is neutral or has hue of 10YR; it has value of 4 or 5 and chroma of 0 or 1. In some places there are few to many yellowish brown or brown mottles. The B horizon is silt loam, clay loam, or silty clay loam.

Wickham series

The Wickham series consists of deep, well drained, moderately permeable soils that formed in loamy sediments. Wickham soils are in small areas on stream terraces adjacent to the larger streams. Slope ranges from 2 to 6 percent.

Wickham soils are associated with Altavista and Cecil soils. Altavista soils are on the same landscape, but, unlike Wickham soils, they are moderately well drained. Unlike Wickham soils, Cecil soils are on uplands and have a clayey Bt horizon.

Typical pedon of Wickham fine sandy loam, 2 to 6 percent slopes, in an area of permament pasture, 0.2 mile south of Little River bridge on Georgia Highway 80, 930 feet west, in Warren County:

Ap—0 to 6 inches; reddish brown (5YR 5/3) fine sandy loam; weak fine granular structure; very friable; many very fine roots; few rounded quartz pebbles; few fine flakes of mica; medium acid; clear smooth boundary.

B1—6 to 10 inches; reddish brown (5YR 5/3) sandy clay loam; weak medium granular structure; friable; common very fine and fine roots; few fine flakes of mica; few patchy clay films on faces of peds; medium acid; gradual wavy boundary.

B21t—10 to 26 inches; red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; few thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B22t—26 to 44 inches; red (2.5YR 4/8) clay loam; moderate medium subangular blocky structure; friable; few very fine roots; common fine flakes of mica; continuous clay films on faces of peds; very strongly acid; gradual wavy boundary.

B3—44 to 62 inches; yellowish red (5YR 4/8) sandy clay loam; common fine and medium distinct strong brown (7.5YR 5/8) mottles; weak medium granular structure; friable; common fine flakes of mica; few patchy clay films on faces of peds; very strongly acid.

The solum is 40 to 60 inches thick. Bedrock is at a depth of 6 to 10 feet or more. In unlimed areas the soil is very strongly acid to medium acid throughout.

The Ap horizon is 5 to 7 inches thick. It has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4.

The Bt horizon is 30 to 40 inches thick. It has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. The Bt horizon is sandy clay loam or clay loam.

The B3 horizon is 10 to 18 inches thick. It has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 6 or 8. The B3 horizon is sandy loam or sandy clay loam. In some places there are mottles. The mottles are few or common, fine or medium, and brown.

Worsham series

The Worsham series consists of deep, poorly drained soils that are moderately slowly permeable to very slowly permeable. These soils formed in stratified alluvial material at the base of slopes, in depressions, and at the head of draws. The water table is at a depth of less than 12 inches from late in fall until spring. Slope ranges from 0 to 2 percent.

Worsham soils are associated with Altavista, Appling, and Wedowee soils. The associated soils are better drained than Worsham soils. Unlike Worsham soils, Altavista soils are on stream terraces, and Appling and Wedowee soils are on higher lying ridgetops and hillsides of uplands.

Typical pedon of Worsham sandy loam, in a wooded area, 0.4 mile west of oak flooring plant on Masena road, 100 feet north, in McDuffie County:

A1—0 to 5 inches; dark gray (5Y 4/1) sandy loam; moderate fine granular structure; very friable; many very fine and fine roots; very strongly acid; clear wavy boundary.

A2—5 to 8 inches; light brownish gray (2.5Y 6/2) sandy loam; common fine faint brownish yellow (10YR 6/6) mottles; moderate medium granular structure; friable; common very fine and fine roots; few angular quartz pebbles; strongly acid; clear smooth boundary.

B1g—8 to 14 inches; light gray (10YR 7/1) sandy clay loam; common medium faint brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; few angular quartz pebbles; few discontinuous clay films on faces of peds; strongly acid; gradual wavy boundary.

B2tg—14 to 33 inches; gray (10YR 6/1) sandy clay; common fine and coarse faint brownish yellow (10YR 6/8) mottles; moderate coarse subangular blocky structure; very firm; few fine roots; few angular quartz pebbles; few patchy clay films on faces of peds; many fine and medium pores; medium acid; gradual wavy boundary.

B3g—33 to 42 inches; light gray (N 7/0) sandy clay and white (2.5Y 8/2) sandy clay loam; many coarse distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure, massive in places; light gray areas are firm, and white areas are friable; common fine roots; strongly acid; gradual wavy boundary.

Cg—42 to 62 inches; white (5Y 8/1) sandy clay loam; common medium distinct yellow (2.5Y 8/6) mottles; common medium light gray (N 7/0) clay pockets; massive; friable; strongly acid.

The solum is 42 to 60 inches thick. Bedrock is at a depth of more than 7 feet. In unlimed areas the soil is very strongly acid or strongly acid throughout.

The A horizon is 8 or 9 inches thick. It has hue of 2.5Y to 10YR, value of 3 to 6, and chroma of 1 or 2.

The B1g horizon is 4 to 8 inches thick. It has hue of 10YR, value of 5 to 7, and chroma of 1. In some places there are mottles. The mottles are few to common, medium, and red, brown, and yellow. The B1g horizon is sandy clay loam or clay loam.

The Btg horizon is 19 to 32 inches thick. It has neutral colors or hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. In some places there are mottles. The mottles are few or common and yellow, red, and brown.

The B3g horizon is 8 to 14 inches thick. It is mottled in hue of 7.5YR to 2.5Y, value of 5 to 8, and chroma of 1 to 4, 6, or 8. The B3g horizon is sandy clay loam or clay loam.

The C horizon is mottled in hue of 7.5YR to 5Y, value of 5 to 7, and chroma of 1 to 4, 6, or 8.

Formation of the soils

Glenn L. Bramlett, soil correlator, Soil Conservation Service, helped prepare this section.

In this section, the factors of soil formation are discussed and related to soils in the survey area. In addition, the processes of soil formation are explained.

The characteristics of the soil at any given point are determined by the physical and mineral composition of the parent material; the climate under which the parent material accumulated and has existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time the forces of soil formation have acted on the soil material. All five of these factors influence the present characteristics of every soil, but the significance of each factor varies from one place to another. In one area one factor may dominate the formation of a soil, and in another area a different factor may be more important.

The interrelationship among these five factors is complex, and the effects of any one factor cannot be isolated and completely evaluated. It is convenient to discuss each factor separately, however, and to indicate the probable effects of each.

Parent material

Parent material is the unconsolidated mass in which soil forms. It is largely responsible for the chemical and mineralogical composition of a soil. Columbia, McDuffie, and Warren Counties are underlain by crystalline rock and sedimentary deposits; thus, the parent material is quite variable.

According to the 1976 Geologic Map of Georgia (*5*), about 80 percent of Columbia, McDuffie, and Warren Counties is underlain by Piedmont crystalline rock, and 20 percent is underlain by Coastal Plain sedimentary deposits. (In this soil survey the Coastal Plain is referred to as the Carolina and Georgia Sandhills.)

Most of the Piedmont area is underlain by granite gneiss and graphite schist or closely related rocks. The gneiss and schist are mainly quartz and feldspar. The parent material of Appling and Cecil soils weathered from these rocks. These soils are low in base saturation and have kaolonitic mineralogy.

Some areas on the Piedmont are underlain by mica schist. This rock has weathered to parent material that is high in content of mica. Grover and Madison soils, which are micaceous throughout, are examples of soils that formed in this parent material.

On the Piedmont also are Georgeville soils, which formed in parent material that weathered from fine-grained metavolcanic rock. Both the parent material and the soils are medium in content of silt.

The Coastal Plain Carolina and Georgia Sandhills area is underlain by sedimentary rocks classified as Irvington sand, Lower Tertiary-Cretaceous Undifferentiated, and Twiggs clay. These marine sediments are commonly stratified and weakly consolidated. Norfolk, Troup, and Wagram soils formed in these sediments. The soils are low in base saturation and have siliceous mineralogy.

Moderately thick recent sediments on the flood plains are the parent material of Bibb and Toccoa soils. These soils are considered to be geologically young soils because they do not have a B horizon. Bibb soils have siliceous mineralogy and are acid; they reflect the characteristics of soils on the uplands from which the sediments derived. Correspondingly, Toccoa soils have mixed mineralogy and are nonacid.

Plants and animals

The role of plants, animals, and other organisms is significant in soil development, but the direct impact of each is difficult to measure in a soil. Some of the changes caused by plants and animals are gains in organic matter and nitrogen, gains or losses of plant nutrients, and change in structure and porosity.

The soils of Columbia, McDuffie, and Warren Counties formed under a succession of plants. Deciduous trees are the climax vegetation that has contributed significantly toward the recycling of plant nutrients, the accumulation of organic matter, and the energy for animal life. Plants provide cover that reduces erosion, and they stabilize the surface of the soil, enabling the soil-forming processes to continue. Plants provide a more stable environment for the soil-forming processes because they reduce the extremes in temperature that unprotected soils are subjected to.

Animal life in the soils is abundant under the present vegetation and environment. Ants, bees, wasps, earthworms, and spiders, by making channels in the soil, and rodents, moles, crustacea, reptiles, and foxes, by making burrows, mix the soil in the upper horizons. Bacteria, fungi, and other micro-organisms hasten decomposition of organic matter and increase the release of minerals for additional plant growth. Man is projecting himself into the soil-forming process by tilling the soils, removing hills, filling valleys, and reducing or increasing soil fertility.

The net gains and losses caused by plants and animals in the soil-forming process are important in Columbia, McDuffie, and Warren Counties. However, within the relatively small confines of the survey area, one soil is not significantly different from another soil because of plants and animals.

Climate

The two most important measured features of climate that relate to soil properties are rainfall and temperature.

Water is essential in the formation of soil. Water dissolves soluble materials and is used by plants and animals. It transports material from one part of the soil to another part and from one area to another area. These processes and chemical reactions in the soil are dependent to some extent on temperature. Temperature is important in controlling the type and quantity of vegetation, the amount and kind of organic matter, and the rate of decomposition of organic matter.

The climate of Columbia, McDuffie, and Warren Counties is warm and moist and is probably similar to the climate that existed as the soils were forming. The relatively high rainfall and warm temperature contribute to rapid soil formation. Rainfall and temperature are uniform throughout the survey area.

The properties of a soil in some measure tend to control the temperature of the soil. Davidson soils, for example, can be planted earlier in the spring than Appling soils because the dark colored minerals in the surface layer of Davidson soils absorb more solar energy than the light colored minerals in the surface layer of Appling soils. Also, the amount of water in a soil at a given time controls the temperature of the soil. For example, well drained Troup soils cool and heat more rapidly than well drained Faceville soils because Troup soils have very thick loamy sand surface and subsurface layers that have a lower available water capacity than Faceville soils, which have a thin sandy loam surface layer and a clayey subsoil.

