United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with University of Georgia, College of Agriculture and Environmental Sciences, Agricultural Experiment Stations and Newton County

Soil Survey of Newton and Rockdale Counties, Georgia

How to Use This Soil Survey

General Soil Map

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

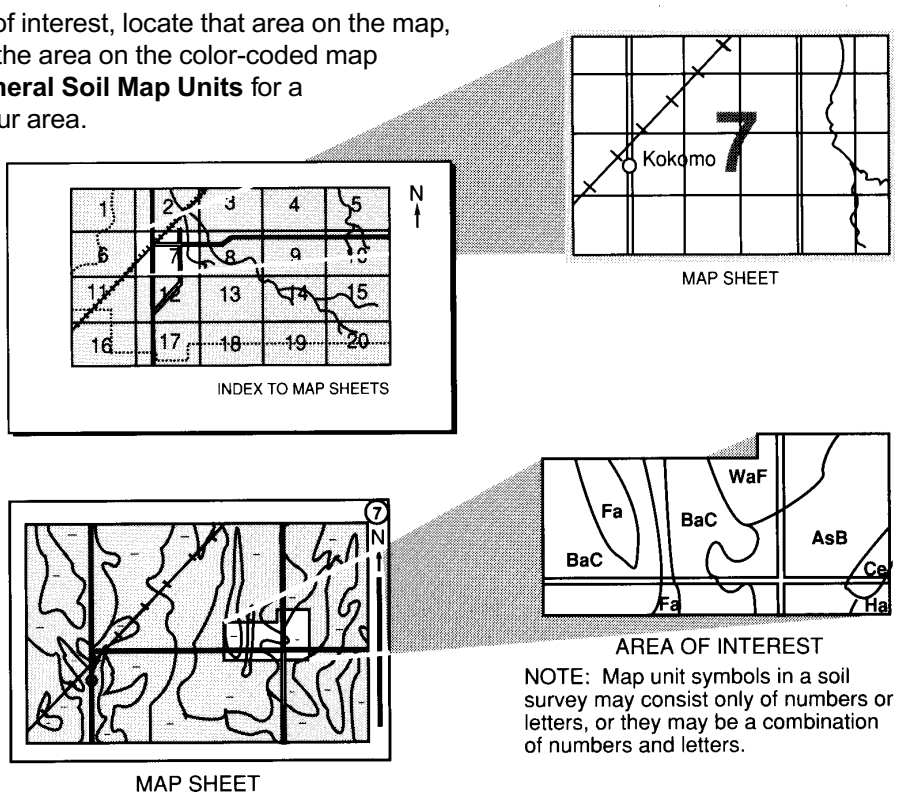
To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

Detailed Soil Maps

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

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

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



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

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

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

Major fieldwork for this soil survey was completed in 1989. Soil names and descriptions were approved in 1989. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1989. This soil survey was made cooperatively by the Natural Resources Conservation Service; the University of Georgia, College of Agriculture and Environmental Sciences, Agricultural Experiment Stations; and Newton County. The survey is part of the technical assistance furnished to the Upper Ocmulgee River Soil and Water Conservation District and the Rockdale County Soil and Water Conservation District.

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

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Cover: Cattle grazing fescue pasture in an area of Cecil sandy loam, 2 to 6 percent slopes.

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

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Foreword

This soil survey contains information that affects land use planning in Newton and Rockdale Counties. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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

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

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. 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 soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Earl Cosby
State Conservationist
Natural Resources Conservation Service

Soil Survey of
Newton and Rockdale Counties, Georgia

By James R. Lathem, Natural Resources Conservation Service

Fieldwork by James R. Lathem, Alfred Green, James O. Murphy, and
Mack Thomas, Jr., Natural Resources Conservation Service, and
Grover J. Thomas, Jr., and Dan D. Bacon, Newton County

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
Newton County and the University of Georgia, College of Agriculture and
Environmental Sciences, Agricultural Experiment Stations

Newton and Rockdale Counties are in the north-central part of Georgia (fig. 1). The total land area is 411 square miles, or 263,092 acres. Newton County makes up 178,586 acres, or 279 square miles. Its county seat is Covington. Rockdale County makes up 84,506 acres, or 132 square miles. Its county seat is Conyers. Elevation ranges from 980 feet above sea level at the Hightower Trail in northern Rockdale County to 527 feet at Jackson Lake in southern Newton County.

Newton County is dissected by the Alcovy, Little, South, and Yellow Rivers and by the tributaries of these rivers. Runoff from the central and northern parts of the county drains into the Alcovy River, runoff from the extreme northeastern part of the county drains into the Little River, and runoff from the western and southwestern parts of the county drains into the Yellow and South Rivers, respectively. The Alcovy, South, and Yellow Rivers all empty into Jackson Lake in the southern tip of the county.

Rockdale County is dissected by the South River, the Yellow River, and Big Haynes Creek and their tributaries. Runoff from the southern part of the county drains into the South River, runoff from the central part of the county drains into the Yellow River, and runoff from the northern part of the county drains into Big Haynes Creek.

Newton and Rockdale Counties are in the Southern Piedmont Major Land Resource Area. Most of the soils on uplands are well drained and have a loamy surface layer and a clayey subsoil with yellow or red colors.

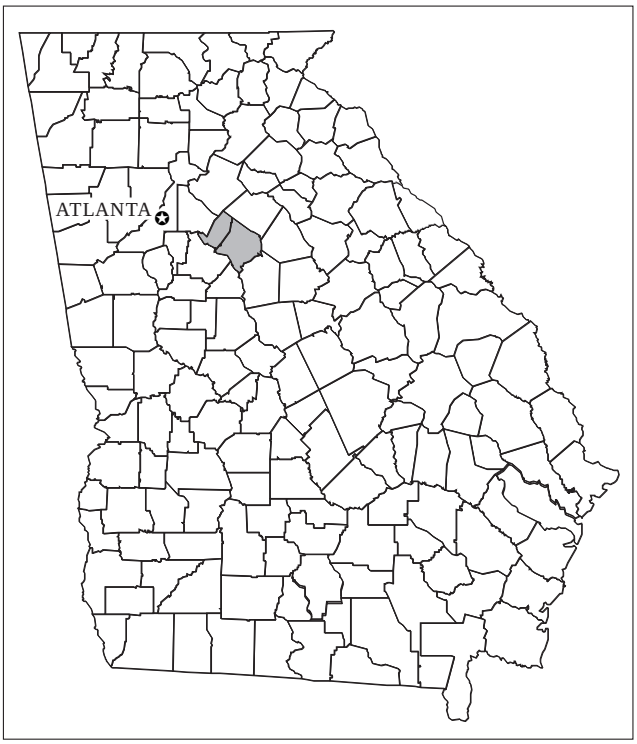

Figure 1.—Location of Newton and Rockdale Counties in Georgia.

Soils that have thicker subsoils are usually associated with areas ranging from the broader, gently sloping ridgetops to sloping hillsides. Soils that have thinner

subsoils are usually associated with strongly sloping to steep hillsides. The nearly level soils on flood plains are well drained to poorly drained and are mainly loamy throughout.

This soil survey updates the survey of Rockdale County published in 1920 *(13)*. It also updates data on Newton County published in the soil survey of Covington Area, Georgia, in 1901 *(12)*. The survey provides additional information and has larger maps, which show the soils in greater detail.

General Nature of the Survey Area

This section gives general information about Newton and Rockdale Counties. It describes the climate, geology, history and settlement, water resources, and agriculture.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Covington, Georgia, in the period 1951 to 1987. 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 45 degrees F and the average daily minimum temperature is 34 degrees. The lowest temperature on record, which occurred on January 21, 1985, is -7 degrees. In summer, the average temperature is 78 degrees and the average daily maximum temperature is 89 degrees. The highest recorded temperature, which occurred on July 29, 1952, is 106 degrees.

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

The total average annual precipitation is about 48 inches. Of this, 22 inches, or about 45 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 18 inches. The heaviest 1-day rainfall during the period of record was 4.89 inches on October 1, 1965. Thunderstorms occur on about 50 days each year.

The average seasonal snowfall is about 1 inch. The greatest snow depth at any one time during the period of record was 6 inches.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 65 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the northwest. Average windspeed is highest, 11 miles per hour, in spring.

Tornadoes and severe thunderstorms occasionally strike the survey area. These storms are local and short in duration. They result in sparse damage in narrow belts. Hailstorms occur at times during the warmer months in irregular patterns and in relatively small areas. Every few years in summer and fall, a tropical depression or remnant of a hurricane which has moved inland causes extremely heavy rains and possibly wind damage.

Geology

William R. Fulmer, Geologist, Natural Resources Conservation Service, helped prepare this section.

Newton and Rockdale Counties are in two districts within the Piedmont physiographic province. The northern part of the survey area is within the Winder Slope District, and the southern part of the survey area is within the Washington Slope District. Both counties are located within the Southern Piedmont Major Land Resource Area.

Landforms and soils within Newton and Rockdale Counties are essentially the weathering products of two principle rock types. Lithonia gneiss underlies much of the northern part of the survey area, encompassing the principle cities of Conyers and Covington and extending slightly south of this area to form an east-west, somewhat irregular contact with the other major rock type, a biotite gneiss. The biotite gneiss provides the geologic terrain, soils, and parent materials for the western and southern parts of the survey area. A more intermixed zone of mica schist, gneiss, and amphibolite forms the northwestern corner of Rockdale County. The Lithonia gneiss (a granite gneiss) is a light gray, evenly banded gneiss containing characteristic pink layers of garnet. The rock is highly folded and sheared with coarse feldspars or pegmatite dikes within the shear zones. The rock is medium grained and hard. Alternating bands, consisting of quartz and feldspars with dark biotite mica, provide an overall gray-white color in fresh exposures. However, much of the Lithonia gneiss is deeply weathered and covered with a reddish soil mantle. Original structure, including banking and schistosity, is commonly preserved within the soil profile. Soils may vary in color from light gray to dark red. Because soil profiles are deep, bedrock exposures are limited to streambeds or large residual

outcrops consisting of essentially flat-lying rock pavement, typically north and east of Conyers and south of Covington. Many of these pavement outcrops have been developed as quarries for the production of crushed stone for aggregate.

In contact with the Lithonia gneiss, the biotite gneiss is a medium grained, well banded rock, essentially the same in mineral content as the Lithonia gneiss but lacking the shear zones, extensive folding, and numerous garnet zones. Extensive reddish clay subsoils are commonly associated with the outcrop area for this parent material. Bedrock exposure is generally limited to streambeds. Minor northwest-trending diabase dikes, composed of pyroxene and dark feldspars, have intruded into the surrounding rocks in north Rockdale County and central Newton County. These structures, generally 50 feet or less in width, weather to reddish brown or yellowish brown clays.

The weathering of similar rock types, biotite gneiss and Lithonia gneiss or granite gneiss, has produced extensive areas of soils common to both counties. Distinguishing any minor differences is not practical. Cecil, Appling, Madison, Pacolet, and Gwinnett soils are commonly associated with the weathering of gneiss and granite gneiss parent material. Where the thin soil mantle common to the rock pavement outcrops of the area occurs, Ashlar soils are mapped. Areas of the large streams within these counties have shallow alluvium, level flood plain soils which are mapped as Cartecay, Chewacla, and Roanoke soils.

History and Settlement

The survey area was first inhabited by the Cherokee and Creek Indians. The United States acquired land ownership after a series of treaties signed in 1805, 1821, and 1825. Although a few settlers had been moving into the area as early as 1800, the territory was not officially open until 1821. Soon, many settlers were moving into the area from Virginia, the Carolinas, and the older settlements in eastern Georgia.

Newton County was formed in 1821 from territory in Henry, Walton, and Jasper Counties. It was named after Sergeant John Newton, a hero of the Revolutionary War. Covington, the county seat, was incorporated from the community of Newtonsboro in 1822. It was named after General Leonard Covington, who was killed in the War of 1912 and had served seats in the Maryland Legislature and the Congress of the United States.

Rockdale County was formed in 1870 from territory in Newton and Henry Counties. It was named for the underlying granite strata that surfaces in places throughout the county. Conyers, the county seat, was incorporated in 1854 and is the only city in Rockdale County. It was named after Dr. W.D. Conyers, a prominent Covington citizen.

In 1980, Newton County had a population of 34,489 and Rockdale County had a population of 36,747. By 1994, the population of Newton County had increased to 46,795 and that of Rockdale County had increased to 62,093.

Water Resources

The most abundant water resources in the survey area are the Alcovy, Little, South, and Yellow Rivers and Bear, Big Haynes, Cornish, Gum, Honey, and Snapping Shoals Creeks. Jackson Lake, a Georgia Power Company reservoir, and Cornish Creek Reservoir, a Newton County water supply reservoir, are partially within the survey area.

There are many watersheds supplying perennial streams throughout the survey area. Water flows only during wet periods near the upper reaches of these watersheds. Most perennial streams in the survey area have flood plains. These streams frequently overflow their banks during periods of heavy rainfall. Many small ponds have been constructed in the watersheds of smaller streams. These ponds are used for watering livestock, recreational activities, and irrigation.

Drilled or bored wells supply water throughout the survey area for domestic use and some private water systems. Bored wells average 40 to 65 feet in depth. Drilled wells commonly extend to 200 feet or more in depth. Water supplies from wells are usually adequate for domestic use; however, supply rates may be inconsistent, even in the same general areas.

Agriculture

Cindy Lewis, County Soil Conservationist, Newton County, helped prepare this section.

Prior to the 1800's, the survey area was covered with virgin forest consisting of oak, hickory, yellow-poplar, sweetgum, and pines. Soon after the Indian treaties were signed, settlers began clearing the land to build homes, market the timber, and cultivate crops. Corn and wheat were two important crops grown in the survey area. Cotton, however, quickly became the dominant crop produced. Most of the agriculture in the area focused around this valuable commodity until the advent of the boll weevil around 1921 *(9)*.

By the early 1900's, soil erosion caused by farming without adequate conservation measures had

depleted much of the topsoil in the two counties. Additionally, the boll weevil made it difficult if not impossible to produce what had been the most important cash crop in the area, cotton. Many fields were abandoned, and the land was left barren and exposed to continuous and excessive soil erosion.

Conservationists became increasingly aware that the land needed to be protected. In 1937, legislation by the State of Georgia established Soil Conservation Districts. This enactment was supported by leading farmers of Newton and Rockdale Counties, who, in July of 1939, became part of the Upper Ocmulgee River Soil and Water Conservation District *(13)*. Farmers began using crop rotations, terraces, grassed waterways, improved pastures, and ponds to control erosion and increase soil productivity. Many seriously eroded fields that were previously cultivated were planted to grass or trees. In September of 1981, Rockdale County split off from the original district and the Rockdale County Soil and Water Conservation District was formed.

Since the early part of this century, the production of row crops has greatly declined. The most commonly produced agricultural crops are now small grains and, on a few acres, corn, soybeans, and, more recently, cotton. Many dairies operated in the two counties in the mid-1900's, but the number has decreased dramatically in the latter part of this century. Most of the current livestock production is centered around beef cattle *(8)*.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

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

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

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

assembled from farm records and from field or plot experiments on the same kinds of soil.

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

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

Formation of the Soils

This section describes the factors of soil formation and relates them to the soils in the survey area.

Factors of Soil Formation

Soil characteristics are determined by the physical and mineralogical composition of the parent material; the plants and animals living on and in the soil; the climate under which the parent material accumulated and has existed since accumulation; the relief, or lay of the land; and the length of time that the forces of soil formation have acted on the soil material *(5)*. All of these factors influence every soil, but the significance of each factor varies from place to place. In one area, one factor may dominate soil formation; in another area, a different factor may dominate.

The interrelationships among the soil-forming factors are complex, and the effects of any one factor cannot be isolated and completely evaluated. It is convenient, however, to describe each factor separately and to indicate the probable effects of each.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. The chemical and mineralogical composition of the soil is derived largely from the parent material. The soils in Newton and Rockdale Counties formed mainly from materials weathered from crystalline rock, such as granite gneiss, biotite gneiss, amphibolites, and mica schist.

Appling and Wedowee soils are examples of soils that have a yellowish brown subsoil which formed in parent material weathered mainly from granite gneiss. Cecil and Pacolet soils are examples of soils that have a reddish subsoil which formed in parent material weathered mainly from granite gneiss or biotite gneiss. Madison soils have a high content of mica and weathered mainly from mica schist. Gwinnett and Hiwassee soils are examples of soils that have a dark surface layer and subsoil which formed in parent material weathered mainly from amphibolites.

Stream alluvium is adjacent to all the streams in Newton and Rockdale Counties. It includes sandy, loamy, and clayey sediment transported from the uplands. Cartecay, Chewacla, Congaree, Roanoke, and Toccoa soils formed in stream alluvium.

Stream terraces are near some of the larger streams and rivers. The soils on these terraces formed in alluvium that is younger than the parent material of upland soils but older than the alluvium on adjacent flood plains. Altavista, Molena, and Wickham soils formed in alluvium on stream terraces.

Plants and Animals

The effects of plants, animals, and other organisms on soil formation are significant. Plants and animals increase the content of organic matter and nitrogen in the soil, increase or decrease the content of plant nutrients, and change soil structure and porosity.

Plants recycle nutrients, add organic matter, and provide food and cover for animals. They stabilize the surface layer so that the soil-forming processes can continue. They also provide a more stable environment for the soil-forming processes by protecting the soils from extremes in temperature.

The soils in the survey area formed under a succession of briers, brambles, and woody plants that were dominated by pines and hardwoods. Hardwoods eventually suppressed most other plants and became the climax vegetation.