Relief

Relief implies relative elevation and is defined as the elevations or inequalities of a land surface considered collectively (*6*). Thickness of the solum, wetness, soil temperature, erosion, and plant cover are features commonly thought to be influenced by relief.

In Columbia, McDuffie, and Warren Counties, obvious relationships with relief are thickness of the solum and wetness. Cecil soils on broad, gentle ridgetops have a thicker solum than Wedowee soils on steeper and more undulating hillsides. This difference in thickness can be attributed to slow geologic erosion of the surface layer on gently sloping soils and to the lack of percolating water on steep soils.

The movement of water across the surface and through the soil profile is controlled to a large extent by relief. Therefore, the degree of soil wetness is related to relief. In sloping areas, runoff is more rapid and less water enters the soil, so the areas are drier. As a result of runoff and the lateral movement of water through the soil, lower lying areas are commonly wetter. Well drained Davidson soils on sloping uplands characteristically are dark red and do not have mottles. Poorly drained Worsham soils in nearly level depressions have a seasonally high water table, are characteristically gray throughout, and are mottled.

Time

The length of time that the soil-forming factors act on the parent material determines to a large degree the characteristics of the soil. Soils in Columbia, McDuffie, and Warren Counties are generally classified as either young or mature. The young soils do not have pedogenic horizons; they show an irregular decrease in content of carbon with an increase in depth. Mature soils are in equilibrium with the environment. They have readily recognizable pedogenic horizons and show a regular decrease in content of carbon with an increase in depth.

Bibb and Toccoa soils are on flood plains that annually receive new sediment from floodwaters. These soils are stratified and are not old enough to have a zone of eluviation. Appling, Faceville, and Tifton soils are commonly on broad, stable, interstream divides where the soil-forming processes have been active for thousands of years. These soils have a thick solum and a highly developed zone of illuviation.

References

(1) Abercrombie, W.F. 1954. A system of soil classification. Highw. Res. Bd. Proc. Publ. 324, pp. 509-514, illus.

(2) American Association of State Highway [and Transportation] Officials. 1970. Standard specifications for highway materials and methods of sampling and testing. Ed. 10, 2 Vol., illus.

(3) American Society for Testing and Materials. 1974. method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

(4) Bergeaux, P.J. [rev. Mar. 1976]. Fertilizer recommendations for field crops. Univ. of Ga. Coll. of Agric., Circ. 639, 6 pp., illus.

(5) Georgia Department of Natural Resources. 1976. Geologic map of Georgia. Geol. and Wat. Resour. Div., Ga. Geol. Surv., 1 p.

(6) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962]

(7) United States Department of Agriculture. 1975. Soil taxonomy: a basic system of soil classification for making and interpreting soil surveys. Soil Conserv. Serv., U.S. Dep. Agric. Handb. 436, 754 pp., illus.

Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Medium	6 to 9
High	More than 9

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A map of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, for example, in "hillpeats" and "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake. The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured (heavy textured) soil. Sandy clay, silty clay, and clay.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *No-*

vember-May, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material from 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate soil strength for supporting loads.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differencees are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of subsurface tunnels or pipelike cavities in the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents that commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on exposure to repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade, whereas ironstone cannot be cut but can be broken or shattered with a spade. Plinthite is one form of the material that has been called laterite.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and 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 described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Saprolite (geology). Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In soil survey, the term saprolite is applied to any unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by

100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in 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. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use or management.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, 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."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

TABLES

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

[Recorded in the period 1951-75 at Warrenton, Ga.]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	57.1	35.4	46.5	77	13	72	4.92	2.76	6.68	8	.1
February---	60.0	36.2	48.1	79	14	92	4.86	2.96	6.56	8	.9
March------	66.9	41.7	54.3	85	23	187	5.58	3.49	7.45	8	.0
April------	76.3	50.1	63.2	90	32	396	4.00	2.31	5.36	6	.0
May--------	83.7	58.6	71.2	96	40	657	4.37	2.03	6.27	6	.0
June-------	88.7	65.2	77.0	100	52	810	3.72	2.11	5.02	7	.0
July-------	91.1	68.6	79.9	101	59	927	4.59	2.82	6.18	8	.0
August-----	90.9	68.2	79.6	100	59	918	3.63	1.88	5.05	6	.0
September--	84.8	63.4	74.1	98	48	723	3.92	1.82	5.61	5	.0
October----	76.1	51.6	63.9	90	31	431	2.58	.63	4.12	4	.0
November---	66.4	41.5	54.0	83	23	147	2.53	1.23	3.59	5	.0
December---	58.7	35.9	47.3	77	15	82	4.24	2.36	5.77	7	.0
Year-----	75.1	51.4	63.3	102	11	5,442	48.94	40.92	56.59	78	1.0

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50°F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-75 at Warrenton, Ga.]

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 21	April 3	April 10
2 years in 10 later than--	March 11	March 26	April 5
5 years in 10 later than--	February 22	March 13	March 25
First freezing temperature in fall:			
1 year in 10 earlier than--	November 18	November 2	October 25
2 years in 10 earlier than--	November 25	November 8	October 29
5 years in 10 earlier than--	December 7	November 18	November 6

TABLE 3.--GROWING SEASON LENGTH

[Recorded in the period 1951-75 at Warrenton, Ga.]

Probability	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	253	225	207
8 years in 10	265	233	213
5 years in 10	287	249	225
2 years in 10	310	266	237
1 year in 10	322	274	243

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Columbia County	McDuffie County	Warren County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Acres	Pct
AkA	Altavista sandy loam, 0 to 2 percent slopes	796	3,343	3,136	7,275	1.4
AmB	Appling sandy loam, 2 to 6 percent slopes	11,223	9,654	17,981	38,858	7.4
AmC	Appling sandy loam, 6 to 10 percent slopes	7,888	4,949	7,788	20,625	3.9
Bh	Bibb silt loam	1,678	2,840	2,588	7,106	1.4
CfB2	Cecil sandy clay loam, 2 to 6 percent slopes, eroded	13,445	5,833	8,697	27,975	5.3
CfC2	Cecil sandy clay loam, 6 to 10 percent slopes, eroded	14,626	3,998	7,275	25,899	4.9
CfE2	Cecil sandy clay loam, 10 to 25 percent slopes, eroded	10,788	2,474	3,119	16,381	3.1
CK	Chewacla and Congaree soils	4,488	4,853	7,195	16,536	3.1
DgB	Davidson loam, 2 to 6 percent slopes	1,805	728	340	2,873	0.5
DhC2	Davidson clay loam, 6 to 10 percent slopes, eroded	1,651	612	267	2,530	0.5
DhE2	Davidson clay loam, 10 to 25 percent slopes, eroded	948	262	12	1,222	0.2
EnD	Enon sandy loam, 10 to 15 percent slopes	3,246	418	73	3,737	0.7
FdB	Faceville sandy loam, 2 to 6 percent slopes	140	129	1,410	1,679	0.3
FmC	Flomaton Variant gravelly loamy sand, 2 to 10 percent slopes	0	0	1,367	1,367	0.3
GcB	Georgeville fine sandy loam, 2 to 6 percent slopes	4,915	13,042	9,601	27,558	5.2
GdC2	Georgeville clay loam, 6 to 10 percent slopes, eroded	4,884	12,350	10,518	27,752	5.2
GdE2	Georgeville clay loam, 10 to 25 percent slopes, eroded	2,692	7,945	7,891	18,528	3.5
GeB	Grover sandy loam, 2 to 6 percent slopes	1,502	4,080	8,730	14,312	2.7
GeC	Grover sandy loam, 6 to 10 percent slopes	2,465	2,784	3,978	9,227	1.8
GeD	Grover sandy loam, 10 to 15 percent slopes	1,393	965	383	2,741	0.5
HeB	Helena loamy coarse sand, 2 to 6 percent slopes	4,021	2,276	2,835	9,132	1.7
HeC	Helena loamy coarse sand, 6 to 10 percent slopes	5,911	1,111	1,704	8,726	1.7
MdB	Madison sandy loam, 2 to 6 percent slopes	2,717	3,504	4,469	10,690	2.0
MdC	Madison sandy loam, 6 to 10 percent slopes	2,803	1,411	3,041	7,255	1.4
MdE	Madison sandy loam, 10 to 25 percent slopes	3,081	1,253	946	5,280	1.0
MgD	Madison-Grover complex, 6 to 15 percent slopes	991	665	0	1,656	0.3
NhB	Norfolk loamy sand, 2 to 6 percent slopes	2,280	7,750	5,017	15,047	2.9
NhC	Norfolk loamy sand, 6 to 10 percent slopes	921	1,779	1,656	4,356	0.8
OcB	Orangeburg sandy loam, 2 to 6 percent slopes	1,440	2,980	2,299	6,719	1.3
OcC	Orangeburg sandy loam, 6 to 10 percent slopes	1,342	919	1,134	3,395	0.6
Pg	Pits, gravel	0	0	133	133	*
Pk	Pits, kaolin	0	19	227	246	*
Pm	Pits, quarries	194	0	128	322	0.1
Ro	Roanoke silt loam	11	876	813	1,700	0.3
Rx	Rock outcrop	262	0	0	262	*
TfB	Tifton loamy sand, 2 to 6 percent slopes	512	499	1,396	2,407	0.5
TsC	Tifton sandy loam, 6 to 10 percent slopes	454	260	632	1,346	0.3
Tv	Toccoa loam	5,169	2,939	3,643	11,751	2.2
TwC	Troup sand, 2 to 10 percent slopes	4,553	12,265	7,717	24,535	4.6
TwE	Troup sand, 10 to 25 percent slopes	626	1,297	1,245	3,168	0.6
VeB	Vaucluse loamy coarse sand, 2 to 6 percent slopes	318	509	245	1,072	0.2
VeD	Vaucluse loamy coarse sand, 6 to 15 percent slopes	2,088	2,080	898	5,066	1.0
WaB	Wagram loamy sand, 2 to 6 percent slopes	8,097	11,834	11,668	31,599	6.0
WaC	Wagram loamy sand, 6 to 10 percent slopes	4,021	5,607	4,715	14,343	2.7
WaD	Wagram loamy sand, 10 to 15 percent slopes	1,236	1,598	959	3,793	0.7
WeB	Wedowee loamy sand, 2 to 6 percent slopes	5,600	2,762	5,639	14,001	2.6
WeC	Wedowee loamy sand, 6 to 10 percent slopes	14,124	5,704	7,229	27,057	5.1
WeD	Wedowee loamy sand, 10 to 15 percent slopes	10,186	2,795	1,593	14,574	2.8
WeE	Wedowee loamy sand, 15 to 25 percent slopes	9,613	3,525	3,810	16,948	3.2
Wf	Wehadkee silt loam	1,723	1,366	1,936	5,025	0.9
WhB	Wickham fine sandy loam, 2 to 6 percent slopes	482	256	545	1,283	0.2
Wo	Worsham sandy loam	507	694	1,139	2,340	0.4
	Total	185,856	161,792	181,760	529,408	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Corn	Cotton lint	Soybeans	Wheat	Grain sorghum	Pasture
	Bu	Lb	Bu	Bu	Bu	AUM*
AkA: Altavista	120	550	45	55	60	9.0
AmB: Appling	95	650	35	45	55	8.0
AmC: Appling	80	600	30	40	45	7.5
Bh: Bibb	---	---	---	---	---	---
CfB2: Cecil	70	500	40	35	50	7.5
CfC2: Cecil	60	450	35	30	40	7.0
CfE2: Cecil	---	---	---	---	---	5.5
CK: Chewacla	96	---	35	---	---	9.0
DgB: Davidson	110	750	45	50	65	9.0
DhC2: Davidson	75	450	35	40	50	8.0
DhE2: Davidson	---	---	---	---	---	6.0
EnD: Enon	65	450	25	40	40	8.0
FdB: Faceville	105	875	40	45	70	9.0
FmC: Flomaton Variant	---	---	---	---	---	4.0
GcB: Georgeville	90	700	35	40	60	6.5
GdC2: Georgeville	60	450	30	30	40	4.5
GdE2: Georgeville	---	---	---	---	---	---
GeB: Grover	90	700	45	50	60	7.5
GeC: Grover	80	600	40	45	50	6.5
GeD: Grover	70	500	35	40	45	6.0
HeB: Helena	75	575	40	45	50	5.8

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Cotton lint	Soybeans	Wheat	Grain sorghum	Pasture
	Bu	Lb	Bu	Bu	Bu	AUM*
HeC----------------------- Helena	65	475	35	40	45	5.3
MdB----------------------- Madison	90	700	45	50	60	7.5
MdC----------------------- Madison	80	600	40	45	50	6.5
MdE----------------------- Madison	---	---	---	---	---	5.5
MgD----------------------- Madison	---	---	---	---	---	4.5
NhB----------------------- Norfolk	100	650	35	55	65	10.0
NhC----------------------- Norfolk	90	600	30	50	55	9.5
OcB----------------------- Orangeburg	100	850	45	45	65	10.5
OcC----------------------- Orangeburg	80	650	30	35	55	10.0
Pg, Pk, Pm---------------- Pits	---	---	---	---	---	---
Ro------------------------ Roanoke	---	---	---	---	---	5.2
Rx------------------------ Rock outcrop	---	---	---	---	---	---
TfB----------------------- Tifton	100	950	45	45	65	8.5
TsC----------------------- Tifton	85	750	40	40	55	8.0
Tv------------------------ Toccoa	90	---	45	45	65	6.5
TwC----------------------- Troup	55	---	30	35	---	7.0
TwE----------------------- Troup	---	---	---	---	---	6.0
VeB----------------------- Vaucluse	60	500	25	30	40	7.5
VeD----------------------- Vaucluse	---	---	---	---	---	7.0
WaB----------------------- Wagram	75	550	25	40	50	8.0
WaC----------------------- Wagram	70	500	20	30	45	6.5
WaD----------------------- Wagram	---	---	---	---	---	5.5
WeB----------------------- Wedowee	80	525	30	35	50	5.0

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Cotton lint	Soybeans	Wheat	Grain sorghum	Pasture
	Bu	Lb	Bu	Bu	Bu	AUM*
WeC------------------------ Wedowee	75	450	25	30	40	4.5
WeD------------------------ Wedowee	---	---	---	---	---	4.0
WeE------------------------ Wedowee	---	---	---	---	---	4.0
Wf------------------------- Wehadkee	---	---	---	---	---	8.5
WhB------------------------ Wickham	115	750	50	50	65	9.5
Wo------------------------- Worsham	---	---	---	---	---	4.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas excluded. Absence of an entry means no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	---	---	---	---
II	195,184	144,559	19,026	31,599
III	166,448	111,034	16,536	38,878
IV	82,393	77,233	---	5,160
V	11,146	---	11,146	---
VI	70,106	65,081	5,025	---
VII	3,168	---	---	3,168
VIII	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available. Site index was calculated at age 30 for eastern cottonwood, at age 35 for American sycamore, and at age 50 for all other species]

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Important trees	Site index	
AkA----------------- Altavista	2w	Slight	Moderate	Slight	Loblolly pine----------	91	Loblolly pine, yellow-poplar, black walnut, sweetgum, American sycamore, cherrybark oak, water oak.
					Longleaf pine----------	84	
					Shortleaf pine---------	77	
					Sweetgum---------------	84	
					White oak--------------	---	
AmB, AmC----------- Appling	3o	Slight	Slight	Slight	Loblolly pine----------	81	Loblolly pine, slash pine, yellow-poplar, cherrybark oak, American sycamore, northern red oak.
					Shortleaf pine---------	65	
					Scarlet oak------------	68	
					Southern red oak-------	76	
					Virginia pine----------	74	
					White oak--------------	71	
					Yellow-poplar----------	90	
Bh----------------- Bibb	2w	Slight	Severe	Severe	Loblolly pine----------	90	Loblolly pine, sweetgum, yellow-poplar, American sycamore.
					Sweetgum---------------	90	
					Water oak--------------	90	
CfB2, CfC2--------- Cecil	4c	Moderate	Moderate	Moderate	Loblolly pine----------	72	Loblolly pine, Virginia pine.
					Shortleaf pine---------	66	
					Virginia pine----------	65	
CfE2--------------- Cecil	4c	Severe	Severe	Moderate	Loblolly pine----------	72	Loblolly pine, Virginia pine.
					Shortleaf pine---------	66	
					Virginia pine----------	65	
CK*:							
Chewacla-----------	1w	Slight	Moderate	Moderate	Loblolly pine----------	96	Loblolly pine, slash pine, American sycamore, yellow-poplar, sweetgum, eastern white pine, green ash, cherrybark oak, black walnut.
					Yellow-poplar----------	104	
					American sycamore------	90	
					Sweetgum---------------	97	
					Water oak--------------	86	
					Eastern cottonwood-----	100	
					Green ash--------------	97	
					Southern red oak-------	90	
Congaree-----------	1o	Slight	Slight	Slight	Sweetgum---------------	100	Loblolly pine, slash pine, yellow-poplar, American sycamore, black walnut, cherrybark oak, eastern cottonwood, sweetgum.
					Yellow-poplar----------	107	
					Cherrybark oak---------	107	
					Loblolly pine----------	90	
					Eastern cottonwood-----	107	
					American sycamore------	89	
					Black walnut-----------	100	
					Scarlet oak------------	100	
					Willow oak-------------	95	
DgB---------------- Davidson	3o	Slight	Slight	Slight	Loblolly pine----------	81	Loblolly pine, slash pine, yellow-poplar, American sycamore, black walnut, cherrybark oak, eastern cottonwood, sweetgum, northern red oak.
					Shortleaf pine---------	68	
					Northern red oak-------	86	
					Southern red oak-------	72	
					Sweetgum---------------	80	
					White oak--------------	71	
					Yellow-poplar----------	80	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
DhC2: Davidson	3c	Moderate	Slight	Slight	Loblolly pine	81	Loblolly pine, yellow-poplar, northern red oak.
					Shortleaf pine	68	
					Northern red oak	86	
					Southern red oak	72	
					Sweetgum	80	
					White oak	71	
					Yellow-poplar	80	
DhE2: Davidson	3r	Moderate	Moderate	Slight	Loblolly pine	81	Loblolly pine, yellow-poplar, northern red oak.
					Shortleaf pine	68	
					Northern red oak	86	
					Southern red oak	72	
					Sweetgum	80	
					White oak	71	
					Yellow-poplar	80	
EnD: Enon	4o	Moderate	Moderate	Moderate	Loblolly pine	71	Eastern redcedar, loblolly pine, Virginia pine.
					Shortleaf pine	60	
					Virginia pine	65	
FdB: Faceville	3o	Slight	Slight	Slight	Loblolly pine	82	Loblolly pine, slash pine.
					Slash pine	80	
					Longleaf pine	65	
FmC: Flomaton Variant	4f	Slight	Moderate	Moderate	Loblolly pine	70	Loblolly pine, Virginia pine.
					Longleaf pine	60	
					Shortleaf pine	60	
GcB: Georgeville	3o	Slight	Slight	Slight	Loblolly pine	81	Loblolly pine, black walnut, yellow-poplar, American sycamore, northern red oak.
					Longleaf pine	67	
					Shortleaf pine	63	
					White oak	69	
					Scarlet oak	70	
					Southern red oak	67	
GdC2, GdE2: Georgeville	4c	Moderate	Moderate	Moderate	Loblolly pine	70	Loblolly pine, Virginia pine.
					Longleaf pine	60	
GeB, GeC, GeD: Grover	3o	Slight	Slight	Slight	Loblolly pine	80	Loblolly pine, Virginia pine.
					White oak	---	
					Southern red oak	---	
HeB, HeC: Helena	3w	Slight	Moderate	Slight	Loblolly pine	80	Loblolly pine, Virginia pine, yellow-poplar.
					Shortleaf pine	63	
					White oak	64	
					Yellow-poplar	87	
MdB, MdC: Madison	3o	Slight	Slight	Slight	Loblolly pine	73	Loblolly pine, yellow-poplar, American sycamore, northern red oak.
					Longleaf pine	63	
					Shortleaf pine	66	
					Southern red oak	81	
					Yellow-poplar	96	
MdE: Madison	3r	Moderate	Moderate	Slight	Loblolly pine	73	Loblolly pine, yellow-poplar, northern red oak, white pine.
					Longleaf pine	63	
					Shortleaf pine	66	
					Southern red oak	81	
					Yellow-poplar	96	
MgD*:							
Madison	3o	Slight	Slight	Slight	Loblolly pine	73	Loblolly pine, yellow-poplar, American sycamore, northern red oak.
					Longleaf pine	63	
					Shortleaf pine	66	
					Southern red oak	81	
					Yellow-poplar	96	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Important trees	Site index	
MgD*: Grover	3o	Slight	Slight	Slight	Loblolly pine White oak Southern red oak	80 --- ---	Loblolly pine, slash pine, yellow-poplar, American sycamore.
NhB, NhC: Norfolk	2o	Slight	Slight	Slight	Loblolly pine Longleaf pine Slash pine	86 68 86	Slash pine, loblolly pine.
OcB, OcC: Orangeburg	2o	Slight	Slight	Slight	Loblolly pine Slash pine Longleaf pine	86 86 70	Slash pine, loblolly pine.
Ro: Roanoke	2w	Slight	Severe	Severe	Pin oak Loblolly pine Virginia pine	85 85 65	Loblolly pine.
TfB, TsC: Tifton	2o	Slight	Slight	Slight	Loblolly pine Slash pine Longleaf pine	86 86 68	Loblolly pine, slash pine.
Tv: Toccoa	1o	Slight	Slight	Slight	Loblolly pine Yellow-poplar Sweetgum Southern red oak	90 107 100 ---	Loblolly pine, yellow-poplar, American sycamore, cherrybark oak, black walnut.
TwC, TwE: Troup	3s	Slight	Moderate	Moderate	Loblolly pine Longleaf pine Slash pine	80 70 80	Loblolly pine, slash pine.
VeB, VeD: Vaucluse	3o	Slight	Slight	Slight	Loblolly pine	76	Loblolly pine, slash pine.
WaB, WaC, WaD: Wagram	3s	Slight	Moderate	Moderate	Loblolly pine Slash pine Longleaf pine	82 80 67	Loblolly pine, slash pine,
WeB, WeC, WeD: Wedowee	3o	Slight	Slight	Slight	Loblolly pine Virginia pine Shortleaf pine Southern red oak Northern red oak White oak	80 70 70 70 70 65	Loblolly pine, yellow-poplar, American sycamore.
WeE: Wedowee	3r	Moderate	Moderate	Slight	Loblolly pine Virginia pine Shortleaf pine Southern red oak Northern red oak White oak	80 70 70 70 70 65	Loblolly pine, Virginia pine, eastern redcedar, yellow-poplar.
Wf: Wehadkee	1w	Slight	Severe	Severe	Loblolly pine Sweetgum Yellow-poplar Willow oak Green ash Water oak White ash	102 93 98 90 96 86 88	Loblolly pine, American sycamore, yellow-poplar, green ash, sweetgum, eastern cottonwood, cherrybark oak.
WhB: Wickham	2o	Slight	Slight	Slight	Loblolly pine Slash pine Yellow-poplar Southern red oak	90 90 100 ---	Loblolly pine, slash pine, yellow-poplar, American sycamore. cherrybark oak, northern red oak.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Important trees	Site index	
Wo: Worsham	2w	Slight	Severe	Severe	Northern red oak Shortleaf pine Virginia pine Loblolly pine	80 65 70 80	Loblolly pine, American sycamore, cherrybark oak, yellow-poplar.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--BUILDING SITE DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
AkA: Altavista	Severe: wetness, floods.	Severe: floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods, low strength.
AmB: Appling	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Slight.
AmC: Appling	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Bh: Bibb	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
CfB2: Cecil	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.
CfC2: Cecil	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
CfE2: Cecil	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CK*:					
Chewacla	Severe: wetness, floods.	Severe: floods, wetness, low strength.	Severe: floods, wetness.	Severe: floods, wetness, low strength.	Severe: wetness, floods, low strength.
Congaree	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
DgB: Davidson	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.
DhC2: Davidson	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
DhE2: Davidson	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
EnD: Enon	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength.
FdB: Faceville	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.
FmC: Flomaton Variant	Moderate: small stones.	Slight	Slight	Moderate: slope.	Slight.
GcB: Georgeville	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.
GdC2, GdE2: Georgeville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
GeB: Grover	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.
GeC, GeD: Grover	Moderate: slope.	Moderate: slope, low strength.	Moderate: slope, low strength.	Severe: slope.	Moderate: slope, low strength.
HeB: Helena	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.
HeC: Helena	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell.
MdB: Madison	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.
MdC: Madison	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.
MdE: Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MgD*:					
Madison	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.
Grover	Moderate: slope.	Moderate: slope, low strength.	Moderate: slope, low strength.	Severe: slope.	Moderate: slope, low strength.
NhB: Norfolk	Slight	Slight	Slight	Moderate: slope.	Slight.
NhC: Norfolk	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
OcB: Orangeburg	Slight	Slight	Slight	Moderate: slope.	Slight.
OcC: Orangeburg	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Pg, Pk, Pm. Pits					
Ro: Roanoke	Severe: floods, too clayey, wetness.	Severe: floods, low strength, wetness.	Severe: floods, low strength, wetness.	Severe: floods, low strength, wetness.	Severe: floods, low strength, wetness.
Rx. Rock outcrop					
TfB, TsC: Tifton	Slight	Slight	Moderate: wetness.	Moderate: slope.	Slight.
Tv: Toccoa	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
TwC: Troup	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
TwE: Troup	Severe: cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
VeB: Vaucluse	Slight	Slight	Slight	Moderate: slope.	Slight.
VeD: Vaucluse	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
WaB: Wagram	Slight	Slight	Slight	Moderate: slope.	Slight.
WaC, WaD: Wagram	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
WeB: Wedowee	Moderate: too clayey.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: slope, low strength, shrink-swell.	Moderate: low strength, shrink-swell.
WeC, WeD: Wedowee	Moderate: slope.	Moderate: slope, low strength, shrink-swell.	Moderate: slope, low strength, shrink-swell.	Severe: slope.	Moderate: slope, low strength, shrink-swell.
WeE: Wedowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wf: Wehadkee	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
WhB: Wickham	Slight	Slight	Slight	Moderate: slope.	Moderate: floods.
Wo: Worsham	Severe: wetness, too clayey.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--SANITARY FACILITIES