Animals rearrange the soil material by roughening the surface, forming and filling channels, and shaping the peds and voids. The soil is mixed by ants, wasps, worms, and spiders, which make channels; by crustaceans, such as crayfish; and by turtles and foxes, which dig burrows. Humans affect the soil-forming processes by tilling crops, removing natural vegetation and establishing different plants, and reducing or increasing the level of fertility.

Bacteria, fungi, and other micro-organisms hasten the decomposition of organic matter and increase the rate at which nutrients are released for plant growth. The net gains and losses caused by plants and animals are important in Newton and Rockdale Counties. Within the relatively small confines of the

survey area, however, one soil is not significantly different from another because of the effects of plants and animals.

Climate

The present climate of Newton and Rockdale Counties is thought to be similar to the climate that existed when the soils formed. The relatively high amount of rainfall and warm temperatures contribute to rapid soil formation. They are the two most important climatic features that relate to soil properties.

Water from precipitation is essential in soil formation. 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 of the landscape to another.

The soils in Newton and Rockdale Counties formed under a thermic temperature regime—that is, the mean soil temperature at a depth of 20 inches is 59 to 72 degrees F. Based on the mean annual air temperature, the estimated soil temperature in these counties is 64 degrees F. The rate of chemical reactions and other processes in the soil depends to some extent on temperature. In addition, temperature affects the type and quality of vegetation, the amount and kind of organic matter, and the rate at which the organic matter decomposes.

Relief

Relief is the elevations, or inequalities, of the land surface considered collectively. The color of the soil, the degree of soil wetness, the thickness of the A horizon, the content of organic matter, and the plant cover are commonly related to relief. In Newton and Rockdale Counties, the most obvious effects of relief are those that relate to soil color and the degree of soil wetness.

Hiwassee soils have a dark red and red subsoil, whereas Roanoke soils have a grayish brown and gray subsoil. The difference in color results from a difference in relief and a corresponding difference in internal drainage. Because Hiwassee soils are in the higher landscape positions and are better drained than Roanoke soils, Hiwassee soils are better oxidized and have a reddish subsoil.

The movement of water across the surface and through the soil is controlled mostly by relief. Water flowing across the surface commonly carries solid particles and causes erosion or deposition, depending on the kind of relief. In the sloping areas, the soils are drier because more water runs off and less water penetrates the surface. The soils in low-lying areas are commonly wetter because they receive the water that flows off and through the soils in the higher landscape positions.

Time

The length of time that the soil-forming processes have acted on the parent material helps to determine the characteristics of the soil. Determinations of when soil formation began in the survey area are not exact. Most of the soils are considered mature. Mature soils are in equilibrium with the environment. They are characterized by readily recognizable pedogenic horizons and a regular decrease in carbon content as depth increases. Some areas of Hiwassee soils are on stable landscapes where the soil-forming processes have been active for thousands of years. These mature soils have a highly weathered solum and a well expressed zone of illuviation. In places erosion has removed most of the zone of eluviation.

Toccoa soils are young soils. They receive sediment annually from floodwater. They are stratified and are not old enough to have a zone of illuviation. They do not have pedogenic horizons. They are characterized by an irregular decrease in carbon content as depth increases.

General Soil Map Units

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

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

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

The soils in this survey area differ in suitability for major land uses. This section desribes for each map unit the visual elements of landform, water, vegetation or land use, and structures. The units are classified as having a low, moderate, or high degree of visual diversity. This is a value rating of landscape elements and their pattern within a frame of reference developed for a local geographic area. Visual diversity can be used in conservation planning and in establishing a desirable continuity of landscape elements. The extent of the units and their components are identified and described. The main concerns of management are listed, and the soil properties that limit use are indicated. Suitability or the degree of limitation is given for the common uses.

Each map unit is rated for field crops, pasture, and woodland. Field crops are those grown in the survey area. Pasture includes the improved grasses grown in the survey area. Woodland refers to areas of native or introduced trees.

For interpretive purposes, the general soil map of this survey joins well with those of the newer surveys in adjacent areas. However, some differences in the names of general soil map units occur along the Dekalb County line in Rockdale County due to the detail and intensity of the general soil map of Dekalb County. The general soil map of this survey joins well with that of Henry County except for units on the flood plain along Camp Creek. This flood plain is too narrow to show on the general soil map of this survey because of revised standards for minimal size.

Differences in map units along the Gwinnett County line are mainly due to changes in series concepts and changes in the dominance of similar series. There are few significant differences in interpretations.

Map units along the county lines of the older surveys of Morgan and Walton Counties matched this survey less well because of considerably less detail in the older surveys, changes in series concepts due to changes in soil taxonomy, and combined slope phases. Differences in interpretations may be significant in some of these areas.

Description of the Soils in Newton County

Nearly Level Soils on Flood Plains

This group has one general soil map unit. The map unit consists of somewhat poorly drained and poorly drained soils on flood plains. These soils have mainly a brownish surface layer and brownish mottled or grayish mottled underlying layers or a grayish subsoil.

1. Cartecay-Chewacla-Roanoke

Somewhat poorly drained and poorly drained soils that have a loamy surface layer and loamy underlying layers or a clayey subsoil

This map unit is characterized by nearly level soils in areas that are about 0.25 to 0.50 mile wide. The soils are mainly on flood plains of the Alcovy River and Cornish Creek. The Cartecay and Chewacla soils are somewhat poorly drained and are intermingled on the

flood plain. The Roanoke soils are poorly drained and are generally located in the lower-lying and backswamp areas of the flood plain. Slopes range from 0 to 2 percent. The drainage system of these major soils is generally defined. These soils flood frequently in winter and spring. Most of the natural watercourses in this unit are perennial. There are few areas of open water. The soils are used mainly for woodland. Other than roads, bridges, and utility lines, manmade development is minimal. The degree of visual diversity is low.

This map unit makes up about 2 percent of Newton County. It is about 40 percent Cartecay soils, 35 percent Chewacla soils, 10 percent Roanoke soils, and 15 percent soils of minor extent.

Typically, the Cartecay soils have a surface layer that is dark yellowish brown loam 9 inches thick. The upper part of the underlying material, to a depth of 18 inches, is strong brown sandy loam that has reddish yellow mottles. The next part, to a depth of 42 inches, is mottled strong brown, grayish brown, and brownish yellow loam. The lower part, to a depth of 60 inches, is gray loamy sand and loam and is stratified.

Typically, the Chewacla soils have a surface layer that is dark brown loam 6 inches thick. The subsoil extends to a depth of 50 inches. In sequence downward, it is 9 inches of reddish brown sandy clay loam that has yellowish brown mottles; 7 inches of reddish brown loam that has grayish brown mottles; 13 inches of mottled grayish brown and yellowish brown clay loam; and 15 inches of mottled light brownish gray and brown loam. The substratum, to a depth of 60 inches, is mottled yellowish brown, brown, and gray stratified clay loam and sandy loam.

Typically, the Roanoke soils have a surface layer that is dark yellowish brown silt loam 6 inches thick. The upper part of the subsoil, to a depth of 20 inches, is grayish brown silty clay that has yellowish red mottles. The middle part, to a depth of 55 inches, is gray clay that has strong brown mottles. The lower part, to a depth of 60 inches, is gray sandy clay that has strong brown mottles and lenses of sandier material.

Soils of minor extent in this map unit include the well drained and moderately well drained Congaree and Toccoa soils. These minor soils are on flood plains, generally near the river channels. Also included are areas of the moderately well drained Altavista soils on adjacent stream terraces.

In this map unit, the main management concerns are wetness and flooding. Flooding is likely to occur on all of the soils in this unit. Wetness may be a limitation in areas on the outer parts of the flood plain. The soils are poorly suited to unsuited to field crops. They are moderately suited to pasture and hay crops. Flooding or the high water table, or both, are limitations affecting nonfarm uses. The potential productivity of these soils for woodland is very high.

Dominantly Very Gently Sloping and Gently Sloping Soils on Ridges and Hillsides in the Uplands

This group has four general soil map units. The map units consist of excessively drained to well drained soils on ridges and hillsides. These soils have a brownish loamy surface layer and a loamy or clayey subsoil that is reddish or brownish. In a few places, hard bedrock is at a depth of less than 40 inches.

2. Cecil-Appling

Well drained soils that have a loamy surface layer and a reddish or brownish clayey subsoil

This map unit is characterized by very gently sloping and gently sloping soils mainly on broad smooth ridges and hillsides. Slopes dominantly range from 2 to 10 percent. Excess surface water drains into a system of intermittent and perennial streams. Manmade ponds are common. The soils are used mainly for pasture and woodland, but some areas are used for field crops. A few areas are in urban uses. Roads, utility lines, fences, houses, and other structures are common. The degree of visual diversity is high.

This map unit makes up about 16 percent of Newton County. It is about 55 percent Cecil soils, 20 percent Appling soils, and 25 percent soils of minor extent.

Typically, the Cecil soils have a surface layer that is brown sandy loam 8 inches thick. The subsoil extends to a depth of 42 inches and is dominantly red sandy clay that has mottles in shades of red and yellow in the lower part. The layer at depths of 32 to 42 inches is red sandy clay loam. The substratum, to a depth of 60 inches, is saprolite that crushes to sandy clay loam.

Typically, the Appling soils have a surface layer that is brown sandy loam 8 inches thick. The upper part of the subsoil, to a depth of 15 inches, is yellowish brown sandy clay loam. The next part, to a depth of 42 inches, is strong brown and yellowish red sandy clay that is mottled in shades of red and yellow. The lower part, to a depth of 55 inches, is sandy clay loam that is mottled in shades of red and yellow. The substratum, to a depth of 60 inches, is sandy clay loam that is mottled in shades of yellow and red.

Soils of minor extent in this map unit include Hiwassee and Pacolet soils on the same landscape as the major soils and the somewhat poorly drained Cartecay and Chewacla soils on nearby flood plains.

In this map unit, the main management concern is controlling erosion. The soils on ridges are well suited to most uses; however, the moderate permeability in the subsoil is a limitation affecting septic tank absorption fields. The slope is a limitation affecting the use of soils on hillsides for field crops, pasture, and nonfarm uses. The potential productivity of this unit for woodland is high.

3. Cecil-Pacolet-Madison

Well drained soils that have a loamy surface layer and a reddish clayey subsoil

This map unit is characterized by very gently sloping and gently sloping soils mainly on convex ridges and hillsides that are mostly smooth. Slopes dominantly range from 2 to 10 percent. Excess surface water drains into a system of intermittent and perennial streams. Manmade ponds are common. The soils are used mainly for pasture and woodland, but many areas are being developed for urban uses. Roads, utility lines, fences, houses, and other structures are common. The degree of visual diversity is high.

This map unit makes up about 35 percent of Newton County. It is about 35 percent Cecil soils, 30 percent Pacolet soils, 10 percent Madison soils, and 25 percent soils of minor extent.

Typically, the Cecil soils have a surface layer that is brown sandy loam 8 inches thick. The subsoil extends to a depth of 42 inches and is dominantly red sandy clay that has mottles in shades of red and yellow in the lower part. The layer at depths of 32 to 42 inches is red sandy clay loam. The substratum, to a depth of 60 inches, is saprolite that crushes to sandy clay loam.

Typically, the Pacolet soils have a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. Reddish yellow and light red mottles occur in the layer at depths of 20 to 33 inches. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

Typically, the Madison soils have a surface layer that is strong brown sandy loam 6 inches thick. The subsoil is red sandy clay and extends to a depth of 35 inches. It contains common or many flakes of mica. The substratum, to a depth of 60 inches, is weathered saprolite that crushes to sandy clay loam. It contains many flakes of mica.

Soils of minor extent in this map unit include Hiwassee and Pacolet soils on landscapes similar to those of the major soils and the somewhat poorly drained Cartecay and Chewacla soils on nearby flood plains.

In this map unit, the main management concern is controlling erosion. The soils on ridges are well suited to most uses; however, the moderate permeability in the subsoil is a limitation affecting septic tank absorption fields. The slope is a limitation affecting the use of the soils on hillsides for field crops, pasture, and nonfarm uses. The potential productivity of this unit for woodland is high.

4. Gwinnett-Hiwassee-Cecil

Well drained soils that have a loamy surface layer and a dominantly dark red clayey subsoil

This map unit is characterized by very gently sloping and gently sloping soils mainly on smooth convex ridges and hillsides. Slopes dominantly range from 2 to 10 percent. Excess surface water drains into a system of intermittent and perennial streams. Manmade ponds are common. The soils are used mainly for pasture and woodland. A few areas are being developed for urban uses. Roads, utility lines, fences, houses, and other structures are common. The degree of visual diversity is high.

This map unit makes up about 16 percent of Newton County. It is about 37 percent Gwinnett soils, 20 percent Hiwassee soils, 18 percent Cecil soils, and 25 percent soils of minor extent.

Typically, the Gwinnett soils have a surface layer that is dark reddish brown sandy loam 8 inches thick. The subsoil is dark red. The upper part of the subsoil, to a depth of 12 inches, is clay loam. The next part, to a depth of 29 inches, is clay. The lower part, to a depth of 35 inches, is sandy clay loam that has reddish yellow mottles. The substratum, to a depth of 50 inches, is red and dark red sandy clay loam that has reddish yellow mottles. Soft bedrock is at a depth of 50 to 53 inches.

Typically, the Hiwassee soils have a surface layer that is dark reddish brown sandy loam 10 inches thick. The subsoil is dark red. In sequence downward, it is 5 inches of clay loam, 21 inches of clay, 16 inches of clay loam, and 8 inches of sandy clay loam.

Typically, the Cecil soils have a surface layer that is brown sandy loam 8 inches thick. The subsoil extends

to a depth of 42 inches and is dominantly red sandy clay that has mottles in shades of red and yellow in the lower part. The layer at depths of 32 to 42 inches is red sandy clay loam. The substratum, to a depth of 60 inches, is saprolite that crushes to sandy clay loam.

Soils of minor extent in this map unit include Madison soils on the same landscape as the major soils, Wickham soils on nearby stream terraces, and the somewhat poorly drained Cartecay and Chewacla soils on nearby flood plains.

In this map unit, the main management concern is controlling erosion. The soils on ridges are well suited to most uses; however, the moderate permeability in the subsoil and soft bedrock below a depth of 50 inches, where it occurs, are limitations affecting septic tank absorption fields. The slope is a limitation affecting the use of soils on hillsides for field crops, pasture, and nonfarm uses. The potential productivity of this unit for woodland is high.

5. Wedowee-Ashlar-Pacolet

Well drained to excessively drained soils that have a loamy surface layer and a loamy or clayey subsoil

This map unit is characterized by very gently sloping to strongly sloping soils mainly on convex ridges and hillsides. Slopes dominantly range from 2 to 15 percent. Excess surface water drains into a series of intermittent and perennial streams. There are few areas of open water. The soils are used mainly for woodland, but a few areas are being developed for urban uses. Roads, utility lines, houses, and other structures are common. The degree of visual diversity is moderate.

This map unit makes up about 4 percent of Newton County. It is about 40 percent Wedowee soils, 22 percent Ashlar soils, 15 percent Pacolet soils, and 23 percent soils of minor extent.

Typically, the Wedowee soils have a surface layer that is brown sandy loam 5 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil, to a depth of 11 inches, is brownish yellow sandy clay loam. The next part, to a depth of 26 inches, is yellowish brown sandy clay that has red and yellowish red mottles. The lower part, to a depth of 38 inches, is mottled yellowish red, red, and yellow sandy clay loam. The substratum, to a depth of 60 inches or more, is yellowish red, brownish yellow, and very pale brown saprolite that crushes to sandy clay loam.

Typically, the Ashlar soils have a surface layer that is dark brown sandy loam 7 inches thick. The subsurface layer, to a depth of 12 inches, is dark yellowish brown sandy loam. The subsoil extends to a depth of 30 inches. It is brown sandy loam and cambic. Below this, to a depth of 33 inches, is strong brown coarse sandy loam. Hard bedrock is at a depth of 33 inches.

Typically, the Pacolet soils have a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles occur in the layer at depths of 20 to 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

Soils of minor extent in this map unit include the moderately well drained Alcovy and Helena soils adjacent to the major soils in smooth areas and the well drained and moderately well drained Congaree and Toccoa soils on nearby flood plains. Also included are areas of Rock outcrop.

In this map unit, the main management concern is controlling erosion. In some areas, hard bedrock is at a depth of 22 to 40 inches and limits urban uses. In other areas, the moderate permeability in the subsoil is a limitation affecting septic tank absorption fields. The slope is a limitation affecting the use of soils on hillsides for pasture and urban development. The potential productivity of this unit for woodland is high.

Dominantly Strongly Sloping to Steep Soils on Hillsides in the Uplands

This group has two general soil map units. The map units consist of well drained to excessively drained soils on hillsides. The soils have a brownish loamy surface layer and a loamy or clayey subsoil that is reddish or brownish. In a few places, hard bedrock is at a depth of less than 40 inches.

6. Pacolet-Gwinnett-Madison

Well drained soils that have a loamy surface layer and a red or dark red clayey subsoil

This map unit is characterized by strongly sloping to moderately steep soils mainly on hillsides. Slopes dominantly range from 15 to 25 percent. Excess surface water drains into a system of intermittent and perennial streams. There are few areas of open water. The soils are used mainly for woodland. A few areas are in pasture, and a few areas are developed for urban uses. There are few roads, utility lines, and

houses except in a few concentrated areas. The degree of visual diversity is moderate.

This map unit makes up about 17 percent of Newton County. It is about 40 percent Pacolet soils, 25 percent Gwinnett soils, 15 percent Madison soils, and 20 percent soils of minor extent.

Typically, the Pacolet soils have a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles occur in the layer at depths of 20 to 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

Typically, the Gwinnett soils have a surface layer that is dark reddish brown sandy loam 8 inches thick. The subsoil is dark red. The upper part of the subsoil, to a depth of 12 inches, is clay loam. The next part, to a depth of 29 inches, is clay. The lower part, to a depth of 35 inches, is sandy clay loam that has reddish yellow mottles. The substratum, to a depth of 50 inches, is red and dark red sandy clay loam that has reddish yellow mottles. Soft bedrock is at a depth of 50 to 53 inches.

Typically, the Madison soils have a surface layer that is strong brown sandy loam 6 inches thick. The subsoil is red sandy clay and extends to a depth of 35 inches. It contains common or many flakes of mica. The substratum, to a depth of 60 inches, is weathered saprolite that crushes to sandy clay loam. It contains many flakes of mica.

Soils of minor extent in this map unit include Rion and Wedowee soils in landscape positions similar to those of the major soils and the well drained and moderately well drained Toccoa and Congaree soils on nearby flood plains.

In this map unit, the main management concern is controlling erosion. The soils are poorly suited to most uses because of the slope. The potential productivity of this unit for woodland is moderately high or high.

7. Pacolet-Wedowee-Ashlar

Well drained to excessively drained soils that have a loamy surface layer and a loamy or clayey subsoil

This map unit is characterized by strongly sloping to steep soils mainly on hillsides. Slopes dominantly range from 15 to 35 percent. Excess surface water drains into a system of intermittent and perennial streams. There are few areas of open water. The soils are used mainly for woodland. A few areas are developed for urban uses. There are few roads, utility lines, and houses except in a few concentrated areas. The degree of visual diversity is moderate.

This map unit makes up about 6 percent of Newton County. It is about 35 percent Pacolet soils, 27 percent Wedowee soils, 13 percent Ashlar soils, and 25 percent soils of minor extent.

Typically, the Pacolet soils have a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles occur in the layer at depths of 20 to 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

Typically, the Wedowee soils have a surface layer that is brown sandy loam 5 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil, to a depth of 11 inches, is brownish yellow sandy clay loam. The next part, to a depth of 26 inches, is yellowish brown sandy clay that has red and yellowish red mottles. The lower part, to a depth of 38 inches, is mottled yellowish red, red, and yellow sandy clay loam. The substratum, to a depth of 60 inches or more, is yellowish red, brownish yellow, and very pale brown saprolite that crushes to sandy clay loam.

Typically, the Ashlar soils have a surface layer that is dark brown sandy loam 7 inches thick. The subsurface layer, to a depth of 12 inches, is dark yellowish brown sandy loam. The subsoil extends to a depth of 30 inches. It is brown sandy loam and cambic. Below this, to a depth of 33 inches, is strong brown coarse sandy loam. Hard bedrock is at a depth of 33 inches.

Soils of minor extent in this map unit include Gwinnett, Madison, and Rion soils on the same landscape as the major soils and the well drained and moderately well drained Toccoa and Congaree soils on nearby flood plains.

In this map unit, the main management concern is controlling erosion. The soils are poorly suited to most uses because of the slope. Hard bedrock at a depth of 22 to 40 inches is also a limitation in some areas. The potential productivity of this unit for woodland is high.

Urban Land on Ridges and Hillsides in the Uplands

This group has one general soil map unit. The map unit consists of areas that have been altered by cutting, filling, and shaping and have been established in residential, community, or industrial uses.

8. Urban land

Areas that are dominantly in residential, commercial, and industrial uses

This map unit is characterized by ridges and hillsides that have been modified by cutting and filling. These areas are associated with adjoining drainageways and flood plains. This unit makes up about 4 percent of Newton County.

Urban land is mainly business districts, churches and cemeteries and industrial and residential areas. A few areas of soil material remain unaltered by development. The soils of minor extent are Appling, Cecil, and Pacolet soils. Roads and utility lines dissect the unit. The degree of visual diversity is high.

Erosion is a management concern in areas under construction. Flooding and sedimentation from uplands are concerns in areas on the flood plains.

Description of the Soils in Rockdale County

Dominantly Very Gently Sloping and Gently Sloping Soils on Ridges and Hillsides in the Uplands

This group has six general soil map units. The map units consist of somewhat excessively drained and well drained soils on ridges and hillsides. These soils have a brownish loamy surface layer and a loamy or clayey subsoil that is reddish or brownish. In some areas, hard bedrock is at a depth of less than 40 inches.

1. Cecil-Appling

Well drained soils that have a loamy surface layer and a reddish or brownish clayey subsoil

This map unit is characterized by very gently sloping and gently sloping soils mainly on broad smooth ridges and hillsides. Slopes dominantly range from 2 to 10 percent. Excess surface water drains into a system of intermittent and perennial streams. Manmade ponds are common. The soils are used mainly for pasture and woodland, but some areas are used for field crops. A few areas are in urban uses. Roads, utility lines, fences, houses, and other structures are common. The degree of visual diversity is high.

This map unit makes up about 2 percent of Rockdale County. It is about 45 percent Cecil soils, 35 percent Appling soils, and 20 percent soils of minor extent.

Typically, the Cecil soils have a surface layer that is brown sandy loam 8 inches thick. The subsoil extends to a depth of 42 inches and is dominantly red sandy clay that has mottles in shades of red and yellow in the lower part. The layer at depths of 32 to 42 inches is red sandy clay loam. The substratum, to a depth of 60 inches, is saprolite that crushes to sandy clay loam.

Typically, the Appling soils have a surface layer that is brown sandy loam 8 inches thick. The upper part of the subsoil, to a depth of 15 inches, is yellowish brown sandy clay loam. The next part, to a depth of 42 inches, is strong brown and yellowish red sandy clay that is mottled in shades of red and yellow. The lower part, to a depth of 55 inches, is sandy clay loam that is mottled in shades of red and yellow. The substratum, to a depth of 60 inches, is also sandy clay loam that is mottled in shades of yellow and red.

Soils of minor extent in this map unit include Pacolet soils on landscapes similar to those of the major soils and the somewhat poorly drained Cartecay and Chewacla soils on nearby flood plains.

In this map unit, the main management concern is controlling erosion. The soils on ridges are well suited to most uses; however, the moderate permeability in the subsoil is a limitation affecting septic tank absorption fields. The slope is a limitation affecting the use of soils on hillsides for field crops, pasture, and nonfarm uses. The potential productivity of this unit for woodland is high.

2. Cecil-Pacolet-Madison

Well drained soils that have a loamy surface layer and a reddish clayey subsoil

This map unit is characterized by very gently sloping and gently sloping soils mainly on convex ridges and hillsides that are mostly smooth. Slopes dominantly range from 2 to 10 percent. Excess surface water drains into a system of intermittent and perennial streams. Manmade ponds are common. The soils are used mainly for pasture and woodland, but many areas are being developed for urban uses. Roads, utility lines, fences, houses, and other structures are common. The degree of visual diversity is high.

This map unit makes up about 22 percent of Rockdale County. It is about 40 percent Cecil soils, 35

percent Pacolet soils, 10 percent Madison soils, and 15 percent soils of minor extent.

Typically, the Cecil soils have a surface layer that is brown sandy loam 8 inches thick. The subsoil extends to a depth of 42 inches and is dominantly red sandy clay that has mottles in shades of red and yellow in the lower part. The layer at depths of 32 to 42 inches is red sandy clay loam. The substratum, to a depth of 60 inches, is saprolite that crushes to sandy clay loam.

Typically, the Pacolet soils have a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles occur in the layer at depths of 20 to 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

Typically, the Madison soils have a surface layer that is strong brown sandy loam 6 inches thick. The subsoil is red sandy clay and extends to a depth of 35 inches. It contains common or many flakes of mica. The substratum, to a depth of 60 inches, is weathered saprolite that crushes to sandy clay loam. It contains many flakes of mica.

Soils of minor extent in this map unit include Gwinnett and Pacolet soils on landscapes similar to those of the major soils, Wickham soils on stream terraces, and the somewhat poorly drained Cartecay and Chewacla soils on nearby flood plains.

In this map unit, the main management concern is controlling erosion. The soils on ridges are well suited to most uses; however, the moderate permeability of the subsoil is a limitation affecting septic tank absorption fields. The slope is a limitation affecting the use of soils on hillsides for field crops, pasture, and nonfarm uses. The potential productivity of this unit for woodland is high.

3. Gwinnett-Hiwassee-Cecil

Well drained soils that have a loamy surface layer and a dominantly dark red clayey subsoil

This map unit is characterized by very gently sloping and gently sloping soils mainly on smooth convex ridges and hillsides. Slopes dominantly range from 2 to 10 percent. Excess surface water drains into a system of intermittent and perennial streams. Manmade ponds are common. The soils are used mainly for pasture and woodland. A few areas are being developed for urban uses. Roads, utility lines, fences, houses, and other structures are common. The degree of visual diversity is high.

This map unit makes up about 2 percent of Rockdale County. It is about 50 percent Gwinnett soils, 15 percent Hiwassee soils, 10 percent Cecil soils, and 25 percent soils of minor extent.

Typically, the Gwinnett soils have a surface layer that is dark reddish brown sandy loam 8 inches thick. The subsoil is dark red. The upper part of the subsoil, to a depth of 12 inches, is clay loam. The next part, to a depth of 29 inches, is clay. The lower part, to a depth of 35 inches, is sandy clay loam that has reddish yellow mottles. The substratum, to a depth of 50 inches, is red and dark red sandy clay loam that has reddish yellow mottles. Soft bedrock is at a depth of 50 to 53 inches.

Typically, the Hiwassee soils have a surface layer that is dark reddish brown sandy loam 10 inches thick. The subsoil is dark red. In sequence downward, it is 5 inches of clay loam, 21 inches of clay, 16 inches of clay loam, and 8 inches of sandy clay loam.

Typically, the Cecil soils have a surface layer that is brown sandy loam 8 inches thick. The subsoil extends to a depth of 42 inches and is dominantly red sandy clay that has mottles in shades of red and yellow in the lower part. The layer at depths of 32 to 42 inches is red sandy clay loam. The substratum, to a depth of 60 inches, is saprolite that crushes to sandy clay loam.

Soils of minor extent in this map unit include Pacolet and Madison soils on the same landscape as the major soils, Wickham soils on nearby stream terraces, and the somewhat poorly drained Cartecay and Chewacla soils on nearby flood plains.

In this map unit, the main management concern is controlling erosion. The soils on ridges are well suited to most uses; however, the moderate permeability in the subsoil and soft bedrock below a depth of 50 inches, where it occurs, are limitations affecting septic tank absorption fields. The slope is a limitation affecting the use of the soils on hillsides for field crops, pasture, and nonfarm uses. The potential productivity of this unit for woodland is high.

4. Wedowee-Ashlar-Pacolet

Well drained to excessively drained soils that have a loamy surface layer and a loamy or clayey subsoil

This map unit is characterized by very gently sloping to strongly sloping soils mainly on convex ridges and hillsides. Slopes dominantly range from 2 to 15 percent. Excess surface water drains into a series

of intermittent and perennial streams. There are few areas of open water. The soils are used mainly for woodland, but a few areas are being developed for urban uses. Roads, utility lines, and other structures are common. The degree of visual diversity is moderate.

This map unit makes up about 35 percent of Rockdale County. It is about 30 percent Wedowee soils, 12 percent Ashlar soils, 10 percent Pacolet soils, and 48 percent soils of minor extent.

Typically, the Wedowee soils have a surface layer that is brown sandy loam 5 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil, to a depth of 11 inches, is brownish yellow sandy clay loam. The next part, to a depth of 26 inches, is yellowish brown sandy clay that has red and yellowish red mottles. The lower part, to a depth of 38 inches, is mottled yellowish red, red, and yellow sandy clay loam. The substratum, to a depth of 60 inches or more, is yellowish red, brownish yellow, and very pale brown saprolite that crushes to sandy clay loam.

Typically, the Ashlar soils have a surface layer that is dark brown sandy loam 7 inches thick. The subsurface layer, to a depth of 12 inches, is dark yellowish brown sandy loam. The subsoil extends to a depth of 30 inches. It is brown sandy loam and cambic. Below this, to a depth of 33 inches, is strong brown coarse sandy loam. Hard bedrock is at a depth of 33 inches.

Typically, the Pacolet soils have a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles occur in the layer at depths of 20 to 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

Soils of minor extent in this map unit include the well drained Appling soils and the moderately well drained Alcovy and Helena soils adjacent to the major soils in smooth areas and the well drained and moderately well drained Congaree and Toccoa soils and the excessively drained Buncombe soils on nearby flood plains. Also included are areas of Rock outcrop.

In this map unit, the main management concern is controlling erosion. In some areas, hard bedrock is at a depth of 22 to 40 inches and limits urban uses. In other areas, the moderate permeability in the subsoil is a limitation affecting septic tank absorption fields. The slope is a limitation affecting the use of the soils on hillsides for pasture and urban development. The potential productivity of this unit for woodland is high.

5. Pacolet-Madison-Gwinnett

Well drained soils that have a loamy surface layer and a reddish or dark red clayey subsoil

This map unit is characterized by very gently sloping and gently sloping soils mainly on convex ridges and undulating hillsides. Slopes dominantly range from 2 to 10 percent. Excess surface water drains into a system of intermittent and perennial streams. Manmade ponds are few. The soils are used mainly for woodland. A few areas are used for pasture, and some areas are being developed for urban uses. Roads, utility lines, fences, houses, and other structures are common. The degree of visual diversity is moderate.

This map unit makes up about 7 percent of Rockdale County. It is about 45 percent Pacolet soils, 25 percent Madison soils, 15 percent Gwinnett soils, and 15 percent soils of minor extent.

Typically, the Pacolet soils have a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles occur in the layer at depths of 20 to 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

Typically, the Madison soils have a surface layer that is strong brown sandy loam 6 inches thick. The subsoil is red sandy clay and extends to a depth of 35 inches. It contains common or many flakes of mica. The substratum, to a depth of 60 inches, is weathered saprolite that crushes to sandy clay loam. It contains many flakes of mica.

Typically, the Gwinnett soils have a surface layer that is dark reddish brown sandy loam 8 inches thick. The subsoil is dark red. The upper part, to a depth of 12 inches, is clay loam. The next part, to a depth of 29 inches, is clay. The lower part, to a depth of 35 inches, is sandy clay loam that has reddish yellow mottles. The substratum, to a depth of 50 inches, is red and dark red sandy clay loam that has reddish yellow mottles. Soft bedrock is at a depth of 50 to 53 inches.

Soils of minor extent in this map unit include Wedowee soils on the same landscape as the major soils and the somewhat poorly drained Cartecay and Chewacla soils on nearby flood plains.

In this map unit, the main management concern is controlling erosion. The soils on ridges are well suited to most uses; however, the moderate permeability in the subsoil and soft bedrock below a depth of 50 inches, where it occurs, are limitations affecting septic

tank absorption fields. The slope is a limitation affecting the use of soils on hillsides for field crops, pasture, and nonfarm uses. The potential productivity of this unit for woodland is high.

6. Ashlar-Rock outcrop-Pacolet

Somewhat excessively drained soils that have a loamy surface layer and a loamy or clayey subsoil and areas of hard granite or gneiss rock

This map unit is characterized by very gently sloping and gently sloping soils mainly on convex ridges and hillsides. Slopes dominantly range from 2 to 10 percent. Areas are typically dry and droughty, although some pockets and nearly level areas near the Rock outcrop may become saturated with water sometimes. The soils are used primarily for woodland. A few areas are in pasture. Areas of hard bedrock occur at the surface throughout the unit. Other than roads and a few quarry areas, manmade development is minimal. The degree of visual diversity is moderate.

This map unit makes up about 4 percent of Rockdale County. It is about 25 percent Ashlar soils, 23 percent areas of Rock outcrop, 15 percent Pacolet soils, and 37 percent soils of minor extent.

Typically, the Ashlar soils have a surface layer that is dark brown sandy loam 7 inches thick. The subsurface layer, to a depth of 12 inches, is dark yellowish brown sandy loam. The subsoil extends to a depth of 30 inches. It is brown sandy loam and cambic. Below this, to a depth of 33 inches, is strong brown coarse sandy loam. Hard bedrock is at a depth of 33 inches.

Rock outcrop consists of granite and gneiss bedrock that is bare and hard.

Typically, the Pacolet soils have a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles occur in the layer at depths of 20 to 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

Soils of minor extent in this map unit include the well drained Pacolet and Wedowee soils. Also included are somewhat excessively drained soils that have hard bedrock at a depth of less than 20 inches. All the minor soils are on the same landscape as the major soils.

In this map unit, the Ashlar soils are generally poorly suited to urban uses. They are moderately suited to recreational development. The slope and depth to bedrock are the main limitations. The Ashlar soils are moderately suited to pasture. The areas of Rock outcrop are unsuited to most uses. The main management concern on the Pacolet soils is controlling erosion. However, the moderate permeability in the subsoil is a limitation affecting septic tank absorption fields. The slope is a limitation affecting the use of soils on hillsides for field crops, pasture, and nonfarm uses. The potential productivity of this unit for woodland is high.

Dominantly Strongly Sloping to Steep Soils on Hillsides in the Uplands

This group has three general soil map units. The map units consist of well drained and somewhat excessively drained soils on hillsides. The soils have a brownish loamy surface layer and a loamy or clayey subsoil that is reddish or brownish. In a few places, hard bedrock is at a depth of less than 40 inches.

7. Pacolet-Gwinnett-Madison

Well drained soils that have a loamy surface layer and a reddish or dark red clayey subsoil

This map unit is characterized by strongly sloping to moderately steep soils mainly on hillsides. Slopes dominantly range from 15 to 25 percent. Excess surface water drains into a system of intermittent and perennial streams. There are few areas of open water. The soils are used mainly for woodland. A few areas are in pasture, and a few areas are developed for urban uses. Roads, utility lines, and houses are common. The degree of visual diversity is high.