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AkA Altavista	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Good.
AmB Appling	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
AmC Appling	Moderate: slope, percs slowly.	Severe: slope, seepage.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
Bh Bibb	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.
CfB2 Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey, seepage.	Slight	Fair: too clayey.
CfC2 Cecil	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey, seepage.	Moderate: slope.	Fair: too clayey, slope.
CfE2 Cecil	Severe: slope.	Severe: slope.	Moderate: too clayey, seepage, slope.	Severe: slope.	Poor: slope.
CK*:					
Chewacla	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Good.
Congaree	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
DgB Davidson	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
DhC2 Davidson	Moderate: slope, percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
DhE2 Davidson	Severe: slope.	Severe: slope.	Severe: too clayey, slope.	Severe: slope.	Poor: too clayey, slope.
EnD Enon	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
FdB Faceville	Slight	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
FmC Flomaton Variant	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.
GcB Georgeville	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Poor: too clayey.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GdC2, GdE2---------- Georgeville	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Poor: too clayey.
GeB----------------- Grover	Moderate: percs slowly.	Moderate: slope, seepage.	Slight-----------	Slight-----------	Fair: hard to pack.
GeC, GeD------------ Grover	Moderate: slope, percs slowly.	Severe: slope.	Slight-----------	Moderate: slope.	Fair: slope, hard to pack.
HeB----------------- Helena	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----------	Poor: too clayey.
HeC----------------- Helena	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
MdB----------------- Madison	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight-----------	Fair: too clayey.
MdC----------------- Madison	Moderate: slope, percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
MdE----------------- Madison	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
MgD*:					
Madison------------	Moderate: slope, percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
Grover-------------	Moderate: slope.	Severe: slope.	Slight-----------	Moderate: slope.	Fair: slope, hard to pack.
NhB----------------- Norfolk	Slight-----------	Moderate: slope, seepage.	Slight-----------	Slight-----------	Good.
NhC----------------- Norfolk	Moderate: slope, wetness.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
OcB----------------- Orangeburg	Slight-----------	Moderate: slope, seepage.	Slight-----------	Slight-----------	Good.
OcC----------------- Orangeburg	Moderate: slope.	Severe: slope.	Slight-----------	Moderate: slope.	Fair: slope.
Pg, Pk, Pm. Pits					
Ro------------------ Roanoke	Severe: floods, percs slowly, wetness.	Slight-----------	Severe: floods, too clayey, wetness.	Severe: floods, wetness.	Poor: hard to pack, too clayey, wetness.
Rx. Rock outcrop					
TfB----------------- Tifton	Moderate: percs slowly.	Moderate: slope, seepage.	Slight-----------	Slight-----------	Good.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
TsC Tifton	Moderate: percs slowly.	Severe: slope.	Slight	Slight	Good.
Tv Toccoa	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
TwC Troup	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
TwE Troup	Severe: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: slope, too sandy.
VeB Vaucluse	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
VeD Vaucluse	Severe: percs slowly.	Severe: slope.	Slight	Moderate: slope.	Fair: slope.
WaB Wagram	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
WaC, WaD Wagram	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, too sandy.
WeB Wedowee	Moderate: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey, area reclaim.
WeC, WeD Wedowee	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, area reclaim, slope.
WeE Wedowee	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
Wf Wehadkee	Severe: wetness.	Severe: floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: wetness.
WhB Wickham	Slight	Moderate: slope, seepage.	Severe: seepage.	Slight	Good.
Wo Worsham	Severe: percs slowly, wetness.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AkA: Altavista	Poor: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
AmB, AmC: Appling	Fair: low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
Bh: Bibb	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
CfB2, CfC2: Cecil	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
CfE2: Cecil	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
CK*:				
Chewacla	Poor: wetness, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
Congaree	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
DgB: Davidson	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
DhC2: Davidson	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, slope.
DhE2: Davidson	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
EnD: Enon	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
FdB: Faceville	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
FmC: Flomaton Variant	Good	Poor: excess fines.	Fair: excess fines.	Poor: small stones.
GcB, GdC2, GdE2: Georgeville	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
GeB, GeC, GeD: Grover	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
HeB, HeC: Helena	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
MdB, MdC: Madison	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
MdE: Madison	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
MgD*:				
Madison	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Grover	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
NhB Norfolk	Good	Unsuited: excess fines.	Unsuited: excess fines.	Good.
NhC Norfolk	Good	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
OcB, OcC Orangeburg	Good	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Pg, Pk, Pm. Pits				
Ro Roanoke	Poor: area reclaim, low strength, wetness.	Poor: excess fines.	Poor: excess fines.	Poor: area reclaim, thin layer, wetness.
Rx. Rock outcrop				
TfB, TsC Tifton	Poor: low strength.	Poor: thin layer.	Unsuited: excess fines.	Poor: small stones.
Tv Toccoa	Good	Poor: excess fines.	Unsuited: excess fines.	Good.
TwC Troup	Good	Fair: excess fines.	Poor: excess fines.	Poor: too sandy.
TwE Troup	Fair: slope.	Fair: excess fines.	Poor: excess fines.	Poor: slope, too sandy.
VeB, VeD Vaucluse	Good	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too sandy.
WaB, WaC, WaD Wagram	Good	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy.
WeB Wedowee	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
WeC, WeD Wedowee	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer, area reclaim.
WeE Wedowee	Fair: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Wf Wehadkee	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: wetness.
WhB Wickham	Good	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Wo-------------------- Worsham	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--WATER MANAGEMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not evaluated]