This map unit makes up about 4 percent of Rockdale County. It is about 40 percent Pacolet soils, 35 percent Gwinnett soils, 15 percent Madison soils, and 10 percent soils of minor extent.

Typically, the Pacolet soils have a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles occur in the layer at depths of 20 to 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

Typically, the Gwinnett soils have a surface layer that is dark reddish brown sandy loam 8 inches thick. The subsoil is dark red. The upper part of the subsoil, to a depth of 12 inches, is clay loam. The next part, to a depth of 29 inches, is clay. The lower part, to a depth

of 35 inches, is sandy clay loam that has reddish yellow mottles. The substratum, to a depth of 50 inches, is red and dark red sandy clay loam that has reddish yellow mottles. Soft bedrock is at a depth of 50 to 53 inches.

Typically, the Madison soils have a surface layer that is strong brown sandy loam 6 inches thick. The subsoil is red sandy clay and extends to a depth of 35 inches. It contains common or many flakes of mica. The substratum, to a depth of 60 inches, is weathered saprolite that crushes to sandy clay loam. It contains many flakes of mica.

Soils of minor extent in this map unit include Ashlar, Rion, and Wedowee soils on landscapes similar to those of the major soils and the somewhat poorly drained Cartecay and Chewacla soils on nearby flood plains.

In this map unit, the main management concern is controlling erosion. The soils are poorly suited to most uses because of the slope. The potential productivity of this unit for woodland is moderately high or high.

8. Pacolet-Madison

Well drained soils that have a loamy surface layer and a reddish clayey subsoil

This map unit is characterized by strongly sloping to moderately steep soils mainly on hillsides. Slopes dominantly range from 15 to 25 percent. Excess surface water drains into a system of intermittent and perennial streams. There are few areas of open water. The soils are used mainly for woodland. A few areas are in pasture, and a few areas are being developed for urban uses. There are few roads, utility lines, and houses except in a few concentrated areas. The degree of visual diversity is moderate.

This map unit makes up about 9 percent of Rockdale County. It is about 50 percent Pacolet soils, 30 percent Madison soils, and 20 percent soils of minor extent.

Typically, the Pacolet soils have a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles occur in the layer at depths of 20 to 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

Typically, the Madison soils have a surface layer that is strong brown sandy loam 6 inches thick. The subsoil is red sandy clay and extends to a depth of 35 inches. It contains common or many flakes of mica. The substratum, to a depth of 60 inches, is weathered saprolite that crushes to sandy clay loam. It contains many flakes of mica.

Soils of minor extent in this map unit include Rion and Wedowee soils on landscapes similar to those of the major soils and the somewhat poorly drained Cartecay and Chewacla soils on nearby flood plains.

In this map unit, the main management concern is controlling erosion. The soils are poorly suited to most uses because of the slope. The potential productivity of this unit for woodland is high.

9. Pacolet-Wedowee-Ashlar

Well drained to excessively drained soils that have a loamy surface layer and a loamy or clayey subsoil

This map unit is characterized by strongly sloping to steep soils mainly on hillsides. Slopes dominantly range from 15 to 35 percent. Excess surface water drains into a system of intermittent and perennial streams. There are few areas of open water. The soils are used mainly for woodland, but many areas are being developed for urban uses. Roads, utility lines, houses, and other structures are common. The degree of visual diversity is high.

This map unit makes up about 10 percent of Rockdale County. It is about 35 percent Pacolet soils, 20 percent Wedowee soils, 10 percent Ashlar soils, and 35 percent soils of minor extent.

Typically, the Pacolet soils have a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles occur in the layer at depths of 20 to 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

Typically, the Wedowee soils have a surface layer that is brown sandy loam 5 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil, to a depth of 11 inches, is brownish yellow sandy clay loam. The next part, to a depth of 26 inches, is yellowish brown sandy clay that has red and yellowish red mottles. The lower part, to a depth of 38 inches, is mottled yellowish red, red, and yellow sandy clay loam. The substratum, to a depth of 60 inches or more, is yellowish red, brownish yellow, and very pale brown saprolite that crushes to sandy clay loam.

Typically, the Ashlar soils have a surface layer that is dark brown sandy loam 7 inches thick. The subsurface layer, to a depth of 12 inches, is dark yellowish brown sandy loam. The subsoil extends to a

depth of 30 inches. It is brown sandy loam and cambic. Below this, to a depth of 33 inches, is strong brown coarse sandy loam. Hard bedrock is at a depth of 33 inches.

Soils of minor extent in this map unit include Madison and Rion soils on the same landscape as the major soils and the well drained and moderately well drained Toccoa and Congaree soils on nearby flood plains. Also included are areas of Rock outcrop on uplands.

The main management concern is controlling erosion. The soils are poorly suited to most uses because of the slope. Hard bedrock at a depth of 40 inches or less is also a limitation in some areas. The potential productivity of this unit for woodland is high.

Urban Land on Ridges and Hillsides in the Uplands

This group has one general soil map unit. The map unit consists of areas that have been altered by cutting, filling, and shaping and have been established in residential, community, or industrial uses.

10. Urban land

Areas that are dominantly in residential, commercial, and industrial uses

This map unit is characterized by ridges and hillsides that have been modified by cutting and filling. These areas are associated with adjoining drainageways and flood plains. This unit makes up about 5 percent of Rockdale County.

Urban land is mainly business districts, churches and cemeteries and industrial and residential areas. A few areas of soil material remain unaltered by development. The soils of minor extent are Appling, Cecil, and Pacolet soils. Roads and utility lines dissect the unit. The degree of visual diversity is high.

Erosion is a concern in areas under construction. Flooding and sedimentation from uplands are concerns in areas on the flood plains.

Broad Land Use Considerations

A large acreage in the survey area is being converted to urban uses. The general soil map can be used to help plan future land use patterns on a broad scale, but it cannot be used to locate sites for specific structures. Generally, the soils in the survey area that are well suited to cultivated crops and pasture also are well suited to urban development. Their suitability to farmland should not be overlooked in planning.

Some areas in Newton and Rockdale Counties are used for field crops and pasture. Most of the soils in these areas are well drained and well suited or moderately suited to farming. Some of the soils are poorly suited or unsuited to these uses because of steep slopes, a limited effective root zone, flooding, or poor tilth.

Many of the soils in the survey area are used for woodland. Most of the soils are moderately suited to commercial woodland production.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(15)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 4 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (*Ud*, meaning humid climate, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizon development, plus *udult*, the suborder of the Ultisols that occurs in humid climates).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, thermic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Detailed Soil Map Units

In this section, each soil series recognized in the survey area is described. Each description is followed by the detailed soil map units that are associated with the series.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The location of the typical pedon is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(16)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(15)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units delineated on the detailed maps represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. A soil is well suited to a particular use if it has properties that are favorable; moderately suited if it has properties that require special planning and management to obtain satisfactory performance; and poorly suited if it has properties that are unfavorable. More information about each map unit is given under the heading "Use and Management of the Soils."

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

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

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

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

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

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

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

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Appling-Urban land complex, 2 to 10 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Toccoa and Congaree soils, frequently flooded, is an undifferentiated group in this survey area.

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

Table 5 gives the acreage and proportionate extent of each map unit. Other tables (see “Contents”) give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

Generally, the detailed soil maps of this survey join well with those of adjacent soil surveys. Some soil names differ along the boundaries of the older surveys of Gwinnett, Morgan, and Walton Counties. These differences in names are due primarily to changes in series concepts or, in a few cases, different kinds of map units. Significant differences in interpretations resulting from name differences are few or none.

Alcovy Series

The Alcovy series consists of very deep, moderately well drained soils that formed in old valley fill material on uplands. Permeability is moderate in the upper part of the subsoil and slow in the lower part of the subsoil. Slopes range from 2 to 6 percent. These soils are fine-loamy, siliceous, thermic Typic Kanhapludults.

Alcovy soils are geographically associated with Appling, Cecil, Helena, Madison, and Pacolet soils. The associated soils are on the same landscape as the Alcovy soils. They have a clayey particle-size control section and do not have a firm, compact, brittle layer in the subsoil. Cecil, Madison, and Pacolet soils are red in the Bt horizons.

Typical pedon of Alcovy loamy sand, 2 to 6 percent slopes (See fig. 8 at end of section); Newton County; 2.0 miles north of Oxford, Georgia, on Georgia Highway 81 to Stone Road, 0.5 mile east to Georgia Highway 142, about 350 feet south on Georgia Highway 142, about 150 feet south on a dirt road, 100 feet west of the road, in an idle field:

Ap—0 to 7 inches; brown (10YR 5/3) loamy sand; weak fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

E—7 to 11 inches; light yellowish brown (10YR 6/4) sandy loam; weak fine subangular blocky structure; very friable; common fine roots; moderately acid; clear smooth boundary.

Bt1—11 to 16 inches; yellowish brown (10YR 5/8) sandy clay loam; weak fine subangular blocky structure; friable; common fine roots; strongly acid; gradual wavy boundary.

Bt2—16 to 23 inches; yellowish brown (10YR 5/8) sandy clay loam; few medium prominent yellowish red (5YR 5/8) mottles; moderate fine subangular blocky structure; friable; common fine roots; few distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Btx1—23 to 32 inches; yellowish brown (10YR 5/8) sandy clay loam; many medium prominent yellowish red (5YR 5/8) and many medium distinct strong brown (7.5YR 5/8) mottles; moderate fine platy structure; firm; 10 percent compact, dense and brittle brown platy material; common prominent clay films on faces of peds; strongly acid; gradual wavy boundary.

Btx2—32 to 37 inches; mottled strong brown (7.5YR 5/8), yellowish red (5YR 5/8), red (2.5YR 4/8), and light yellowish brown (10YR 6/4) sandy clay; strong fine platy structure; 50 percent very firm, dense and brittle in red and brown platy areas and 50 percent firm in other areas; 2 percent plinthite nodules; common prominent clay films on faces of peds; strongly acid; clear smooth boundary.

Btx3—37 to 45 inches; mottled strong brown (7.5YR 5/8), yellowish red (5YR 5/8), red (2.5YR 4/8), light brownish gray (10YR 6/2), and light yellowish brown (10YR 6/4) sandy clay; strong fine platy

structure; 50 percent very firm, dense and brittle in red and brown platy areas and 50 percent firm in other areas; 2 percent plinthite nodules; common prominent clay films on faces of peds; strongly acid; clear smooth boundary.

Cd1—45 to 64 inches; mottled red (2.5YR 4/8), light brownish gray (10YR 6/2), and strong brown (7.5YR 5/8) sandy clay loam; massive; very firm and dense in place; few bodies of coarse sandy loam and sandy clay; very strongly acid; gradual wavy boundary.

Cd2—64 to 80 inches; mottled red (2.5YR 4/8), light brownish gray (10YR 6/2), strong brown (7.5YR 5/8), and brownish yellow (10YR 6/6) sandy clay; massive; very firm and dense in place; few bodies of coarse sandy loam; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches or more. Depth to the horizons having brittle properties is 20 to 36 inches. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Some pedons contain few or common flakes of mica throughout the solum.

The A horizon is 4 to 11 inches thick. It has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 3 or 4. It is loamy sand.

The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 or 6. It is loamy sand, loamy coarse sand, sandy loam, or coarse sandy loam.

The Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 5 or 6, and chroma of 4 to 8. It has none to many mottles in shades of red, brown, and yellow. It is sandy clay loam.

The Btx horizon has hue of 10YR, value of 5, and chroma of 6 or 8. It has common or many mottles in shades of red, brown, and yellow or, in some pedons, it is mottled in the same colors. Gray mottles occur in the lower part of the horizon. The horizon is sandy clay loam, sandy clay, or clay loam. It is brittle in 10 to 55 percent but is at least 40 percent brittle in some part. It has 0 to 4 percent plinthite.

The BC horizon, if it occurs, has the same colors as the Btx horizon or is mottled in shades of red, brown, yellow, and gray. It is sandy clay loam or sandy clay.

The C or Cd horizon has hue of 2.5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 1 to 8, or it is mottled in the same colors. It is sandy loam, sandy clay loam, sandy clay, clay loam, or, rarely, clay that has lenses of contrasting texture in most pedons. In some pedons this horizon may be very firm and dense in place, suggesting semiconsolidation during deposition.

The 2C horizon, if it occurs, has the same colors as the C or Cd horizon. It is saprolite from highly weathered acid crystalline rock and crushes to sandy loam, sandy clay loam, or clay loam. Mica flakes range from few to many.

AcB—Alcovy loamy sand, 2 to 6 percent slopes

This very deep, moderately well drained, very gently sloping soil is on broad hillsides and toe slopes on uplands. Slopes are smooth and convex.

Typically, the surface layer is brown loamy sand 7 inches thick. The subsurface layer, to a depth of 11 inches, is light yellowish brown sandy loam. In sequence downward, the subsoil is 5 inches of yellowish brown sandy clay loam; 7 inches of yellowish brown sandy clay loam that has yellowish red mottles; 9 inches of yellowish brown sandy clay loam that has yellowish red and strong brown mottles; 5 inches of mottled strong brown, yellowish red, red, and light yellowish brown sandy clay (the red and brown mottles are dense and brittle and make up 50 percent); and 8 inches of mottled strong brown, yellowish red, red, light brownish gray, and yellowish brown sandy clay. The subsoil is very firm, dense, and brittle. The substratum, to a depth of 64 inches, is mottled red, light brownish gray, and strong brown sandy clay loam. The next part, to a depth of 80 inches, is mottled red, light brownish gray, strong brown, and brownish yellow sandy clay.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate in the upper part of the subsoil and slow in the firm, compact, and brittle part of the subsoil. Available water capacity is moderate. Tilth is good. The effective rooting depth is limited because of the firm, compact, and brittle part of the subsoil.

Included with this soil in mapping are a few small areas of Appling, Cecil, and Helena soils. These included soils are also on uplands.

This Alcovy soil is well suited to field crops and pasture. In places, yields may be somewhat reduced because the effective rooting depth is limited by the firm, compact, and brittle part of the subsoil. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is very high. Loblolly pine and yellow-poplar are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no

significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize soil erosion.

This soil is moderately suited to urban uses and recreational development because of wetness. The slow permeability in the lower part of the subsoil and wetness are limitations affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Alcovy soil is in capability subclass IIe. The woodland ordination symbol is 9A.

Altavista Series

The Altavista series consists of very deep, moderately well drained, moderately permeable soils that formed in loamy sediment on stream terraces. Slopes range from 0 to 3 percent. These soils are fine-loamy, mixed, thermic Aquic Hapludults.

Altavista soils are geographically associated with Chewacla, Congaree, and Wickham soils. Wickham soils are in the slightly higher landscape positions and are well drained. Chewacla and Congaree soils are on flood plains. They do not have an argillic horizon. Chewacla soils are somewhat poorly drained, and Congaree soils are moderately well drained or well drained.

Typical pedon of Altavista sandy loam, 0 to 3 percent slopes, occasionally flooded; Newton County; 3.7 miles south of Covington, Georgia, to County Road 213, about 0.8 mile east, 60 feet north of a power pole:

Ap—0 to 8 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; friable; many fine roots; moderately acid; clear smooth boundary.

E—8 to 10 inches; yellowish brown (10YR 5/4) sandy loam; weak fine granular structure; friable; many fine roots; moderately acid; clear wavy boundary.

Bt1—10 to 20 inches; yellowish brown (10YR 5/4) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; few fine flakes of mica; moderately acid; gradual wavy boundary.

Bt2—20 to 27 inches; yellowish brown (10YR 5/4) sandy clay loam; common medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt3—27 to 35 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/8), and light gray (10YR 7/1) sandy clay loam; weak medium subangular blocky structure; friable; few fine flakes of mica; strongly acid; gradual wavy boundary.

BCg—35 to 45 inches; light gray (10YR 7/1) sandy clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable; few fine flakes of mica; strongly acid; gradual wavy boundary.

C—45 to 60 inches; mottled brownish yellow (10YR 6/8) and light gray (10YR 7/1) sandy loam and sandy clay loam; massive; friable; few fine flakes of mica; strongly acid.

The thickness of the solum ranges from 38 to more than 60 inches. Reaction ranges from very strongly acid to moderately acid throughout the profile except for the surface layer in limed areas.

The A horizon is 5 to 11 inches thick. It has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4.

The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 6. It is sandy loam.

The Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 5 to 7, and chroma of 3 to 6. Red, gray, yellow, and brown mottles are few or common and fine or medium in the upper part of the horizon and common or many and medium or large in the lower part. The horizon is clay loam or sandy clay loam.

The BC or BCg horizon, if it occurs, has hue of 10YR, value of 5 to 7, and chroma of 1 to 8. In some pedons, it has mottles in shades of red, brown, yellow, and gray or it is mottled in the same colors. The horizon is sandy loam or sandy clay loam.

The C horizon has the same colors as the BC or BCg horizon, or it is mottled. It is commonly stratified sandy loam or sandy clay loam and contains pockets of clayey or sandy materials in some pedons.

AkA—Altavista sandy loam, 0 to 3 percent slopes, occasionally flooded

This very deep, moderately well drained, nearly level or very gently sloping soil is on stream terraces that are slightly downstream from uplands. Slopes are smooth and slightly concave. This soil is very briefly flooded, mainly during spring.

Typically, the surface layer is brown sandy loam 8 inches thick. The subsurface layer, to a depth of 10 inches, is yellowish brown sandy loam. In sequence downward, the subsoil is 10 inches of yellowish brown sandy clay loam; 7 inches of yellowish brown sandy clay loam that has light brownish gray and yellowish brown mottles; 8 inches of mottled yellowish brown, strong brown, and light gray sandy clay loam; and 10

inches of light gray sandy clay loam that has yellowish brown mottles. The substratum, to a depth of 60 inches, is mottled brownish yellow and light gray sandy loam and sandy clay loam.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The effective rooting depth is very deep except in winter and spring when the water table is at a depth of 1.5 to 2.5 feet.