Soil name and map symbol	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AkA----------------- Altavista	Moderate: seepage.	Moderate: thin layer, wetness.	Floods---------	Wetness, floods.	Not needed-----	Favorable.
AmB----------------- Appling	Moderate: seepage.	Moderate: low strength.	Not needed-----	Favorable------	Favorable------	Favorable.
AmC----------------- Appling	Moderate: seepage.	Moderate: low strength.	Not needed-----	Slope----------	Slope----------	Favorable.
Bh------------------ Bibb	Moderate: seepage.	Severe: piping, wetness.	Floods---------	Floods, wetness.	Not needed-----	Wetness.
CfB2, CfC2, CfE2-- Cecil	Moderate: seepage.	Slight---------	Not needed-----	Complex slope	Complex slope	Complex slope.
CK*:						
Chewacla-----------	Moderate: seepage.	Severe: hard to pack, piping, wetness.	Poor outlets, floods.	Wetness, floods.	Not needed-----	Wetness.
Congaree-----------	Moderate: seepage.	Moderate: compressible, piping, low strength.	Not needed-----	Floods---------	Not needed-----	Not needed.
DgB----------------- Davidson	Moderate: seepage.	Moderate: hard to pack.	Not needed-----	Favorable------	Favorable------	Favorable.
DhC2---------------- Davidson	Moderate: seepage.	Moderate: hard to pack.	Not needed-----	Slope----------	Favorable------	Favorable.
DhE2---------------- Davidson	Moderate: seepage.	Moderate: hard to pack.	Not needed-----	Slope----------	Slope----------	Slope.
EnD----------------- Enon	Moderate: depth to rock.	Severe: shrink-swell, hard to pack.	Not needed-----	Percs slowly---	Erodes easily, slope, percs slowly.	Percs slowly, erodes easily.
FdB----------------- Faceville	Moderate: seepage.	Slight---------	Not needed-----	Favorable------	Favorable------	Favorable.
FmC----------------- Flomaton Variant	Severe: seepage.	Moderate: piping, seepage.	Not needed-----	Droughty, fast intake.	Piping, erodes easily, slope.	Droughty, erodes easily, slope.
GcB----------------- Georgeville	Moderate: slope, seepage.	Moderate: compressible, low strength, erodes easily.	Not needed-----	Complex slope, erodes easily.	Favorable------	Favorable.
GdC2, GdE2--------- Georgeville	Moderate: slope, seepage.	Moderate: compressible, low strength, erodes easily.	Not needed-----	Complex slope, erodes easily.	Complex slope, erodes easily.	Slope, erodes easily.
GeB----------------- Grover	Moderate: seepage.	Moderate: hard to pack, piping.	Not needed-----	Favorable------	Favorable------	Favorable.
GeC, GeD----------- Grover	Moderate: seepage.	Moderate: hard to pack, piping.	Not needed-----	Slope----------	Slope----------	Slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
HeB---------------- Helena	Moderate: depth to rock.	Moderate: shrink-swell, erodes easily.	Not needed-----	Erodes easily	Favorable------	Favorable.
HeC---------------- Helena	Moderate: depth to rock.	Moderate: shrink-swell, erodes easily.	Not needed-----	Erodes easily	Slope----------	Slope.
MdB, MdC, MdE------ Madison	Moderate: seepage.	Moderate: hard to pack, piping.	Not needed-----	Slow intake, slope.	Slope----------	Slope.
MgD*:						
Madison-----------	Moderate: seepage.	Moderate: hard to pack, piping.	Not needed-----	Slow intake, slope.	Slope----------	Slope.
Grover------------	Moderate: seepage.	Moderate: hard to pack, piping.	Not needed-----	Slope----------	Slope----------	Slope.
NhB---------------- Norfolk	Moderate: seepage.	Slight---------	Not needed-----	Favorable------	Favorable------	Favorable.
NhC---------------- Norfolk	Moderate: seepage.	Slight---------	Not needed-----	Slope----------	Favorable------	Slope.
OcB---------------- Orangeburg	Moderate: seepage.	Slight---------	Not needed-----	Favorable------	Favorable------	Favorable.
OcC---------------- Orangeburg	Moderate: seepage.	Slight---------	Not needed-----	Slope----------	Slope----------	Slope.
Pg, Pk, Pm. Pits						
Ro----------------- Roanoke	Favorable------	Compressible, hard to pack, low strength.	Floods, percs slowly, poor outlets.	Slow intake, wetness, percs slowly.	Not needed-----	Not needed.
Rx. Rock outcrop						
TfB---------------- Tifton	Moderate: seepage.	Slight---------	Not needed-----	Fast intake----	Too sandy------	Favorable.
TsC---------------- Tifton	Moderate: seepage.	Slight---------	Not needed-----	Slope, fast intake.	Too sandy------	Favorable.
Tv----------------- Toccoa	Severe: seepage.	Moderate: piping.	Not needed-----	Floods, seepage.	Not needed-----	Not needed.
TwC, TwE----------- Troup	Severe: seepage.	Severe: seepage, piping.	Not needed-----	Droughty, fast intake, seepage.	Too sandy, erodes easily, piping.	Droughty, erodes easily.
VeB, VeD----------- Vaucluse	Slight---------	Moderate: piping.	Not needed-----	Complex slope	Complex slope, percs slowly.	Percs slowly.
WaB---------------- Wagram	Severe: seepage.	Moderate: piping.	Not needed-----	Fast intake, droughty.	Too sandy------	Favorable.
WaC, WaD----------- Wagram	Severe: seepage.	Moderate: piping.	Not needed-----	Slope, droughty.	Slope, too sandy.	Slope.
WeB, WeC----------- Wedowee	Moderate: depth to rock, seepage.	Moderate: low strength, thin layer.	Not needed-----	Slope----------	Favorable------	Favorable.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
WeD, WeE----------Wedowee	Moderate: depth to rock, seepage.	Moderate: low strength, thin layer.	Not needed-----	Slope----------	Slope----------	Slope.
Wf----------------Wehadkee	Moderate: seepage.	Severe: wetness.	Floods---------	Wetness, floods.	Not needed-----	Wetness.
WhB---------------Wickham	Moderate: seepage.	Slight---------	Not needed-----	Favorable------	Favorable------	Favorable.
Wo----------------Worsham	Favorable------	Favorable------	Percs slowly---	Slow intake, wetness.	Not needed-----	Percs slowly, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--RECREATIONAL DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
AkA: Altavista	Severe: floods.	Slight	Moderate: wetness, floods.	Slight.
AmB: Appling	Slight	Slight	Moderate: slope.	Slight.
AmC: Appling	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Bh: Bibb	Severe: floods, wetness.	Severe: wetness.	Severe: floods, wetness.	Severe: floods, wetness.
CfB2: Cecil	Moderate: too clayey.	Moderate: too clayey.	Moderate: slope, too clayey.	Moderate: too clayey.
CfC2: Cecil	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.
CfE2: Cecil	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
CK*:				
Chewacla	Severe: floods, wetness.	Moderate: wetness, floods.	Severe: wetness, floods.	Moderate: wetness, floods.
Congaree	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
DgB: Davidson	Slight	Slight	Moderate: slope.	Slight.
DhC2: Davidson	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.
DhE2: Davidson	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.
EnD: Enon	Moderate: percs slowly.	Moderate: slope.	Severe: slope.	Slight.
FdB: Faceville	Slight	Slight	Moderate: slope.	Slight.
FmC: Flomaton Variant	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.
GcB: Georgeville	Slight	Slight	Moderate: slope.	Slight.
GdC2, GdE2: Georgeville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
GeB: Grover	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
GeC, GeD: Grover	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
HeB: Helena	Moderate: percs slowly.	Moderate: wetness.	Moderate: percs slowly.	Moderate: wetness.
HeC: Helena	Moderate: percs slowly.	Moderate: slope, wetness.	Moderate: percs slowly, slope.	Moderate: wetness.
MdB: Madison	Slight	Slight	Moderate: slope.	Slight.
MdC: Madison	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
MdE: Madison	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
MgD*:				
Madison	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Grover	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
NhB: Norfolk	Slight	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
NhC: Norfolk	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: too sandy.
OcB: Orangeburg	Slight	Slight	Moderate: slope.	Slight.
OcC: Orangeburg	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Pg, Pk, Pm. Pits				
Ro: Roanoke	Severe: floods, wetness, percs slowly.	Severe: wetness.	Severe: floods, wetness, percs slowly.	Severe: wetness.
Rx. Rock outcrop				
TfB: Tifton	Slight	Slight	Moderate: slope, small stones.	Slight.
TsC: Tifton	Slight	Slight	Severe: slope.	Slight.
Tv: Toccoa	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
TwC: Troup	Moderate: too sandy.	Moderate: too sandy.	Severe: too sandy.	Moderate: too sandy.
TwE: Troup	Severe: slope.	Severe: slope.	Severe: too sandy.	Moderate: slope, too sandy.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
VeB------------------- Vaucluse	Moderate: percs slowly, too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Slight.
VeD------------------- Vaucluse	Moderate: percs slowly, too sandy.	Moderate: too sandy.	Severe: slope.	Slight.
WaB------------------- Wagram	Moderate: too sandy.	Moderate: too sandy.	Moderate: slope, too sandy.	Moderate: too sandy.
WaC, WaD-------------- Wagram	Moderate: too sandy, slope.	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy.
WeB------------------- Wedowee	Slight---------------	Slight---------------	Moderate: slope.	Slight.
WeC, WeD-------------- Wedowee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
WeE------------------- Wedowee	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Wf-------------------- Wehadkee	Severe: floods, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
WhB------------------- Wickham	Slight---------------	Slight---------------	Moderate: slope.	Slight.
Wo-------------------- Worsham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AkA---------------- Altavista	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
AmB---------------- Appling	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AmC---------------- Appling	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Bh----------------- Bibb	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
CfB2, CfC2--------- Cecil	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
CfE2--------------- Cecil	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
CK*:										
Chewacla-----------	Very poor.	Poor	Poor	Good	Good	Fair	Fair	Poor	Good	Fair.
Congaree-----------	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
DgB---------------- Davidson	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Good	Poor.
DhC2--------------- Davidson	Fair	Good	Good	Good	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
DhE2--------------- Davidson	Poor	Fair	Good	Good	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
EnD---------------- Enon	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FdB---------------- Faceville	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
FmC---------------- Flomaton Variant	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
GcB---------------- Georgeville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GdC2, GdE2--------- Georgeville	Poor	Poor	Poor	Fair	Poor	Very poor.	Very poor.	Poor	Fair	Very poor.
GeB---------------- Grover	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GeC---------------- Grover	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GeD---------------- Grover	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HeB---------------- Helena	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HeC---------------- Helena	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
MdB----------------- Madison	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MdC----------------- Madison	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MdE----------------- Madison	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
MgD*:										
Madison------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Grover-------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
NhB----------------- Norfolk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
NhC----------------- Norfolk	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
OcB----------------- Orangeburg	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
OcC----------------- Orangeburg	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Pg, Pk, Pm, Pits										
Ro------------------ Roanoke	Poor	Poor	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Rx. Rock outcrop										
TfB----------------- Tifton	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TsC----------------- Tifton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Tv------------------ Toccoa	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TwC, TwE------------ Troup	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
VeB----------------- Vaucluse	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
VeD----------------- Vaucluse	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
WaB----------------- Wagram	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WaC, WaD------------ Wagram	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WeB----------------- Wedowee	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WeC, WeD------------ Wedowee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
WeE----------------- Wedowee	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wf------------------ Wehadkee	Very poor.	Poor	Poor	Fair	Fair	Good	Fair	Poor	Fair	Fair.
WhB----------------- Wickham	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Wo------------------ Worsham	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
AkA----------------- Altavista	0-11	Sandy loam------	SM	A-2	0	95-100	95-100	50-75	15-35	---	NP
	11-57	Clay loam, sandy clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	95-100	95-100	60-95	50-75	20-45	5-26
	57-65	Variable--------	---	---	0	---	---	---	---	---	---
AmB, AmC----------- Appling	0-9	Sandy loam------	SM, SM-SC	A-2	0-5	86-100	80-100	55-80	15-35	<27	NP-5
	9-38	Sandy clay, clay loam, clay.	MH, CL, ML, SC	A-7	0-5	95-100	95-100	70-95	51-80	41-74	15-30
	38-48	Sandy clay, clay loam, sandy clay loam.	SC, CL	A-4, A-6	0-5	95-100	95-100	70-90	40-75	25-45	8-22
	48-72	Variable--------	---	---	---	---	---	---	---	---	---
Bh----------------- Bibb	0-15	Silt loam-------	SM, SM-SC, ML, CL-ML	A-2, A-4	0-5	95-100	90-100	60-90	30-60	<25	NP-7
	15-60	Sandy loam, loam, silt loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0-10	60-100	50-100	40-100	30-90	<30	NP-7
CfB2, CfC2, CfE2--- Cecil	0-4	Sandy clay loam	SM, SC, CL, ML	A-4, A-6	0	74-100	72-100	68-95	38-81	21-35	3-15
	4-59	Clay------------	MH, ML	A-7	0	97-100	92-100	72-99	55-95	41-80	9-37
	59-69	Weathered bedrock.	---	---	---	---	---	---	---	---	---
CK*: Chewacla----------	0-6	Silt loam-------	ML	A-4, A-5, A-6, A-7	0	98-100	95-100	70-100	55-90	36-50	4-18
	6-40	Silt loam, silty clay loam, clay loam.	ML, MH	A-4, A-5, A-6, A-7	0	96-100	95-100	80-100	51-98	36-56	4-20
	40-60	Silt loam, clay loam, silty clay loam.	ML, MH	A-4, A-5, A-6, A-7	0	75-100	65-100	60-100	51-98	32-61	4-28
Congaree----------	0-6	Silt loam-------	CL-ML, ML, CL	A-4	0	95-100	95-100	70-100	51-90	20-35	3-10
	6-30	Silty clay loam, fine sandy loam, loam.	SM, SC, ML, CL	A-4, A-6, A-7	0	95-100	95-100	70-100	40-90	25-50	4-22
	30-60	Variable--------	---	---	---	---	---	---	---	---	---
DgB---------------- Davidson	0-7	Loam------------	CL, CL-ML, ML	A-4, A-6	0	94-100	84-100	80-95	60-75	18-30	4-15
	7-14	Clay loam-------	CL	A-6	0	96-100	90-100	75-95	50-75	25-40	11-25
	14-64	Clay------------	CL, CH, ML, MH	A-7, A-6	0	96-100	95-100	85-100	65-85	35-65	15-35
	64-70	Clay, clay loam, sandy clay loam.	CL, ML	A-4, A-6, A-7	0	95-100	90-100	75-100	50-80	20-50	7-25