Included with this soil in mapping are a few small areas of Wickham soils and somewhat poorly drained soils on stream terraces and the somewhat poorly drained Chewacla and the well drained Congaree soils on flood plains.

This Altavista soil is well suited to field crops and pasture; however, it is somewhat limited because of wetness. Drainage systems generally help to overcome the wetness limitation. A conservation tillage system helps to increase the content of organic matter and maintains good tilth.

The potential productivity of this soil for woodland is very high. Loblolly pine is the preferred tree to plant. Although there are no significant limitations affecting woodland, management practices and harvesting operations should be performed during the drier periods.

This soil is only moderately suited to most recreational development because of wetness and flooding. It is poorly suited to urban uses because of the wetness limitation and flooding. These limitations may be reduced by a drainage and flood control system.

This Altavista soil is in capability subclass IIw. The woodland ordination symbol is 9A.

Appling Series

The Appling series consists of very deep, well drained, moderately permeable soils that formed in residuum weathered mainly from acid crystalline rock, such as granite and granite gneiss, on uplands. Slopes range from 2 to 10 percent. These soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Appling soils are geographically associated with Ashlar, Cecil, Pacolet, and Wedowee soils. Ashlar soils have a coarse-loamy particle-size control section. They have hard bedrock at depths of 22 to 40 inches. Cecil and Pacolet soils have a subsoil that is redder than that of the Appling soils. Pacolet and Wedowee soils have a solum that is thinner than that of the Appling soils.

Typical pedon of Appling sandy loam, 2 to 6 percent slopes; Newton County; 7.5 miles south of Covington, Georgia, on Georgia Highway 36, about 1,200 feet south of Georgia Highway 36 on Scout Road, 100 feet east:

Ap—0 to 8 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; many fine roots; neutral; clear smooth boundary.

Bt1—8 to 15 inches; yellowish brown (10YR 5/6) sandy clay loam; weak fine subangular blocky structure; friable; few fine roots; strongly acid; gradual wavy boundary.

Bt2—15 to 25 inches; strong brown (7.5YR 5/8) sandy clay; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt3—25 to 42 inches; yellowish red (5YR 5/8) sandy clay; common medium prominent brownish yellow (10YR 6/8) and common medium distinct red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; common distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

BC—42 to 55 inches; mottled red (2.5YR 4/8), yellowish red (5YR 5/8), and brownish yellow (10YR 6/8) sandy clay loam; weak medium subangular blocky structure; firm; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C—55 to 60 inches; mottled yellow (2.5Y 7/6), red (2.5YR 4/6), and yellowish red (5YR 5/8) sandy clay loam; massive; friable; many medium flakes of mica; very strongly acid.

The thickness of the solum ranges from 41 to 60 inches or more. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas.

The A horizon is 5 to 12 inches thick. It has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 or 4.

The upper part of the Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 3 to 8. It is sandy clay and may have thin layers of sandy clay loam.

The lower part of the Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 4 to 8. It has few to many mottles in shades of red and brown. It is sandy clay or clay.

The BC horizon, if it occurs, has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 6 or 8, or it is mottled in shades of red, yellow, and brown. It is clay loam or sandy clay loam.

The C horizon has the same colors as the BC

horizon, or it is mottled in shades of red, yellow, and brown. It is sandy loam or sandy clay loam.

AmB—Appling sandy loam, 2 to 6 percent slopes

This very deep, well drained, very gently sloping soil is on upland ridges. Slopes are smooth and convex.

Typically, the surface layer is brown sandy loam 8 inches thick. The upper part of the subsoil, to a depth of 15 inches, is yellowish brown sandy clay loam. The next part, to a depth of 42 inches, is strong brown and yellowish red sandy clay that is mottled in shades of red and yellow. The lower part, to a depth of 55 inches, is sandy clay loam that is mottled in shades of red and yellow. The substratum, to a depth of 60 inches, is also sandy clay loam that is mottled in shades of yellow and red.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Cecil, Pacolet, and Wedowee soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Appling soil. Also included are a few small areas of soils that have a surface layer of gravelly sandy loam.

This Appling soil is well suited to field crops and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and shortleaf pine are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize soil erosion.

This soil is well suited to most urban uses and recreational development; however, the moderate permeability in the subsoil and substratum is a limitation affecting septic tank absorption fields. Generally, this limitation can be overcome by special design and proper application.

This Appling soil is in capability subclass IIe. The woodland ordination symbol is 8A.

AmC—Appling sandy loam, 6 to 10 percent slopes

This very deep, well drained, gently sloping soil is on ridges and hillsides of uplands. Slopes are smooth and convex. Individual areas are 5 to 30 acres in size.

Typically, the surface layer is brown sandy loam 8 inches thick. The upper part of the subsoil, to a depth of 15 inches, is yellowish brown sandy clay loam. The next part, to a depth of 42 inches, is strong brown and yellowish red sandy clay that is mottled in shades of red and yellow. The lower part, to a depth of 55 inches, is sandy clay loam that is mottled in shades of red and yellow. The substratum, to a depth of 60 inches, is also sandy clay loam that is mottled in shades of yellow and red.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are small areas of Ashlar, Cecil, Pacolet, and Wedowee soils and soils that have a surface layer of loamy sand or sandy clay loam. These included soils are on the same landscape as the Appling soil.

This Appling soil is moderately suited to field crops because of the slope. It is well suited to pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and shortleaf pine are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize soil erosion.

This soil is only moderately suited to most urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil and substratum is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Appling soil is in capability subclass IIIe. The woodland ordination symbol is 8A.

AnC—Appling-Urban land complex, 2 to 10 percent slopes

This map unit consists of areas of the very deep, well drained Appling soil and areas of Urban land that are so intermingled that they could not be separated at the scale selected for mapping. The map unit typically is about 50 percent Appling soil, 25 percent Urban land, and 25 percent included soils. The unit is on very gently sloping and gently sloping ridges of uplands.

Typically, the Appling soil has a surface layer that is brown sandy loam 8 inches thick. The upper part of the subsoil, to a depth of 15 inches, is yellowish brown sandy clay loam. The next part, to a depth of 42 inches, is strong brown and yellowish red sandy clay that is mottled in shades of red and yellow. The lower part, to a depth of 55 inches, is sandy clay loam that is mottled in shades of red and yellow. The substratum, to a depth of 60 inches, is also sandy clay loam that is mottled in shades of yellow and red.

The Appling soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Urban land consists of soils have been altered by cutting, filling, and shaping. Most areas of Urban land are used for private dwellings, schools, churches, streets, and sidewalks.

Included in this unit in mapping are Ashlar, Cecil, Pacolet, and Wedowee soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Appling soil and Urban land.

This map unit is well suited to most urban uses and recreational development. However, the moderate permeability in the subsoil and substratum of the Appling soil is a limitation affecting septic tank absorption fields. Generally, this limitation can be overcome by special design and careful installation procedures. The common plants used for landscaping grow well on the Appling soil; however, the hazard of erosion is severe until permanent plant cover is established.

This map unit is not assigned a capability subclass or a woodland ordination symbol.

Ashlar Series

The Ashlar series consists of moderately deep, excessively drained soils that formed in residuum weathered mainly from acid crystalline rock, such as granite and granite gneiss, on uplands. Permeability is moderately rapid throughout the profile. Slopes range from 2 to 35 percent. These soils are coarse-loamy, mixed, thermic Typic Dystrochrepts.

Ashlar soils are geographically associated with Gwinnett, Madison, Pacolet, and Wedowee soils. These associated soils have a clayey particle-size control section.

Typical pedon of Ashlar sandy loam in an area of Ashlar-Pacolet-Wedowee complex, 15 to 25 percent slopes; Rockdale County; 1.1 miles southeast from the intersection of Bethel Road and Georgia Highway 20 to Zingard to Black Shoals Road, 1.7 miles north on Black Shoals Road, 75 feet west of the road, in a wooded area:

A—0 to 7 inches; dark brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; many fine and many large roots; few small rock fragments; few stones; few fine flakes of mica; strongly acid; clear smooth boundary.

E—7 to 12 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; very friable; many fine and few large roots; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bw—12 to 30 inches; brown (7.5YR 5/4) sandy loam; moderate fine subangular blocky structure; very friable; common fine roots; few small rock fragments; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C—30 to 33 inches; strong brown (7.5YR 5/6) coarse sandy loam; massive; very friable; 5 percent common small rock fragments; few fine flakes of mica; very strongly acid; abrupt wavy boundary.

R—33 inches; hard granite rock.

The thickness of the solum ranges from 21 to 35 inches. Depth to hard bedrock ranges from 22 to 40 inches. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas.

The A horizon is 5 to 7 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The content of coarse fragments of angular quartz, granite, and gneiss ranges from 0 to 15 percent.

The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 4. It is coarse sandy loam or sandy loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 8. The content of coarse fragments of quartz, granite, and gneiss ranges from 0 to 20 percent.

The C horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 3 to 6. It is soft saprolite.

ArF—Ashlar sandy loam, 20 to 35 percent slopes, very bouldery

This excessively drained, moderately steep or steep soil is on upland hillsides. Slopes are irregular and interrupted by areas of exposed granite and granite boulders.

The soil surface has boulders that are 2 to 20 feet in diameter and about 10 to 100 feet apart. Typically, the surface layer is dark brown sandy loam 7 inches thick. The subsurface layer, to a depth of 12 inches, is dark yellowish brown sandy loam. The subsoil extends to a depth of 30 inches. It is brown sandy loam and cambic. Below this, to a depth of 33 inches, is strong brown coarse sandy loam. Hard bedrock is at a depth of 33 inches.

This soil is low in natural fertility and organic matter. Reaction is strongly acid or very strongly acid except for the surface layer in limed areas. Permeability is moderately rapid. Available water capacity is low. Penetration of the plant roots is limited to the area above hard bedrock.

Included with this soil in mapping are a few small areas of Gwinnett, Madison, and Pacolet soils. These included soils are on the same landscape as the Ashlar soil. Also included are soils that are similar to the Ashlar soil and have hard bedrock at a depth of less than 20 inches.

This Ashlar soil is poorly suited to field crops and pasture. The slope, a low available water capacity, and boulders on the surface are the main limitations.

The potential productivity of this soil for woodland is high (fig. 2). Loblolly pine and shortleaf pine are among the preferred trees to plant. The main management concerns are erosion, the equipment limitation, and seedling mortality. Performing management practices and harvesting operations on the contour and during the drier periods helps to minimize erosion. Proper placement of access roads and skid trails helps to reduce the equipment limitation. In addition, the needed use of heavy equipment on this soil can be reduced if seedlings are planted by hand. Log decks placed near the top of the slope further reduce the equipment limitation. The reduction of competing vegetation generally increases the rate of seedling survival. Not excessively thinning trees helps to prevent windthrow.

This soil is poorly suited to urban uses and recreational development. The slope and depth to bedrock are the main limitations. Boulders also limit the use of this soil.

This Ashlar soil is in capability subclass VIIe. The woodland ordination symbol is 7R.

AsC—Ashlar-Rock outcrop complex, 2 to 10 percent slopes

This map unit consists of areas of the Ashlar soil and areas of Rock outcrop that are so intermingled that they could not be separated at the scale selected for mapping. The map unit is about 45 percent Ashlar soil, 35 percent Rock outcrop, and 20 percent included soils. It is on narrow to broad, very gently sloping and gently sloping ridges and hillsides of uplands.

Typically, the Ashlar soil has a surface layer that is dark brown sandy loam 7 inches thick. The subsurface layer, to a depth of 12 inches, is dark yellowish brown sandy loam. The subsoil extends to a depth of 30 inches. It is brown sandy loam and cambic. Below this, to a depth of 33 inches, is strong brown coarse sandy loam. Hard bedrock is at a depth of 33 inches.

The Ashlar soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except in limed areas. Permeability is moderately rapid. Available water capacity is low. Tilth is good. Penetration of the plant roots is limited to the area above hard bedrock.

Rock outcrop typically consists of exposed granite and gneiss bedrock that is bare and hard.

Included in this unit in mapping are a few small areas of Pacolet soils, Wedowee soils, soils that have hard bedrock at a depth of less than 20 inches, and soils that have 15 to 20 percent rock fragments in the A horizon. These included soils are on the same landscape as the Ashlar soil and Rock outcrop.

This Ashlar soil is poorly suited to field crops. The slope and a low available water capacity are the main limitations. The soil is moderately suited to pasture.

The potential productivity of this Ashlar soil for woodland is high. Loblolly pine and shortleaf pine are the preferred trees to plant. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize erosion.

This Ashlar soil is generally poorly suited to urban uses and moderately suited to recreational development. The slope and depth to bedrock are the main limitations. In some places, these limitations can be overcome by special design and proper application.

This Ashlar soil is in capability subclass IVe, and Rock outcrop is in capability subclass VIIIs. The woodland ordination symbol for the Ashlar soil is 8S, and Rock outcrop is not assigned a woodland ordination symbol.

Figure 2.—Scattered hardwoods in an area of Ashlar sandy loam, 20 to 35 percent slopes, very bouldery. Steep slopes and boulders make this unit difficult to manage.

AwC—Ashlar-Pacolet-Wedowee complex, 4 to 15 percent slopes

This map unit consists of gently sloping or strongly sloping soils on ridges and hillsides of uplands. The components of this map unit commonly occur in a regular repeating pattern. This unit typically is about 30 percent Ashlar soil, 25 percent Pacolet soil, 20 percent Wedowee soil, and 25 percent included soils; however, the proportion of each soil may vary significantly from one mapped area to another. The Ashlar soil generally is on the ridges, the Pacolet soil generally is on the upper and middle hillsides, and the Wedowee soil generally is on the middle and lower hillsides. Slopes are irregular.

Typically, the Ashlar soil has a surface layer that is dark brown sandy loam 7 inches thick. The subsurface layer, to a depth of 12 inches, is dark yellowish brown sandy loam. The subsoil extends to a depth of 30 inches. It is brown sandy loam and cambic. Below this, to a depth of 33 inches, is strong brown coarse sandy loam. Hard bedrock is at a depth of 33 inches.

The Ashlar soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except in limed areas. Permeability is moderately rapid. Available water capacity is low. Tilth is good. Penetration of the plant roots is limited to the area above hard bedrock.

Typically, the Pacolet soil has a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is saprolite that crushes to sandy loam.

The Pacolet soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Typically, the Wedowee soil has a surface layer that is brown sandy loam 5 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil, to a depth of 11 inches, is brownish yellow sandy clay loam. The next part, to a depth of 26 inches, is yellowish brown sandy clay that has red and yellowish red mottles. The lower part, to a depth of 38 inches, is mottled yellowish red, red, and yellow sandy clay loam. The substratum, to a depth of 60 inches or more, is yellowish red, brownish yellow, and very pale brown saprolite that crushes to sandy clay loam.

The Wedowee soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included in this unit in mapping are small areas of Rion soils, soils that have hard bedrock at a depth of less than 22 inches, soils that have bedrock between depths of 40 and 60 inches, and Rock outcrop.

These Ashlar, Pacolet, and Wedowee soils are poorly suited to field crops because of the slope. They are moderately suited to pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if these soils are cultivated and the surface is not protected.

The potential productivity of these soils for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize soil erosion.

These soils are generally moderately suited to most urban uses and recreational development. The slope is the main limitation. In addition, the depth to bedrock and seepage are limitations in areas of the Ashlar soil and moderate permeability is a limitation in areas of the Pacolet and Wedowee soils. In some cases, the limitations can be overcome by special design and proper application.

These soils are in capability subclass IVe. The woodland ordination symbol for the Ashlar soil is 8S and that for the Pacolet and Wedowee soils is 8A.

AwE—Ashlar-Pacolet-Wedowee complex, 15 to 25 percent slopes

This map unit consists of moderately steep soils on narrow ridges and hillsides of uplands. The components of this map unit commonly occur in a regular repeating pattern. This unit typically is about 45 percent Ashlar soil, 20 percent Pacolet soil, 15 percent Wedowee soil, and 20 percent included soils; however, the proportion of each soil may vary significantly from one mapped area to another. The Ashlar soil generally is on the narrow ridges and the upper hillsides, the Pacolet soil generally is on the upper and middle hillsides, and the Wedowee soil generally is on the middle and lower hillsides. Slopes are irregular.

Typically, the Ashlar soil has a surface layer that is dark brown sandy loam 7 inches thick. The subsurface layer, to a depth of 12 inches, is dark yellowish brown sandy loam. The subsoil extends to a depth of 30

inches. It is brown sandy loam and cambic. Below this, to a depth of 33 inches, is strong brown coarse sandy loam. Hard bedrock is at a depth of 33 inches.

The Ashlar soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except in limed areas. Permeability is moderately rapid. Available water capacity is low. Tilth is good. Penetration of the plant roots is limited to the area above hard bedrock.

Typically, the Pacolet soil has a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is saprolite that crushes to sandy loam.

The Pacolet soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Typically, the Wedowee soil has a surface layer that is brown sandy loam 5 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil, to a depth of 11 inches, is brownish yellow sandy clay loam. The next part, to a depth of 26 inches, is yellowish brown sandy clay that has red and yellowish red mottles. The lower part, to a depth of 38 inches, is mottled yellowish red, red, and yellow sandy clay loam. The substratum, to a depth of 60 inches or more, is yellowish red, brownish yellow, and very pale brown saprolite that crushes to sandy clay loam.

The Wedowee soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included in this unit in mapping are small areas of Madison soils, Rion soils, soils that have hard bedrock at a depth of less than 22 inches, soils that have bedrock between depths of 40 and 60 inches, and Rock outcrop. These included soils and Rock outcrop are on uplands. Also included are a few small areas of soils that have a stony subsoil.