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
DhC2, DhE2--------- Davidson	0-5	Clay loam-------	CL, SC, CL-ML, SM-SC	A-6, A-4	0	94-100	84-100	75-95	40-70	25-40	5-18
	5-14	Clay loam-------	CL	A-6	0	96-100	90-100	75-95	50-75	25-40	11-25
	14-64	Clay------------	CL, CH, ML, MH	A-7, A-6	0	96-100	95-100	85-100	65-85	35-65	15-35
	64-70	Clay, clay loam, sandy clay loam.	CL, ML	A-4, A-6, A-7	0	95-100	90-100	75-100	50-80	20-50	7-25
EnD---------------- Enon	0-9	Sandy loam------	SM, SM-SC, SC	A-2-4, A-4, A-6, A-2-6	0-5	80-100	80-100	60-85	25-49	<30	NP-15
	9-32	Clay loam, clay	CH	A-7-6	0-5	85-100	80-100	75-95	65-95	51-75	25-45
	32-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
FdB---------------- Faceville	0-7	Sandy loam------	SM, SM-SC	A-2, A-4	0	90-100	85-100	72-97	17-38	<25	NP-5
	7-70	Sandy clay, clay, clay loam.	CL, SC, ML	A-6, A-7	0	98-100	95-100	75-99	45-72	25-43	11-23
FmC---------------- Flomaton Variant	0-6	Very gravelly loamy sand.	GM, GP-GM, SM, SP-SM	A-1	0-5	30-80	30-75	20-40	5-25	<20	NP-4
	6-65	Gravelly loamy sand, gravelly sandy clay loam, gravelly sandy loam.	GP-GM, GM-GC, SM-SC, SP-SM	A-1, A-2	0-10	30-70	25-65	20-50	10-35	<20	NP-7
GcB---------------- Georgeville	0-7	Fine sandy loam	ML, CL-ML	A-4	0-3	90-100	85-100	65-100	51-98	<40	NP-10
	7-46	Silty clay, silty clay loam, clay loam.	MH, ML	A-7-5	0	95-100	95-100	90-100	75-98	41-75	15-35
	46-56	Silty clay loam, silt loam, clay loam.	MH	A-7-5	0	95-100	90-100	65-100	60-98	50-75	15-35
	56-64	Silt loam-------	ML, CL, CL-ML	A-4	0-5	90-100	90-100	65-100	60-95	<30	NP-10
GdC2, GdE2--------- Georgeville	0-4	Clay loam-------	CL, ML	A-6, A-7-6	0-3	95-100	95-100	90-100	65-100	30-49	11-20
	4-46	Silty clay, silty clay loam, clay loam.	MH, ML	A-7-5	0	95-100	95-100	90-100	75-98	41-75	15-35
	46-56	Silty clay loam, silt loam, clay loam.	MH	A-7-5	0	95-100	90-100	65-100	60-98	50-75	15-35
	56-64	Silt loam-------	ML, CL, CL-ML	A-4	0-5	90-100	90-100	65-100	60-95	<30	NP-10
GeB, GeC, GeD------ Grover	0-5	Sandy loam------	SM, SM-SC, SC	A-4	0-5	95-100	90-100	50-75	36-50	<30	NP-10
	5-30	Sandy clay loam, clay loam.	SC, CL	A-6, A-7	0-5	95-100	90-100	70-85	40-70	35-50	12-25
	30-55	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
HeB, HeC-----------	0-10	Loamy coarse sand.	SM	A-2	0	95-100	90-100	45-70	15-35	---	NP
Helena	10-17	Sandy clay loam, clay loam.	CL	A-6, A-7	0	95-100	95-100	70-90	55-70	30-49	15-25
	17-34	Clay loam, sandy clay, clay.	CH, MH	A-7	0	95-100	95-100	73-93	56-80	50-85	24-50
	34-61	Variable--------	---	---	---	---	---	---	---	---	---
MdB, MdC, MdE------ Madison	0-6	Sandy loam------	SM	A-2, A-4	0-3	85-100	80-100	60-90	26-49	<35	NP-8
	6-32	Clay, clay loam	MH, ML	A-7	0-3	90-100	85-100	75-97	57-85	43-82	12-43
	32-62	Weathered bedrock.	---	---	---	---	---	---	---	---	---
MgD*:											
Madison-----------	0-6	Gravelly sandy loam.	SM	A-2, A-4	3-10	75-95	60-85	50-70	30-49	<35	NP-7
	6-32	Clay, clay loam	MH, ML	A-7	0-3	90-100	85-100	75-97	57-85	43-82	12-43
	32-62	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Grover------------	0-5	Sandy loam------	SM, SM-SC, SC	A-4	0-5	95-100	90-100	50-75	36-50	<30	NP-10
	5-30	Sandy clay loam, clay loam.	SC, CL	A-6, A-7	0-5	95-100	90-100	70-85	40-70	35-50	12-25
	30-55	Weathered bedrock.	---	---	---	---	---	---	---	---	---
NhB, NhC----------- Norfolk	0-9	Loamy sand------	SM	A-2	0	95-100	92-100	50-91	13-30	<20	NP
	9-65	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	95-100	91-100	70-96	30-55	20-40	4-20
OcB, OcC----------- Orangeburg	0-9	Sandy loam------	SM	A-2	0	98-100	95-100	75-95	20-35	---	NP
	9-13	Sandy loam------	SM	A-2	0	98-100	95-100	70-84	25-35	<30	NP-4
	13-65	Sandy clay loam	SC, CL	A-6, A-4	0	98-100	95-100	71-91	38-55	22-40	8-19
Pg, Pk, Pm. Pits											
Ro----------------- Roanoke	0-9	Silt loam-------	ML, CL-ML, CL, SM	A-6, A-4	0	95-100	85-100	60-100	35-90	25-40	5-16
	9-55	Clay, silty clay, clay loam.	CH, MH, CL	A-7	0	90-100	85-100	85-100	65-95	45-60	22-36
	55-65	Variable--------	---	---	---	---	---	---	---	---	---
Rx. Rock outcrop											

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
TfB----------------- Tifton	0-8	Loamy sand------	SM, SP-SM, SM-SC	A-2	0	70-95	62-89	53-85	11-27	<25	NP-5
	8-36	Sandy clay loam	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	70-95	65-89	60-81	33-53	22-40	5-20
	36-72	Sandy clay loam	SC, CL	A-2, A-6, A-7	0	87-100	80-99	70-94	34-55	24-45	11-21
TsC----------------- Tifton	0-8	Sandy loam------	SM, SM-SC	A-2	0	70-95	60-89	55-89	15-30	<30	NP-6
	8-36	Sandy clay loam	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	70-95	65-89	60-81	33-53	22-40	5-20
	36-72	Sandy clay loam	SC, CL	A-2, A-6, A-7	0	87-100	80-99	70-94	34-55	24-45	11-21
Tv------------------ Toccoa	0-8	Loam------------	SM, ML	A-2, A-4	0	98-100	95-100	85-100	25-60	<30	NP-4
	8-70	Sandy loam, loam	SM, ML	A-2, A-4	0	95-100	90-100	60-100	30-55	<30	NP-4
TwC, TwE------------ Troup	0-58	Sand------------	SM	A-2, A-4	0	100	100	65-90	15-40	---	NP
	58-62	Sandy loam------	SC, SM-SC, CL-ML, CL	A-4	0	95-100	95-100	80-90	36-55	20-30	4-10
VeB, VeD------------ Vaucluse	0-9	Loamy coarse sand.	SM, SP-SM	A-2, A-3	0	98-100	90-100	51-70	8-30	---	NP
	9-20	Sandy clay loam, sandy loam.	SC, SM-SC	A-2, A-4, A-6	0	98-100	90-100	51-70	25-50	20-40	5-18
	20-70	Sandy clay loam, sandy loam, sandy clay.	SC, SM-SC, SM	A-2, A-4, A-6	0	95-100	92-100	55-75	20-50	<40	NP-20
WaB, WaC, WaD------- Wagram	0-35	Loamy sand------	SM	A-2	0	100	98-100	50-85	15-35	---	NP
	35-69	Sandy clay loam, sandy loam.	SC	A-2, A-4, A-6	0	100	98-100	80-95	31-49	21-40	8-25
WeB, WeC, WeD------- Wedowee	0-10	Loamy sand------	SM, SM-SC	A-4	0	95-100	90-100	60-85	15-35	<30	NP-6
	10-15	Loam, sandy clay loam.	SM, SC, CL, ML	A-4, A-6	0	90-100	90-100	80-97	40-75	<32	NP-15
	15-36	Sandy clay, clay loam, clay.	SC, ML, CL, SM	A-4, A-6, A-7	0	95-100	95-100	65-97	45-70	30-58	10-25
	36-60	Variable--------	---	---	---	---	---	---	---	---	---
WeE----------------- Wedowee	0-6	Loamy sand------	SM, SM-SC	A-4	0	95-100	90-100	60-85	15-35	<30	NP-6
	6-15	Loam, sandy clay loam, sandy loam.	SM, SC, CL, ML	A-4, A-6	0	90-100	90-100	80-97	40-75	<32	NP-15
	15-36	Sandy clay, clay loam, clay.	SC, ML, CL, SM	A-4, A-6, A-7	0	95-100	95-100	65-97	45-70	30-58	10-25
	36-60	Variable--------	---	---	---	---	---	---	---	---	---
Wf------------------ Wehadkee	0-8	Silt loam-------	CL, MH, ML, CH	A-6, A-7	0	100	98-100	85-100	51-95	25-52	11-22
	8-42	Loam, sandy clay loam, clay loam.	ML, CL	A-6, A-7	0	100	99-100	90-100	51-85	30-45	11-20
	42-60	Variable--------	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
WhB----------------- Wickham	0-6	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	70-100	45-80	<25	NP-7
	6-62	Sandy clay loam, clay loam, loam.	CL-ML, CL, SC, SM-SC	A-2, A-4, A-6, A-7-6	0	95-100	90-100	75-100	30-70	20-41	5-15
Wo------------------ Worsham	0-8	Sandy loam------	SM, SC, ML, CL	A-2, A-4	0-5	90-100	85-100	50-85	25-55	16-30	NP-9
	8-42	Sandy clay loam, sandy clay, clay.	SC, MH, CH	A-2, A-7	0-5	90-100	85-100	70-100	30-95	42-66	22-40
	42-62	Sandy loam, sandy clay loam, clay loam.	SM, SC, ML, CL	A-2, A-4, A-6, A-7	0-10	90-95	80-95	50-90	30-70	20-50	12-30

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T
	In	In/hr	In/in	pH			
AkA: Altavista	0-11	2.0-20	0.07-0.12	4.5-6.0	Low	0.20	4
	11-57	0.6-2.0	0.12-0.20	4.5-6.0	Low	0.24	
	57-65	---	---	---	---	---	
AmB, AmC: Appling	0-9	2.0-6.0	0.10-0.15	4.5-5.5	Low	0.24	4
	9-38	0.6-2.0	0.15-0.17	4.5-5.5	Moderate	0.20	
	38-48	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.24	
	48-72	---	---	---	---	---	
Bh: Bibb	0-15	0.6-2.0	0.12-0.18	4.5-5.5	Low	0.20	5
	15-60	0.6-2.0	0.12-0.20	4.5-5.5	Low	0.37	
CfB2, CfC2, CfE2: Cecil	0-4	0.6-2.0	0.13-0.15	4.5-6.0	Low	0.28	3
	4-59	0.6-2.0	0.13-0.15	4.5-5.5	Moderate	0.28	
	59-69	---	---	---	---	---	
CK*:							
Chewacla	0-6	0.6-2.0	0.15-0.24	4.5-6.5	Low	0.28	4
	6-40	0.6-2.0	0.15-0.24	4.5-6.5	Low	0.32	
	40-60	0.6-2.0	0.15-0.24	4.5-6.5	Low	0.32	
Congaree	0-6	0.6-2.0	0.12-0.20	5.1-7.3	Low	0.37	5
	6-30	0.6-2.0	0.12-0.20	5.1-7.3	Low	0.37	
	30-60	---	---	---	---	---	
DgB: Davidson	0-7	0.6-2.0	0.14-0.18	4.5-6.5	Low	0.28	5
	7-14	0.6-2.0	0.15-0.18	4.5-6.0	Low	0.32	
	14-64	0.6-2.0	0.12-0.16	4.5-6.0	Low	0.24	
	64-70	0.6-2.0	0.12-0.18	4.5-6.0	Low	0.28	
DhC2, DhE2: Davidson	0-5	0.6-2.0	0.14-0.18	4.5-6.5	Low	0.28	5
	5-14	0.6-2.0	0.15-0.18	4.5-6.0	Low	0.32	
	14-64	0.6-2.0	0.12-0.16	4.5-6.0	Low	0.24	
	64-70	0.6-2.0	0.12-0.18	4.5-6.0	Low	0.28	
EnD: Enon	0-9	2.0-6.0	0.11-0.15	5.1-6.5	Low	0.37	4
	9-32	0.06-0.2	0.15-0.20	5.1-7.8	High	0.32	
	32-60	---	---	---	---	---	
FdB: Faceville	0-7	6.0-20	0.06-0.09	4.5-5.5	Low	0.28	5
	7-70	0.6-2.0	0.12-0.18	4.5-5.5	Low	0.37	
FmC: Flomaton Variant	0-6	6.0-20	0.01-0.05	4.5-5.5	Very low	0.15	5
	6-65	2.0-6.0	0.02-0.07	4.5-5.5	Very low	0.17	
GcB: Georgeville	0-7	0.6-2.0	0.15-0.20	4.5-6.0	Low	0.43	3
	7-46	0.6-2.0	0.13-0.18	4.5-5.5	Low	0.37	
	46-56	0.6-2.0	0.13-0.18	4.5-5.5	Low	0.43	
	56-64	0.6-2.0	0.05-0.10	4.5-5.5	Low	0.43	
GdC2, GdE2: Georgeville	0-4	0.6-2.0	0.13-0.18	4.5-6.0	Low	0.37	3
	4-46	0.6-2.0	0.13-0.18	4.5-5.5	Low	0.37	
	46-56	0.6-2.0	0.13-0.18	4.5-5.5	Low	0.43	
	56-64	0.6-2.0	0.05-0.10	4.5-5.5	Low	0.43	
GeB, GeC, GeD: Grover	0-5	2.0-6.0	0.07-0.10	4.5-6.5	Low	0.28	3
	5-30	0.6-2.0	0.12-0.14	4.5-5.5	Low	0.32	
	30-55	---	---	---	---	---	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea- bility	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
HeB, HeC--------- Helena	0-10	6.0-20	0.07-0.09	4.5-6.0	Low------------	0.37	3
	10-17	0.2-0.6	0.13-0.15	4.5-5.5	Moderate--------	0.37	
	17-34	0.06-0.2	0.13-0.15	4.5-5.5	High-----------	0.32	
	34-61	---	---	---	---------------	---	
MdB, MdC, MdE---- Madison	0-6	2.0-6.0	0.11-0.15	4.5-6.0	Low------------	0.32	4
	6-32	0.6-2.0	0.13-0.18	4.5-5.5	Low------------	0.32	
	32-62	---	---	---	---------------	---	
MgD*:							
Madison---------	0-6	>6.0	0.08-0.13	4.5-6.0	Low------------	0.28	4
	6-32	0.6-2.0	0.13-0.18	4.5-5.5	Low------------	0.32	
	32-62	---	---	---	---------------	---	
Grover----------	0-5	2.0-6.0	0.07-0.10	4.5-6.5	Low------------	0.28	3
	5-30	0.6-2.0	0.12-0.14	4.5-5.5	Low------------	0.32	
	30-55	---	---	---	---------------	---	
NhB, NhC--------- Norfolk	0-9	6.0-20	0.06-0.10	4.5-6.0	Low------------	0.17	---
	9-65	0.6-2.0	0.10-0.15	4.5-5.5	Low------------	0.24	
OcB, OcC--------- Orangeburg	0-9	2.0-6.0	0.07-0.10	4.5-6.0	Low------------	0.24	5
	9-13	2.0-6.0	0.07-0.10	4.5-5.5	Low------------	0.24	
	13-65	0.6-2.0	0.10-0.13	4.5-5.5	Low------------	0.24	
Pg, Pk, Pm. Pits							
Ro--------------- Roanoke	0-9	0.6-2.0	0.14-0.20	4.5-5.5	Low------------	---	---
	9-55	0.06-0.2	0.10-0.19	4.5-5.5	Moderate--------	---	
	55-65	---	---	---	---------------	---	
Rx. Rock outcrop							
TfB-------------- Tifton	0-8	6.0-20	0.03-0.08	4.5-5.5	Low------------	0.20	4
	8-36	0.6-2.0	0.12-0.15	4.5-5.5	Low------------	0.24	
	36-72	0.6-2.0	0.10-0.13	4.5-5.5	Low------------	0.17	
TsC-------------- Tifton	0-8	6.0-20	0.06-0.10	4.5-5.5	Low------------	0.20	4
	8-36	0.6-2.0	0.12-0.15	4.5-5.5	Low------------	0.24	
	36-72	0.6-2.0	0.10-0.13	4.5-5.5	Low------------	0.17	
Tv--------------- Toccoa	0-8	2.0-6.0	0.09-0.12	5.1-6.5	Low------------	0.10	4
	8-70	2.0-6.0	0.06-0.12	5.1-6.5	Low------------	0.10	
TwC, TwE--------- Troup	0-58	6.0-20	0.05-0.10	4.5-5.5	Very low--------	0.17	5
	58-62	0.6-2.0	0.10-0.13	4.5-5.5	Low------------	0.24	
VeB, VeD--------- Vaucluse	0-9	6.0-20	0.04-0.08	4.5-5.5	Low------------	0.17	3
	9-20	0.6-6.0	0.10-0.15	4.5-5.5	Low------------	0.20	
	20-70	0.06-0.2	0.05-0.08	4.0-5.5	Low------------	0.17	
WaB, WaC, WaD---- Wagram	0-35	6.0-20	0.05-0.08	4.5-6.0	Low------------	0.15	5
	35-69	2.0-6.0	0.12-0.16	4.5-5.5	Low------------	0.20	
WeB, WeG, WeD---- Wedowee	0-10	2.0-6.0	0.10-0.18	4.5-5.5	Low------------	0.24	2
	10-15	0.6-2.0	0.12-0.18	4.5-5.5	Low------------	0.28	
	15-36	0.2-0.6	0.12-0.18	4.5-5.5	Moderate--------	0.28	
	36-60	---	---	---	---------------	---	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
WeE---------------Wedowee	0-10	2.0-6.0	0.10-0.18	4.5-5.5	Low------------	0.24	2
	10-15	0.6-2.0	0.12-0.18	4.5-5.5	Low------------	0.28	
	15-36	0.2-0.6	0.12-0.18	4.5-5.5	Moderate-------	0.28	
	36-60	---	---	---	---------------	---	
Wf----------------Wehadkee	0-8	2.0-6.0	0.14-0.18	4.5-6.5	Low------------	0.24	---
	8-42	0.6-2.0	0.16-0.20	4.5-6.5	Low------------	0.32	
	42-60	---	---	---	---------------	---	
WhB---------------Wickham	0-6	2.0-6.0	0.11-0.16	4.5-6.0	Low------------	0.20	5
	6-62	0.6-2.0	0.12-0.17	4.5-6.0	Low------------	0.24	
Wo----------------Worsham	0-8	2.0-6.0	0.08-0.15	4.5-5.5	Low------------	0.43	2
	8-42	0.06-0.6	0.10-0.16	4.5-5.5	Moderate-------	0.43	
	42-62	0.2-0.6	0.08-0.19	4.5-5.5	Low------------	0.43	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