These Ashlar, Pacolet, and Wedowee soils are poorly suited to field crops and pasture because of the slope. Erosion is a concern if these soils are cultivated and the surface is not protected.

The potential productivity of these soils for woodland is high. Loblolly pine and shortleaf pine are among the preferred trees to plant. The main management concerns are erosion, the equipment limitation, and seedling mortality. Performing management practices and harvesting operations on the contour and during the drier periods helps to minimize erosion. Proper placement of access systems and skid trails helps to reduce the equipment limitation. In addition, the needed use of heavy equipment on these soils can be reduced if seedlings are planted by hand. Log decks placed near the top of the slope further reduce the equipment limitation. The reduction of competing vegetation generally increases the rate of seedling survival. Not excessively thinning trees helps to prevent windthrow.

These soils generally are poorly suited to most urban uses and recreational development. The slope is the main limitation. The depth to bedrock, permeability, and seepage are additional limitations. In some cases, the limitations can be overcome by special design and proper application.

These soils are in capability subclass VIe. The woodland ordination symbol for the Ashlar soil is 7R and that for the Pacolet and Wedowee soils is 8R.

Buncombe Series

The Buncombe series consists of very deep, excessively drained, rapidly permeable soils that formed in sandy sediment on flood plains. Slopes range from 0 to 5 percent. These soils are mixed, thermic Typic Udipsamments.

Buncombe soils are geographically associated with Chewacla, Congaree, and Toccoa soils. These associated soils are lower on the landscape than the Buncombe soils. Chewacla soils are somewhat poorly drained and have a fine-loamy particle-size control section. Congaree and Toccoa soils are well drained and moderately well drained. Congaree soils have a fine-loamy particle-size control section. Toccoa soils have a coarse-loamy particle-size control section.

Typical pedon of Buncombe loamy sand, 0 to 5 percent slopes, frequently flooded (See fig. 9 at end of section); Newton County; 0.75 mile south-southeast of the Yellow River at Interstate 20:

Ap—0 to 7 inches; brown (10YR 4/3) loamy sand; weak fine granular structure; very friable; many fine roots; very strongly acid; clear smooth boundary.

C1—7 to 11 inches; dark yellowish brown (10YR 4/4) sand; single grained; loose; many fine roots; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C2—11 to 20 inches; yellowish brown (10YR 5/4) sand; single grained; loose; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C3—20 to 50 inches; brown (10YR 5/3) sand; single grained; loose; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C4—50 to 60 inches; brown (10YR 5/3) sand; single grained; loose; common fine flakes of mica; very strongly acid.

The thickness of the sediments ranges from 60 to 72 inches or more. Reaction is very strongly acid or strongly acid throughout the profile.

The A horizon is 6 to 9 inches thick. It has hue of 10YR, value of 3 to 5, and chroma of 3 or 4.

The C horizon has hue of 7.5YR, 10YR, or 2.5Y and value and chroma of 3 to 6. It is loamy sand or sand within a depth of 40 inches. Below a depth of 40 inches, it ranges from sand to sandy loam.

BwB—Buncombe loamy sand, 0 to 5 percent slopes, frequently flooded

This very deep, excessively drained, nearly level or very gently sloping soil is on the natural levee on flood plains. It is flooded for very brief periods from late winter to late spring.

Typically, the surface layer is brown loamy sand 7 inches thick. The underlying material, to a depth of 60 inches or more, is brown sand.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile. Permeability is rapid. Available water capacity is low. Tilth is good.

Included with this soil in mapping are a few small areas of Chewacla, Congaree, and Toccoa soils on flood plains.

This Buncombe soil is unsuited to field crops because of the low available water capacity, its sandy nature, and flooding in late winter to late spring. It is poorly suited to pasture.

The potential productivity of this soil for woodland is very high. Eastern cottonwood, loblolly pine, and American sycamore are the preferred trees to plant. Because this soil is sandy and subject to flooding, the equipment limitation and seedling mortality are management concerns. The equipment limitation generally can be overcome by using modified or special implements and by performing planting and harvesting operations during the drier periods. Proper planting procedures, the use of adapted drought-hardy plants, and the reduction of competing plants generally increase the rate of seedling survival.

This soil is unsuited to urban uses because of the flooding. Poor filtering is an additional limitation affecting septic tank absorption fields.

This soil is poorly suited to most recreational developments because of the flooding.

This Buncombe soil is in capability subclass Vw. The woodland ordination symbol is 9S.

Cartecay Series

The Cartecay series consists of very deep, somewhat poorly drained, moderately rapidly permeable soils that formed in loamy sediment on flood plains. Slopes range from 0 to 2 percent. These soils are coarse-loamy, mixed, nonacid, thermic Aquic Udifluvents.

Cartecay soils are geographically associated with Altavista, Chewacla, Congaree, Roanoke, and Toccoa soils. Roanoke soils are lower on the landscape than the Cartecay soils, and Congaree and Toccoa soils are higher on the landscape. Altavista soils are on stream terraces. Altavista, Chewacla, and Congaree soils have a fine-loamy particle-size control section. Toccoa soils are well drained and moderately well drained. Roanoke soils have a clayey particle-size control section and are poorly drained.

Typical pedon of Cartecay loam in an area of Cartecay and Chewacla soils, frequently flooded; Newton County; 2.0 miles north of Covington, Georgia, on Georgia Highway 142 to Flat Rock Road, 1.5 miles north to Cornish Mountain Road, 200 feet northwest:

A—0 to 9 inches; dark yellowish brown (10YR 4/4) loam; weak fine granular structure; very friable; many fine roots; many fine pores; many very fine flakes of mica; strongly acid; clear smooth boundary.

C1—9 to 18 inches; strong brown (7.5YR 5/6) sandy loam; many medium distinct reddish yellow (7.5YR 7/8) mottles; massive; loose; many very fine flakes of mica; strongly acid; gradual wavy boundary.

C2—18 to 42 inches; mottled strong brown (7.5YR 4/6), grayish brown (10YR 5/2), and brownish yellow (10YR 6/8) loam; massive; friable; common very fine flakes of mica; thin strata of sandy loam and loamy sand; moderately acid; gradual wavy boundary.

Cg1—42 to 50 inches; gray (10YR 5/1) loamy sand; common medium prominent strong brown (7.5YR 5/8) mottles; massive; friable; few fine flakes of mica; pockets of sandy loam and loam; moderately acid; gradual wavy boundary.

Cg2—50 to 60 inches; dark gray (10YR 4/1) loam; massive; friable; few fine flakes of mica; strongly acid.

Thickness of the loamy and sandy sediment ranges from 5 to 10 feet or more. Reaction ranges from very strongly acid to slightly acid throughout the profile, but it is moderately acid or slightly acid in some part of the soil between depths of 10 and 40 inches.

The A horizon is 7 to 9 inches thick. It has hue of 10YR, value of 3 to 5, and chroma of 3 to 6.

The C1 and C2 horizons have hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 3 to 6. Mottles with chroma of 2 or less are within a depth of 20 inches. The Cg horizon has hue of 10YR, value of 4 to 6, and chroma of 1. The C horizons are commonly stratified and contain pockets of finer and coarser textured material.

Chewacla Series

The Chewacla series consists of very deep, somewhat poorly drained, moderately permeable soils that formed in loamy sediment on flood plains. Slopes range from 0 to 2 percent. These soils are fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts.

Chewacla soils are geographically associated with Cartecay, Congaree, Roanoke, and Toccoa soils. Roanoke soils are lower on the landscape than the Chewacla soils, and Congaree and Toccoa soils are higher. Cartecay and Toccoa soils have a coarse-loamy particle-size control section. Toccoa and Congaree soils are well drained and moderately well drained. Roanoke soils have a clayey particle-size control section and are poorly drained.

Typical pedon of Chewacla loam in an area of Cartecay and Chewacla soils, frequently flooded; Newton County; 0.75 mile east of the South River bridge at Georgia Highway 20 to Butler Bridge Road, 2.0 miles south to a gravel mine, 0.5 mile south:

A—0 to 6 inches; dark brown (10YR 3/3) loam; weak fine granular structure; very friable; many fine roots; few very fine flakes of mica; strongly acid; clear smooth boundary.

Bw1—6 to 15 inches; reddish brown (5YR 4/4) sandy clay loam; common fine prominent yellowish brown (10YR 5/4) mottles; weak fine granular and weak medium subangular blocky structure; friable; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bw2—15 to 22 inches; reddish brown (5YR 4/4) loam; common medium prominent grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; firm; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bg1—22 to 35 inches; mottled grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) clay loam; weak medium subangular blocky structure; firm; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bg2—35 to 50 inches; mottled light brownish gray (10YR 6/2) and brown (10YR 5/3) loam; weak medium subangular blocky structure; firm; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Cg—50 to 60 inches; mottled gray (10YR 6/1), brown (10YR 5/3), and yellowish brown (10YR 5/8) stratified clay loam and sandy loam; massive; firm; few fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 37 to 60 inches or more. Reaction ranges from very strongly acid to moderately acid throughout the profile except for the surface layer in limed areas.

The A horizon is 4 to 6 inches thick. It has hue of 7.5YR or 10YR and value and chroma of 3 or 4.

The Bw horizon has hue of 5YR, 7.5YR, or 10YR, value of 3 to 5, and chroma of 4 or 6. Mottles in shades of yellow or brown occur throughout the horizon. Gray mottles occur within a depth of 24 inches. The horizon is sandy clay loam, loam, silt loam, or silty clay loam.

The Bg horizon has hue of 10YR, value of 5 or 6, and chroma of 1 or 2, or it is mottled in shades of brown and gray. It is loam, clay loam, silt loam, or silty clay loam. In some pedons it has thin strata of sandy loam.

The C or Cg horizon has colors similar to those of the Bw or Bg horizon. Where it occurs within a depth of 40 inches, it is loamy. Where it occurs below a depth of 40 inches, it is variable, ranging from extremely gravelly sand to clay.

CCA—Cartecay and Chewacla soils, frequently flooded

This map unit consists of very deep, somewhat poorly drained, nearly level soils on flood plains. This unit is made up of areas of Cartecay and Chewacla soils that are closely associated in an irregular pattern. Although the composition of this unit is variable, the mapping is sufficient enough to make interpretations for use and management of the soils. Each mapped area has at least one of the soils, and some have both. These soils are frequently flooded from late fall to midspring (fig. 3). The map unit typically is about 45 percent Cartecay soil, 40 percent Chewacla soil, and 15 percent included soils; however, the proportion of each soil varies significantly from one mapped area to another. Slopes range from 0 to 2 percent.

Typically, the Cartecay soil has a surface layer that

Figure 3.—Seasonal flooding in an area of Cartecay and Chewacla soils, frequently flooded. These soils support bottomland hardwoods and other vegetation valuable to wildlife.

is dark yellowish brown loam 9 inches thick. The upper part of the underlying material, to a depth of 18 inches, is strong brown sandy loam that has reddish yellow mottles. The next part, to a depth of 42 inches, is mottled strong brown, grayish brown, and brownish yellow loam. The lower part, to a depth of 60 inches, is gray loamy sand and loam and is stratified.

The Cartecay soil is low in natural fertility and moderate in organic matter. Reaction ranges from strongly acid to slightly acid throughout the profile, but it is moderately acid or slightly acid in some part of the soil between depths of 10 and 40 inches. Permeability is dominantly moderately rapid. Available water capacity is moderate. Tilth is fair. The effective rooting depth is very deep except from early winter to midspring when the water table is at a depth of 0.5 foot to 1.5 feet or when the soil is flooded.

Typically, the Chewacla soil has a surface layer that is dark brown loam 6 inches thick. The subsoil extends to a depth of 50 inches. In sequence downward, it is 9 inches of reddish brown sandy clay loam that has yellowish brown mottles, 7 inches of reddish brown loam that has grayish brown mottles, 13 inches of mottled grayish brown and yellowish brown clay loam, and 15 inches of mottled light brownish gray and brown loam. The substratum, to a depth of 60 inches, is mottled yellowish brown, brown, and gray stratified clay loam and sandy loam.

The Chewacla soil is low in natural fertility and moderate in organic matter. Reaction ranges from very strongly acid to moderately acid. Permeability is moderate. Available water capacity is moderate. Tilth is fair. The effective rooting depth is very deep except from late fall to midspring when the water table is at a depth of 0.5 foot to 1.5 feet or when the soil is flooded.

Included with these soils in mapping are small areas of Congaree, Roanoke, and Toccoa soils. These included soils are on flood plains. Also included are small areas of Altavista soils on stream terraces.

These Cartecay and Chewacla soils are poorly suited to field crops because of the wetness and frequent flooding. They are moderately suited to pasture.

The potential productivity of these soils for woodland is very high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Seasonal wetness and flooding limit the use of conventional equipment. The equipment limitation generally can be overcome by performing planting and harvesting operations during the drier periods. Proper drainage and bedding, where permitted, and the use of adapted plants generally increase the rate of seedling survival.

These soils are unsuited to urban uses because of the wetness and flooding. They are poorly suited to recreational development because of these limitations.

This Cartecay soil is in capability subclass Vw. This Chewacla soil is in capability subclass IVw. The woodland ordination symbol for both soils is 10W.

Cecil Series

The Cecil series consists of very deep, well drained, moderately permeable soils that formed in residuum weathered from acid crystalline rock, such as granite, gneiss, and schist, on uplands. Slopes range from 2 to 10 percent. These soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Cecil soils are geographically associated with Appling, Gwinnett, Hiwassee, Madison, and Pacolet soils. Appling soils have a brown subsoil. Gwinnett and Pacolet soils have a solum that is thinner than that of the Cecil soils. Gwinnett and Hiwassee soils have a dark red subsoil. Madison soils have a higher content of mica than the Cecil soils.

Typical pedon of Cecil sandy loam, 2 to 6 percent slopes (See fig. 10 at end of section); Newton County; 1.5 miles south of Porterdale, Georgia, to Georgia Highway 162, about 4.3 miles south and 50 feet west of the highway, 100 feet south of an abandoned homesite:

Ap—0 to 8 inches; brown (7.5YR 4/4) sandy loam; weak fine granular structure; very friable; many fine roots; moderately acid; clear smooth boundary.

Bt1—8 to 18 inches; red (2.5YR 4/8) sandy clay; moderate medium subangular blocky structure; firm; few fine roots; strongly acid; clear wavy boundary.

Bt2—18 to 24 inches; red (2.5YR 4/8) sandy clay; few fine faint yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine flakes of mica; few prominent clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt3—24 to 32 inches; red (2.5YR 4/8) sandy clay; few medium prominent brownish yellow (10YR 6/8) and few medium distinct red (10R 4/8) mottles; moderate medium subangular blocky structure; firm; few fine flakes of mica; common distinct clay films on faces of peds; very strongly acid.

BC—32 to 42 inches; red (2.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; common fine flakes of mica; very strongly acid; gradual wavy boundary.

C—42 to 60 inches; reddish brown (2.5YR 5/4)

saprolite that crushes to sandy clay loam; massive; friable; many fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 42 to more than 60 inches. It is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas.

The A horizon is 3 to 8 inches thick. It has hue of 2.5YR, 5YR, 7.5YR, or 10YR, value of 3 to 5, and chroma of 3 to 8. It is sandy loam or sandy clay loam.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 or 6.

The Bt horizon generally has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It has hue of 5YR, value of 4 or 5, and chroma of 6 or 8 in some pedons where the Bt and BC horizons do not have mottles. In some pedons the lower part of the Bt horizon has few or common mottles in shades of red, brown, or yellow. The upper part of the Bt horizon is clay or sandy clay, and the lower part is sandy clay loam, sandy clay, or clay.

The BC horizon has hue of 10R or 2.5YR, value of 4, and chroma of 6 or 8. In some pedons it has few or common mottles in shades of red, brown, or yellow. It is sandy clay loam or clay loam.

The C horizon has the same colors as those of the BC horizon, or it is mottled in shades of red or brown. It is soft weathered saprolite that crushes to sandy loam or sandy clay loam.

CeB—Cecil sandy loam, 2 to 6 percent slopes

This very deep, well drained, very gently sloping soil is on upland ridges. Slopes are smooth and convex.

Typically, the surface layer is brown sandy loam 8 inches thick. The subsoil extends to a depth of 42 inches and is dominantly red sandy clay that has mottles in shades of red and yellow in the lower part. The layer between depths of 32 and 42 inches is red sandy clay loam. The substratum, to a depth of 60 inches, is saprolite that crushes to sandy clay loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Appling, Gwinnett, Hiwassee, Madison, and Pacolet soils. These included soils are on the same landscape as the Cecil soil. Also included are a few small areas of soils that have a surface layer of gravelly sandy loam or sandy clay loam.

This Cecil soil is well suited to field crops and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and shortleaf pine are the preferred trees to plant (fig. 4). Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize soil erosion.

This soil is well suited to most urban uses and recreational development; however, the moderate permeability in the subsoil is a limitation affecting septic tank absorption fields. Generally, this limitation can be overcome by special design and proper application.

This Cecil soil is in capability subclass IIe. The woodland ordination symbol is 8A.

CeC—Cecil sandy loam, 6 to 10 percent slopes

This very deep, well drained, gently sloping soil is on narrow ridges and long hillsides of uplands. Slopes are smooth and convex.

Typically, the surface layer is brown sandy loam 8 inches thick. The subsoil extends to a depth of 42 inches and is dominantly red sandy clay that has mottles in shades of red and yellow in the lower part. The layer between depths of 32 and 42 inches is red sandy clay loam. The substratum, to a depth of 60 inches, is weathered soil material that crushes to sandy clay loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Appling, Gwinnett, Hiwassee, Madison, and Pacolet soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Cecil soil.

This Cecil soil is moderately suited to field crops because of the slope. It is well suited to pasture. Good tilth is easily maintained by returning crop residue to

Figure 4.—A stand of loblolly pine trees planted on Cecil sandy loam, 2 to 6 percent slopes.

the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is

high. Loblolly pine and shortleaf pine are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize soil erosion.

This soil is moderately suited to most urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Cecil soil is in capability subclass IIIe. The woodland ordination symbol is 8A.

CfB2—Cecil sandy clay loam, 2 to 6 percent slopes, eroded

This very deep, well drained soil is on very gently sloping upland ridges. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Slopes are irregular and complex. Galled spots, rills, and shallow gullies may occur on slopes. Individual areas are 5 to 50 acres in size.

Typically, the surface layer is yellowish red sandy clay loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 42 inches. The upper part of the subsoil is clay, and the lower part is sandy clay loam. The substratum, to a depth of 60 inches or more, is saprolite that crushes to sandy clay loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are areas of Appling, Gwinnett, Hiwassee, Madison, and Pacolet soils. These included soils are on the same landscape as the Cecil soil.

This Cecil soil is only moderately suited to field crops because of poor tilth. It is moderately suited to pasture (fig. 5). Continued erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, helps to prevent further erosion and reduces runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and shortleaf pine are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. The equipment limitation and seedling mortality are management concerns. Performing management practices and harvesting operations during the drier periods helps to minimize soil compaction and reduce the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. In addition, the reduction of competing vegetation generally increases the rate of seedling survival. Performing management practices and harvesting operations on the contour helps to minimize erosion.

The soil is well suited to most urban uses and recreational development; however, the moderate permeability is a limitation affecting septic tank absorption fields. Generally, this limitation can be overcome by special design and proper application.

This Cecil soil is in capability subclass IIIe. The woodland ordination symbol is 7C.

CfC2—Cecil sandy clay loam, 6 to 10 percent slopes, eroded

This very deep, well drained soil in on gently sloping upland hillsides. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Slopes are irregular and complex. Galled spots, rills, and shallow gullies may occur on slopes.

Typically, the surface layer is yellowish red sandy clay loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 42 inches. The upper part of the subsoil is clay, and the lower part is sandy clay loam. The substratum, to a depth of 60 inches or more, is saprolite that crushes to sandy clay loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are areas of Appling, Gwinnett, Hiwassee, Madison, and Pacolet soils. These included soils are on the same landscape as the Cecil soil.

This Cecil soil is poorly suited to field crops because of poor tilth and the slope. It is moderately suited to pasture. Continued erosion is a concern if this soil is cultivated and the surface is not protected. Including grasses and legumes in the cropping system helps to prevent further erosion and reduces runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and shortleaf pine are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. The equipment limitation and seedling mortality are management concerns.

Figure 5.—Pasture of coastal bermudagrass in an area of Cecil sandy clay loam, 2 to 6 percent slopes, eroded.

Performing management practices and harvesting operations during the drier periods helps to minimize soil compaction and reduces the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. In addition, the reduction of competing vegetation generally increases the rate of seedling survival. Performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is only moderately suited to most urban uses and recreational development. The slope is the main limitation. The moderate permeability is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Cecil soil is in capability subclass IVe. The woodland ordination symbol is 7C.

CuC—Cecil-Urban land complex, 2 to 10 percent slopes

This map unit consists of areas of the very deep, well drained Cecil soil and areas of Urban land that are so intermingled that they could not be separated at the scale selected for mapping. This unit typically is about 50 percent Cecil soil, 25 percent Urban land, and 25 percent included soils; however, the proportion of each component may vary from one mapped area to another. The map unit is on very gently sloping ridges and gently sloping hillsides in the uplands.

Typically, the Cecil soil has a surface layer that is brown sandy loam 8 inches thick. The subsoil extends to a depth of 42 inches and is dominantly red sandy clay that has mottles in shades of red and yellow in the lower part. The layer between depths of 32 and 42 inches is red sandy clay loam. The substratum, to a

depth of 60 inches, is saprolite that crushes to sandy clay loam.

The Cecil soil is low in natural fertility and organic matter. Reaction is strongly acid or very strongly acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Urban land consists of areas that have been altered by cutting, filling, and shaping to prepare for construction and paving. It is mainly used for schools, parking lots, streets, commercial buildings, and private dwellings.

Included in this unit in mapping are a few small areas of Appling, Gwinnett, Hiwassee, and Madison soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Cecil soil and Urban land.

This map unit is well suited to most urban uses and recreational development; however, the moderate permeability in the subsoil of the Cecil soil is a limitation affecting septic tank absorption fields. This limitation generally can be overcome by special design and proper application. The common plants used for landscaping grow well in this map unit. Erosion is a concern until permanent plant cover is established.

This map unit is not assigned a capability subclass or a woodland ordination symbol.

Congaree Series

The Congaree series consists of very deep, well drained and moderately well drained, moderately permeable soils that formed in loamy sediment on flood plains. Slopes range from 0 to 2 percent. These soils are fine-loamy, mixed, nonacid, thermic Typic Udifluvents.

Congaree soils are geographically associated with Altavista, Cartecay, Chewacla, and Toccoa soils. Altavista soils are on adjacent stream terraces. Cartecay and Toccoa soils have a coarse-loamy particle-size control section. Cartecay and Chewacla soils are somewhat poorly drained.

Typical pedon of Congaree loam in an area of Toccoa and Congaree soils, frequently flooded (See fig. 11 at end of section); Newton County; 0.75 mile east of the South River bridge on Georgia Highway 20 to Butler Bridge Road, 2.4 miles south and 700 feet east of the river bank:

A—0 to 8 inches; dark brown (7.5YR 3/4) loam; weak fine and medium granular structure; very friable; many fine roots; many very fine flakes of mica; strongly acid; clear smooth boundary.

C1—8 to 15 inches; brown (7.5YR 4/4) loam; few fine distinct strong brown (7.5YR 5/8) mottles; massive; friable; common fine roots; common fine flakes of mica; moderately acid; gradual wavy boundary.

C2—15 to 35 inches; reddish brown (5YR 4/4) loam; few fine prominent strong brown (7.5YR 4/6) mottles; massive; friable; common fine and medium roots; common fine flakes of mica; common horizontal lenses of strong brown loamy sand; strongly acid; clear wavy boundary.

C3—35 to 50 inches; reddish brown (5YR 4/4) loam; massive; friable; common fine flakes of mica; very strongly acid; clear wavy boundary.

C4—50 to 60 inches; dark brown (7.5YR 4/4) loam; massive; friable; common fine flakes of mica; very strongly acid.

The thickness of stratified layers is 60 inches or more. Reaction ranges from very strongly acid to slightly acid throughout the profile, but it is moderately acid or higher in some part of the soil between depths of 6 and 40 inches.

The A horizon is 6 to 10 inches thick. It has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4.

The C horizon has hue of 5YR, 7.5YR, or 10YR, value of 3 to 5, and chroma of 3 to 6. It has none to common mottles in shades of brown throughout. Gray mottles occur in some pedons below a depth of 40 inches. The horizon is silt loam, fine sandy loam, loam, or silty clay loam.

A buried B horizon may occur in some pedons.

Gwinnett Series

The Gwinnett series consists of deep, well drained, moderately permeable soils that formed in residuum weathered mainly from intermediate and basic crystalline rock, such as hornblende gneiss and diabase, on uplands. Slopes range from 2 to 25 percent. These soils are clayey, kaolinitic, thermic Rhodic Kanhapludults.

Gwinnett soils are geographically associated with Hiwassee, Madison, and Pacolet soils. Hiwassee soils have a solum that is thicker than that of the Gwinnett soils. Pacolet and Madison soils do not have dark red colors. In addition, Madison soils contain more mica than the Gwinnett soils.

Typical pedon of Gwinnett sandy loam, 2 to 6 percent slopes; Newton County; 5 miles east of Covington, Georgia, on Interstate Highway 20 to

Georgia Highway 11, north on Alcovy Trestle to River Cove Road, 0.75 mile west, 100 feet east of the road:

Ap—0 to 8 inches; dark reddish brown (5YR 3/4) sandy loam; weak fine granular structure; very friable; many fine roots; many fine pores; slightly acid; clear smooth boundary.

Bt1—8 to 12 inches; dark red (2.5YR 3/6) sandy clay; moderate medium subangular blocky structure; firm; many fine roots; few distinct clay films on faces of peds; few fine flakes of mica; moderately acid; gradual wavy boundary.

Bt2—12 to 23 inches; dark red (10R 3/6) clay; moderate and strong fine subangular blocky structure; firm; common fine roots; common distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt3—23 to 29 inches; dark red (10R 3/6) clay; strong fine subangular blocky structure; firm; few fine roots; common prominent clay films on faces of peds; common fine flakes of mica; strongly acid; clear wavy boundary.

Bt4—29 to 35 inches; dark red (10R 3/6) clay loam; common medium prominent reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; firm; few distinct clay films on faces of peds; common fine flakes of mica; strongly acid; clear wavy boundary.

CB—35 to 50 inches; red (2.5YR 4/6) and dark red (10R 3/6) sandy clay loam; common medium prominent reddish yellow (7.5YR 6/8) mottles; massive; firm; many fine flakes of mica; very strongly acid; clear wavy boundary.

Cr—50 to 53 inches; red (2.5YR 4/6) soft, highly weathered hornblende gneiss bedrock; many fine flakes of mica; strongly acid.

The thickness of the solum ranges from 25 to 39 inches. The depth to soft bedrock ranges from 40 to 60 inches. Reaction ranges from very strongly acid to moderately acid except for the surface layer in limed areas.

The A horizon is 5 to 9 inches thick. It has hue of 2.5YR or 5YR, value of 3, and chroma of 2 to 6. It is sandy loam or sandy clay loam. In some pedons it contains few to many pebbles and few cobbles.

The Bt horizon has hue of 10R or 2.5YR, value of 3, and chroma of 4 or 6. The lower part has none to common mottles in shades of brown and yellow. The horizon is sandy clay or clay.

The BC horizon, if it occurs, has hue of 10R or 2.5YR, value of 3, and chroma of 6. It has none to common mottles in shades of brown and yellow. It is sandy clay loam or sandy clay.

The C horizon, if it occurs, commonly is soft weathered red saprolite that crushes to sandy loam or sandy clay loam and commonly contains pockets of red or dark red clay or clay loam which make up about 5 to 25 percent, by volume, in many pedons.

The Cr horizon is soft bedrock weathered mainly from gneiss.

GeB—Gwinnett sandy loam, 2 to 6 percent slopes

This deep, well drained, very gently sloping soil is on broad ridges in the uplands. Slopes are smooth and convex.

Typically, the surface layer is dark reddish brown sandy loam 8 inches thick. The subsoil is dark red. The upper part of the subsoil, to a depth of 12 inches, is clay loam. The next part, to a depth of 29 inches, is clay. The lower part, to a depth of 35 inches, is sandy clay loam that has reddish yellow mottles. The substratum, to a depth of 50 inches, is red and dark red sandy clay loam that has reddish yellow mottles. Soft bedrock is at a depth of 50 to 53 inches.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is deep.

Included with this soil in mapping are small areas of Cecil, Hiwassee, Madison, and Pacolet soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Gwinnett soil.

This Gwinnett soil is well suited to field crops and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is well suited to most urban uses and recreational development; however, the depth to soft bedrock and the moderate permeability in the subsoil and substratum are limitations affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Gwinnett soil is in capability subclass IIe. The woodland ordination symbol is 8A.

GeC—Gwinnett sandy loam, 6 to 10 percent slopes

This deep, well drained, gently sloping soil is on narrow ridges in the uplands. Slopes are irregular and convex.

Typically, the surface layer is dark reddish brown sandy loam 8 inches thick. The subsoil is dark red. The upper part of the subsoil, to a depth of 12 inches, is clay loam. The next part, to a depth of 29 inches, is clay. The lower part, to a depth of 35 inches, is sandy clay loam that has reddish yellow mottles. The substratum, to a depth of 50 inches, is red and dark red sandy clay loam that has reddish yellow mottles. Soft bedrock is at a depth of 50 to 53 inches.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is deep.

Included with this soil in mapping are a few areas of Cecil, Hiwassee, Madison, and Pacolet soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Gwinnett soil.

This Gwinnett soil is moderately suited to field crops because of the slope. It is well suited to pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is moderately suited to most urban uses and recreational development. The slope is the main limitation. The depth to soft bedrock and the moderate permeability in the subsoil and substratum are additional limitations affecting septic tank absorption fields. Generally, the limitations can be overcome by special design and proper application.

This Gwinnett soil is in capability subclass IIIe. The woodland ordination symbol is 8A.

GeD—Gwinnett sandy loam, 10 to 15 percent slopes

This deep, well drained, strongly sloping soil is on upland hillsides. Slopes are irregular.

Typically, the surface layer is dark reddish brown sandy loam 8 inches thick. The subsoil is dark red. The upper part of the subsoil, to a depth of 12 inches, is clay loam. The next part, to a depth of 29 inches, is clay. The lower part, to a depth of 35 inches, is sandy clay loam that has reddish yellow mottles. The substratum, to a depth of 50 inches, is red and dark red sandy clay loam that has reddish yellow mottles. Soft bedrock is at a depth of 50 to 53 inches.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are a few areas of Hiwassee, Madison, and Pacolet soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Gwinnett soil.

This Gwinnett soil is poorly suited to field crops because of the slope. It is moderately suited to pasture. Erosion is a concern if this soil is cultivated and the surface is not protected. Including grasses and legumes in the cropping system helps to control erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize soil erosion.

This soil is only moderately suited to most urban uses and recreational development. The slope is the main limitation. The depth to soft bedrock and the moderate permeability in the subsoil and substratum are additional limitations affecting septic tank absorption fields. Generally, the limitations can be overcome by special design and proper application.

This Gwinnett soil is in capability subclass IVe. The woodland ordination symbol is 8A.

GeE—Gwinnett sandy loam, 15 to 25 percent slopes

This deep, well drained, moderately steep soil is on upland hillsides. Slopes are irregular.

Typically, the surface layer is dark reddish brown sandy loam 8 inches thick. The subsoil is dark red. The upper part of the subsoil, to a depth of 12 inches, is clay loam. The next part, to a depth of 29 inches, is clay. The lower part, to a depth of 35 inches, is sandy clay loam that has reddish yellow mottles. The substratum, to a depth of 50 inches, is red and dark red sandy clay loam that has reddish yellow mottles. Soft bedrock is at a depth of 50 to 53 inches.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are a few areas of Madison and Pacolet soils and soils that have a surface layer of sandy clay loam. These included soils are also on uplands.

This Gwinnett soil is unsuited to field crops. The slope is the main limitation. The soil is moderately suited to pasture. Erosion is a concern if cultivated crops are grown. Including grasses and legumes in the cropping system helps to control erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Because this soil is moderately steep, the main management concerns are erosion and the equipment limitation. Performing management practices and harvesting operations on the contour and during the drier periods helps to minimize erosion. Proper placement of access roads and skid trails reduces the equipment limitation. In addition, the needed use of heavy equipment on this soil can be reduced if seedlings are planted by hand. Log decks placed near the top of the slope also reduce the equipment limitation.

The soil is poorly suited to urban uses and recreational development. The slope is the main limitation. The depth to soft bedrock and the moderate permeability in the subsoil and substratum are additional limitations affecting septic tank absorption fields. Generally, the limitations can be overcome by special design and proper application.

This Gwinnett soil is in capability subclass VIe. The woodland ordination symbol is 8R.

GwB2—Gwinnett sandy clay loam, 2 to 6 percent slopes, eroded

This deep, well drained, very gently sloping soil is on upland ridges. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Slopes are irregular and convex. Rills or galled spots occur on slopes.

Typically, the surface layer is dark red sandy clay loam 5 inches thick. The subsoil is dark red clay and extends to a depth of 38 inches. The substratum, to a depth of 55 inches, is sandy clay loam. Soft bedrock is at a depth of 55 inches.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is deep.

Included with this soil in mapping are a few small areas of Hiwassee, Madison, and Pacolet soils. These included soils are on the same landscape as the Gwinnett soil.

This Gwinnett soil is moderately suited to field crops because of poor tilth. It is well suited to pasture. Continued erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. The equipment limitation and seedling mortality are management concerns. Performing management practices and harvesting operations during the drier periods helps to minimize soil compaction and reduces the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. Performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is well suited to most urban uses and recreational development; however, the depth to soft bedrock and moderate permeability are limitations affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Gwinnett soil is in capability subclass IIIe. The woodland ordination symbol is 8A.

GwC2—Gwinnett sandy clay loam, 6 to 10 percent slopes, eroded

This deep, well drained, gently sloping soil is on upland ridges. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Slopes are irregular and convex. Rills, galled spots, or shallow gullies, or all three, occur on slopes.

Typically, the surface layer is dark red sandy clay loam 5 inches thick. The subsoil is dark red clay that extends to a depth of 38 inches. The substratum, to a depth of 55 inches, is sandy clay loam. Soft bedrock is at a depth of 55 inches.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is deep.

Included with this soil in mapping are a few small areas of Hiwassee, Madison, and Pacolet soils. These included soils are on the same landscape as the Gwinnett soil.

This Gwinnett soil is poorly suited to field crops because of poor tilth and the slope. It is moderately suited to pasture. Continued erosion is a concern if cultivated crops are grown. Including grasses and legumes in the cropping system helps to prevent further erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. The main management concerns are erosion, the equipment limitation, and seedling mortality. Performing management practices and harvesting operations on the contour and during the drier periods helps to minimize erosion. Proper placement of access roads and skid trails reduces the equipment limitation. In addition, the needed use of heavy equipment on this soil can be reduced if seedlings are planted by hand. Log decks placed near the top of the slope also reduce the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. The reduction of competing vegetation also generally increases the rate of seedling survival.