[The definitions of "flooding" and "water table" in the Glossary explain terms such as "rare," "brief," "apparent," and "perched." The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
AkA---------------- Altavista	C	Occasional--	Very brief	Mar-Jul	1.5-2.5	Apparent	Dec-Mar	>60	---	Moderate	Moderate.
AmB, AmC---------- Appling	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Bh----------------- Bibb	C	Frequent----	Brief-----	Dec-May	0.5-1.5	Apparent	Dec-Apr	>60	---	High-----	Moderate.
CfB2, CfC2, CfE2-- Cecil	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
CK*:											
Chewacla----------	C	Common------	Brief-----	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60	---	High-----	Moderate.
Congaree----------	B	Frequent----	Brief-----	Nov-Apr	2.5-4.0	Apparent	Nov-Apr	>60	---	Moderate	Moderate.
DgB, DhC2, DhE2--- Davidson	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
EnD---------------- Enon	C	None---------	---	---	---	---	---	>60	---	High-----	Moderate.
FdB---------------- Faceville	B	None---------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
FmC---------------- Flomaton Variant	A	None---------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
GcB, GdC2, GdE2--- Georgeville	B	None---------	---	---	>6.0	---	---	>60	---	High-----	High.
GeB, GeC, GeD----- Grover	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
HeB, HeC---------- Helena	C	None---------	---	---	1.0-2.5	Perched	Jan-Mar	40-60	Rip-pable	High-----	High.
MdB, MdC, MdE----- Madison	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
MgD*:											
Madison-----------	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate.
Grover------------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
NhB, NhC---------- Norfolk	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High.
OcB, OcC---------- Orangeburg	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Pg, Pk, Pm. Pits											
Ro----------------- Roanoke	D	Frequent----	Brief-----	Nov-Jun	0-1.0	Apparent	Nov-May	>60	---	High-----	High.
Rx. Rock outcrop											
TfB, TsC---------- Tifton	B	None---------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
Tv----------------- Toccoa	B	Common------	Brief-----	Jan-Dec	2.5-5.0	Apparent	Dec-Apr	>60	---	Low------	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
TwC, TwE---------- Troup	A	None---------	---	---	>6.0	---	---	>60	---	Low------	Moderate.
VeB, VeD---------- Vaucluse	C	None---------	---	---	>6.0	---	---	>60	---	Low------	High.
WaB, WaC, WaD----- Wagram	A	None---------	---	---	>6.0	---	---	>60	---	Low------	High.
WeB, WeC, WeD, WeE--------------- Wedowee	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	High.
Wf----------------- Wehadkee	D	Common------	Brief-----	Nov-Jun	0-2.5	Apparent	Nov-Jun	>60	---	High-----	Moderate.
WhB---------------- Wickham	B	None to rare	---	---	>6.0	---	---	>60	---	Moderate	High.
Wo----------------- Worsham	D	None---------	---	---	0-1.0	Apparent	Nov-Apr	>60	---	High-----	Moderate.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--ENGINEERING TEST DATA

[Dashes indicate data were not available. NP means nonplastic]

Soil name, report number, horizon, and depth in inches	Classification		Grain size distribution										Liquid limit	Plasticity index	Moisture density		Percentage volume change		
			Percentage passing sieve--							Percentage smaller than--									
	AASHTO	Unified	2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Max. dry density	Optimum moisture	Total	Swell	Shrink
													Pct		Lb/Ft3	Pct	Pct	Pct	Pct
Appling sandy loam:[1] (S68GA-149-004)																			
Ap--------0 to 8	A-2-4(00)	SM	100	99	98	96	95	79	34	18	10	7	--	NP	119	10	4.8	4.3	0.5
B2t------16 to 36	A-7-6(13)	ML	100	100	100	100	99	95	76	68	58	53	44	17	91	26	17.0	4.4	2.6
C--------54 to 84	A-4 (00)	ML	100	100	100	100	100	90	65	56	41	31	--	NP	100	20	17.2	11.2	6.0
Faceville sandy loam:[2] (S68GA-149-008)																			
Ap1-------0 to 5	A-2-4(00)	SM	100	100	100	100	100	76	29	19	10	8	--	NP	119	9	6.2	4.9	1.3
B21t------7 to 45	A-6 (05)	CL	100	100	100	100	99	85	54	49	41	38	29	15	109	16	9.2	3.1	6.1
B22t-----45 to 70	A-6 (04)	ML	100	100	100	100	99	84	55	50	48	46	37	12	102	20	10.9	3.6	7.3
Helena loamy coarse sand:[3] (S68GA-036-001)																			
Ap--------0 to 8	A-2-4(00)	SM	100	98	98	97	95	69	18	10	7	5	--	NP	111	11	--	0.0	0.4
B21t-----17 to 25	A-7-5(25)	MH	100	100	98	97	96	86	68	61	59	56	70	36	89	25	23.3	12.1	1.2
C--------34 to 61	A-4 (00)	SM	100	100	100	100	100	87	36	25	14	10	--	NP	103	19	14.9	12.4	2.5
Vaucluse loamy coarse sand:[4] (S68GA-094-006)																			
Ap--------0 to 8	A-2-4(00)	SM	100	100	100	98	97	65	23	19	14	11	--	NP	108	10	12.9	11.7	1.2
B23t-----22 to 34	A-2-4(00)	SM-SC	100	100	100	100	100	74	30	29	26	23	26	6	111	14	4.3	3.4	0.9
Bx-------34 to 70	A-2-4(00)	SM	100	100	100	100	100	56	23	20	18	16	--	NP	112	14	2.6	1.3	1.3
Wagram loamy sand:[5] (S68GA-094-002)																			
A1--------0 to 10	A-2-4(00)	SM	100	100	100	100	98	76	15	10	5	4	--	NP	115	10	2.4	2.1	0.3
B21t-----41 to 53	A-2-6(00)	SC	100	100	100	100	98	75	31	27	23	21	21	12	118	12	2.4	0.4	2.0
C--------53 to 66	A-2-4(00)	SC	100	100	100	100	84	37	19	18	17	15	30	10	116	12	4.8	0.7	4.1

[1]Appling sandy loam:
0.1 mile NE of Providence Church on Georgia Highway 223; 0.1 mile S on county dirt road; E of road cut.

[2]Faceville sandy loam:
5.4 miles W of Norwood on Georgia Highway 278; 2.6 miles S on county paved road; 50 feet W in field.

[3]Helena loamy coarse sand:
0.4 mile S of Mt. Carmel Church, on county road; 2 miles E on county road; 0.2 mile S on woods road; 25 feet E of road.

[4]Vaucluse loamy coarse sand:
1.2 miles E of Thomson Moose Club on paved county road; 0.4 mile S on dirt road; E side of road cut.

[5]Wagram loamy sand:
6.3 miles S of Thomson on Georgia Highway 17; 1 mile E on paved road; 30 feet S of road.

TABLE 18.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that selected phases are a taxadjunct to the series. See text for a description of those characteristics of this taxadjunct that are outside the range of the series]

Soil name	Family or higher taxonomic class
Altavista	Fine-loamy, mixed, thermic Aquic Hapludults
Appling	Clayey, kaolinitic, thermic Typic Hapludults
Bibb	Coarse-loamy, siliceous, acid, thermic Typic Fluvaquents
Cecil	Clayey, kaolinitic, thermic Typic Hapludults
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Congaree	Fine-loamy, mixed, nonacid, thermic Typic Udifluvents
Davidson	Clayey, kaolinitic, thermic Rhodic Paleudults
Enon	Fine, mixed, thermic Ultic Hapludalfs
Faceville	Clayey, kaolinitic, thermic Typic Paleudults
Flomaton Variant	Loamy skeletal, siliceous, thermic Typic Paleudults
*Georgeville	Clayey, kaolinitic, thermic Typic Hapludults
Grover	Fine-loamy, micaceous, thermic Typic Hapludults
Helena	Clayey, mixed, thermic Aquic Hapludults
Madison	Clayey, kaolinitic, thermic Typic Hapludults
Norfolk	Fine-loamy, siliceous, thermic Typic Paleudults
Orangeburg	Fine-loamy, siliceous, thermic Typic Paleudults
Roanoke	Clayey, mixed, thermic Typic Ochraquults
Tifton	Fine-loamy, siliceous, thermic Plinthic Paleudults
Toccoa	Coarse-loamy, mixed, nonacid, thermic Typic Udifluvents
Troup	Loamy, siliceous, thermic Grossarenic Paleudults
Vaucluse	Fine-loamy, siliceous, thermic Typic Fragiudults
Wagram	Loamy, siliceous, thermic Arenic Paleudults
Wedowee	Clayey, kaolinitic, thermic Typic Hapludults
Wehadkee	Fine-loamy, mixed, nonacid, thermic Typic Fluvaquents
Wickham	Fine-loamy, mixed, thermic Typic Hapludults
Worsham	Clayey, mixed, thermic Typic Ochraquults

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