This soil is only moderately suited to most urban uses and recreational development. The slope is the main limitation. The depth to soft bedrock and moderate permeability are additional limitations affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Gwinnett soil is in capability subclass IVe. The woodland ordination symbol is 7C.

GwD2—Gwinnett sandy clay loam, 10 to 15 percent slopes, eroded

This deep, well drained, strongly sloping soil is on upland hillsides. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Slopes are irregular and convex. Galled spots, rills, or shallow gullies, or all three, occur on slopes.

Typically, the surface layer is dark red sandy clay loam 5 inches thick. The subsoil is dark red sandy clay that extends to a depth of 38 inches. The substratum, to a depth of 55 inches, is sandy clay loam. Soft bedrock is at a depth of 55 inches.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is deep.

Included with this soil in mapping are a few areas of Hiwassee, Madison, and Pacolet soils. These included soils are on the same landscape as the Gwinnett soil.

This Gwinnett soil is poorly to field crops because of the slope and poor tilth. It is moderately suited to pasture. Continued erosion is a concern if cultivated crops are grown. Including grasses and legumes in the cropping system helps to prevent further erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. The main management concerns are erosion, the equipment limitation, and seedling mortality. Performing management practices and harvesting operations on the contour and during the drier periods helps to minimize erosion. Proper placement of access roads and skid trails reduces the equipment limitation. In addition, the needed use of heavy equipment on this soil can be reduced if seedlings are planted by hand. Log decks placed near the top of the slope also reduce the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. The reduction of competing vegetation also generally increases the rate of seedling survival.

This soil is only moderately suited to most urban uses and recreational development. The slope is the main limitation. The depth to soft bedrock and the moderate permeability are additional limitations affecting septic tank absorption fields. Generally, the limitations can be overcome by special design and proper application.

This Gwinnett soil is in capability subclass VIe. The woodland ordination symbol is 7C.

GwE2—Gwinnett sandy clay loam, 15 to 25 percent slopes, eroded

This deep, well drained, moderately steep soil is on upland hillsides. The surface layer is a mixture of the

original surface soil and the upper part of the subsoil. Slopes are irregular and convex. Galled spots, rills, or shallow gullies, or all three, occur on slopes.

Typically, the surface layer is dark red sandy clay loam 5 inches thick. The subsoil is dark red sandy clay that extends to a depth of 38 inches. The substratum, to a depth of 55 inches, is sandy clay loam. Soft bedrock is at a depth of 55 inches.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is deep.

Included with this soil in mapping are a few areas of Madison and Pacolet soils. These included soils are on the same landscape as the Gwinnett soil.

This Gwinnett soil is unsuited to field crops because of the slope and poor tilth. It is moderately suited to pasture. Continued erosion is a concern if cultivated crops are grown. Including grasses and legumes in the cropping system helps to prevent further erosion and reduce runoff.

The potential productivity of this soil for woodland is moderately high. Loblolly pine and yellow-poplar are among the preferred trees to plant. The main management concerns are erosion, the equipment limitation, and seedling mortality. Performing management practices and harvesting operations on the contour and during the drier periods helps to minimize erosion. Proper placement of access roads and skid trails reduces the equipment limitation. In addition, the needed use of heavy equipment on this soil can be reduced if seedlings are planted by hand. Log decks placed near the top of the slope also reduce the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. The reduction of competing vegetation also generally increases the rate of seedling survival.

This soil is poorly suited to urban uses and recreational development. The slope is the main limitation. The depth to soft bedrock and moderate permeability are additional limitations affecting septic tank absorption fields. In some areas, the limitations can be overcome by special design and proper application.

This Gwinnett soil is in capability subclass VIe. The woodland ordination symbol is 4R.

Helena Series

The Helena series consists of very deep, moderately well drained, slowly permeable soils that formed in residuum weathered mainly from a mixture of acid and intermediate rocks on uplands. Slopes range from 2 to 6 percent. These soils are clayey, mixed, thermic Aquic Hapludults.

Helena soils are geographically associated with Appling, Cecil, and Wedowee soils. These associated soils are well drained and do not have a sticky and plastic subsoil.

Typical pedon of Helena sandy loam, 2 to 6 percent slopes; Newton County; 0.75 mile west of the Yellow River on Brown's Bridge Road to Crowell Road, 0.25 mile south, 200 feet west:

Ap—0 to 6 inches; olive brown (2.5Y 4/4) sandy loam; weak fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

Bt1—6 to 15 inches; light yellowish brown (2.5Y 6/4) sandy clay; weak medium subangular blocky structure; firm; few fine and medium roots; few faint clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—15 to 27 inches; yellowish brown (10YR 5/8) sandy clay; common medium prominent red (2.5YR 4/8) and yellowish red (5YR 5/8) mottles; weak medium subangular and angular blocky structure; firm; sticky, plastic; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt3—27 to 40 inches; yellowish brown (10YR 5/8) clay; common medium prominent red (2.5YR 4/6) and light brownish gray (10YR 6/2) mottles; moderate medium angular blocky structure; firm; sticky, plastic; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt4—40 to 48 inches; mottled brownish yellow (10YR 6/8) and light gray (10YR 7/1) clay; moderate medium angular blocky structure; firm; sticky, plastic; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

BC—48 to 60 inches; brownish yellow (10YR 6/8) sandy clay loam; common or many pockets of gray (10YR 5/1) clay; weak medium subangular blocky structure; firm; strongly acid.

The thickness of the solum ranges from 36 to more than 50 inches. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas.

The A horizon is 3 to 8 inches thick. It has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4.

The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 6, and chroma of 4.

The upper part of the Bt horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 5 or 6, and chroma of 4 to 8. It has common or many mottles in shades of red, yellow,

and brown throughout. Gray mottles occur within a depth of 24 inches. The upper part of this horizon is sandy clay or clay.

The lower part of the Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 to 8, or it is mottled in shades of red, yellow, brown, and gray. It is sandy clay or clay.

The BC horizon has colors similar to those of the lower part of the Bt horizon. It is sandy clay loam or clay loam.

The C horizon, if it occurs, is highly weathered soil material that crushes to loam or sandy loam.

HaB—Helena sandy loam, 2 to 6 percent slopes

This very deep, moderately well drained, gently sloping soil is on toe slopes in the uplands. Slopes are smooth and convex.

Typically, the surface layer is olive brown sandy loam 6 inches thick. In sequence downward, the subsoil is 9 inches of light yellowish brown sandy clay, 12 inches of yellowish brown sandy clay that has red and yellowish red mottles, 13 inches of yellowish brown clay that has red and light brownish gray mottles, 8 inches of mottled brownish yellow and light gray clay, and 12 inches of brownish yellow sandy clay loam that has pockets of gray clay.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for surface layer in limed areas. Permeability is slow. Available water capacity is moderate. Tilth is good. The effective rooting depth is very deep except from early winter to early spring when the water table is at a depth of 1.5 to 2.5 feet.

Included with this soil in mapping are a few small areas of Appling, Cecil, and Wedowee soils. These included soils are on the higher parts of the landscape. Also included are soils that have a surface layer of gravelly sandy loam.

This Helena soil is well suited to field crops and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Seasonal wetness limits the use of conventional equipment. This limitation generally can be overcome by performing planting and harvesting operations during the drier periods. In addition, the needed use of heavy equipment on this soil can be reduced if seedlings are planted by hand.

This soil is poorly suited to most urban uses because of the wetness and shrink-swell potential. Low soil strength and the shrink-swell potential are limitations affecting roads and streets. The slow permeability in the subsoil and seasonal wetness are limitations affecting septic tank absorption fields. Because of the seasonal wetness, this soil is only moderately suited to most recreational development.

This Helena soil is in capability subclass IIe. The woodland ordination symbol is 8A.

Hiwassee Series

The Hiwassee series consists of very deep, well drained, moderately permeable soils that formed in residuum weathered mainly from intermediate and basic crystalline rock, such as hornblende gneiss and diabase, on uplands. Slopes range from 2 to 10 percent. These soils are clayey, kaolinitic, thermic Rhodic Kanhapludults.

Hiwassee soils are geographically associated with Cecil, Gwinnett, and Pacolet soils. Cecil and Pacolet soils do not have dark red colors. Gwinnett soils have a solum that is thinner than that of the Hiwassee soils.

Typical pedon of Hiwassee sandy loam, 2 to 6 percent slopes; Newton County; 9 miles south on Georgia Highway 36 from Covington, Georgia, 50 feet south of Scout Road, 100 feet west of Highway 36:

Ap—0 to 10 inches; dark reddish brown (5YR 3/3) sandy loam; weak fine granular structure; very friable; many fine roots; moderately acid; clear smooth boundary.

Bt1—10 to 15 inches; dark red (2.5YR 3/6) clay loam; moderate medium subangular blocky structure; firm; common fine roots; few faint clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—15 to 36 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt3—36 to 45 inches; dark red (2.5YR 3/6) clay loam; common medium prominent yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; common fine flakes of mica; strongly acid; gradual wavy boundary.

Bt4—45 to 52 inches; dark red (2.5YR 3/6) clay loam;

moderate medium subangular blocky structure; firm; few fine roots; common fine flakes of mica; strongly acid; gradual wavy boundary.

BC—52 to 60 inches; red (2.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; common fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. Reaction ranges from very strongly acid to moderately acid throughout the profile except for the surface layer in limed areas.

The A horizon is 4 to 10 inches thick. It has hue of 2.5YR or 5YR, value of 2 or 3, and chroma of 3 to 6. It is sandy loam or sandy clay loam.

The Bt horizon has hue of 10R or 2.5YR, value of 3, and chroma of 4 to 6. Mottles in shades of red may occur in the lower part of the horizon. The horizon is sandy clay in the upper part and sandy clay or clay loam in the lower part.

The BC horizon has hue of 10R or 2.5YR, value of 3 or 4, and chroma of 4 to 8. In some pedons, it may have mottles in shades of brown. It is clay loam or sandy clay loam.

The C horizon, if it occurs, has colors and mottles similar to those of the BC horizon. It is sandy loam or sandy clay loam.

HeB—Hiwassee sandy loam, 2 to 6 percent slopes

This very deep, well drained, very gently sloping soil is on broad ridges of uplands. Slopes are smooth and convex.

Typically, the surface layer is dark reddish brown sandy loam 10 inches thick. The subsoil is dark red. In sequence downward, it is 5 inches of clay loam, 11 inches of clay, 16 inches of clay loam, and 8 inches of sandy clay loam.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Gwinnett, Madison, and Pacolet soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Hiwassee soil.

This Hiwassee soil is well suited to field crops and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and shortleaf pine are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize soil erosion.

This soil is well suited to most urban uses and recreational development; however, the moderate permeability is a limitation affecting septic tank absorption fields. Generally, this limitation can be overcome by special design and proper application.

This Hiwassee soil is in capability subclass IIe. The woodland ordination symbol is 8A.

HeC—Hiwassee sandy loam, 6 to 10 percent slopes

This very deep, well drained, gently sloping soil is on narrow ridges and hillsides in the uplands. Slopes are smooth and convex.

Typically, the surface layer is dark reddish brown sandy loam 10 inches thick. The subsoil is dark red. In sequence downward, it is 5 inches of clay loam, 11 inches of clay, 16 inches of clay loam, and 8 inches of sandy clay loam.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Cecil, Gwinnett, Madison, and Pacolet soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Hiwassee soil.

This Hiwassee soil is moderately suited to field crops and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and shortleaf pine are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize soil erosion.

This soil is moderately suited to most urban uses and recreational development. The slope is the main limitation. The moderate permeability is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Hiwassee soil is in capability subclass IIIe. The woodland ordination symbol is 8A.

HwB2—Hiwassee sandy clay loam, 2 to 6 percent slopes, eroded

This very deep, well drained, very gently sloping soil is on upland ridges. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Galled spots, rills, shallow gullies, or all three, occur on slopes.

Typically, the surface layer is dark reddish brown sandy clay loam 4 inches thick. The subsoil is dark red and extends to a depth of 50 inches. The upper part of the subsoil is sandy clay 16 inches thick, and the lower part is clay loam and sandy clay loam 30 inches thick. The substratum, to a depth of 60 inches, is dark red saprolite that crushes to sandy clay loam.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Cecil, Gwinnett, Madison, and Pacolet soils. These included soils are also on uplands.

This Hiwassee soil is only moderately suited to field crops and pasture because of poor tilth. Tilth can be improved by returning crop residue to the soil. Continued erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to prevent further erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and shortleaf pine are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. The equipment limitation and seedling mortality are management concerns. Performing management practices and harvesting operations during the drier periods helps to minimize soil compaction and reduces the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. The reduction of competing vegetation also generally increases the rate of seedling survival. Performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is well suited to most urban uses and recreational development; however, the moderate permeability is a limitation affecting septic tank absorption fields. Generally, this limitation can be overcome by special design and proper application.

This Hiwassee soil is in capability subclass IIIe. The woodland ordination symbol is 7C.

HwC2—Hiwassee sandy clay loam, 6 to 10 percent slopes, eroded

This very deep, well drained, gently sloping soil is on narrow ridges and hillsides in the uplands. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Slopes are irregular and convex. Galled spots, rills, or shallow gullies, or all three, occur on slopes.

Typically, the surface layer is dark reddish brown sandy clay loam 4 inches thick. The subsoil is dark red and extends to a depth of 50 inches. The upper part of the subsoil is sandy clay, and the lower part is clay loam. The substratum, to a depth of 60 inches, is dark red saprolite that is sandy clay loam.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Cecil, Gwinnett, Madison, and Pacolet soils. These included soils are on the same landscape as the Hiwassee soil.

This Hiwassee soil is poorly suited to field crops because of poor tilth and the slope. It is moderately suited to pasture. Tilth can be improved by returning crop residue to the soil. Continued erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to prevent further erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and shortleaf pine are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. The equipment limitation and seedling mortality are management concerns. Performing management practices and harvesting operations during the drier periods helps to minimize soil compaction and reduces the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. The reduction of competing vegetation also

generally increases the rate of seedling survival. Performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is well suited to most urban uses and recreational development. The slope is the main limitation. The moderate permeability is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Hiwassee soil is in capability subclass IVe. The woodland ordination symbol is 7C.

Madison Series

The Madison series consists of very deep, well drained, moderately permeable soils that formed in residuum weathered mainly from felsic or intermediate metamorphic rock, such as mica schist or mica gneiss, on uplands. Slopes range from 2 to 25 percent. These soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Madison soils are geographically associated with Cecil, Gwinnett, and Pacolet soils. Cecil and Pacolet soils contain less mica than the Madison soils. Cecil soils also have a solum that is thicker than that of the Madison soils. Gwinnett soils have a dark red subsoil.

Typical pedon of Madison sandy loam, 2 to 6 percent slopes (See fig. 12 at end of section); Newton County; 0.25 mile south of Newborn, Georgia, on Georgia Highway 142, about 50 feet north:

Ap—0 to 6 inches; strong brown (7.5YR 4/6) sandy loam; weak fine granular structure; very friable; few fine flakes of mica; many fine roots; moderately acid; clear smooth boundary.

Bt1—6 to 20 inches; red (2.5YR 4/8) sandy clay; moderate medium subangular blocky structure; firm; few fine and medium roots; common distinct clay films on faces of peds; common fine flakes of mica; strongly acid; gradual wavy boundary.

Bt2—20 to 30 inches; red (2.5YR 4/6) sandy clay; moderate medium subangular blocky structure; firm; few fine and common medium roots; common distinct clay films on faces of peds; many fine and medium flakes of mica; strongly acid; gradual wavy boundary.

Bt3—30 to 35 inches; red (2.5YR 4/8) sandy clay; moderate medium subangular blocky structure; firm; few medium roots; common distinct clay films on faces of peds; many fine and medium flakes of mica; very strongly acid; gradual wavy boundary.

C—35 to 60 inches; red (2.5YR 4/8) saprolite that crushes to sandy clay loam; massive; friable; many fine and medium flakes of mica; very strongly acid.

The thickness of the solum ranges from 24 to 40 inches. The upper horizons have few to many mica flakes, and the lower horizons have many mica flakes. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas.

The Ap horizon is 4 to 9 inches thick. It has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6. It is sandy loam or sandy clay loam.

The Bt horizon has hue of 10R, 2.5YR, or 5YR, value of 4 or 5, and chroma of 6 or 8. It is sandy clay, clay loam, or clay.

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

The C horizon has the same colors as the BC horizon, or it is mottled in shades of red, pink, or brown. It is soft schist saprolite that crushes to sandy clay loam or sandy loam. In some pedons it has pockets or tongues of clay or clay loam.

MaB—Madison sandy loam, 2 to 6 percent slopes

This very deep, well drained, gently sloping soil is on upland ridges. Slopes are smooth and convex.

Typically, the surface layer is strong brown sandy loam 6 inches thick. The subsoil is red sandy clay and extends to a depth of 35 inches. It contains common or many flakes of mica. The substratum, to a depth of 60 inches, is weathered saprolite that crushes to sandy clay loam. It contains many flakes of mica.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Cecil, Gwinnett, and Pacolet soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Madison soil.

This Madison soil is well suited to field crops and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and shortleaf pine are among the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is well suited to most urban uses and recreational development; however, the moderate permeability in the subsoil and substratum is a limitation affecting septic tank absorption fields. Generally, this limitation can be overcome by special design and proper application.

This Madison soil is in capability subclass IIe. The woodland ordination symbol is 7A.

MaC—Madison sandy loam, 6 to 10 percent slopes

This very deep, well drained, gently sloping soil is on narrow ridges in the uplands. Slopes are irregular and convex.

Typically, the surface layer is strong brown sandy loam 6 inches thick. The subsoil is red sandy clay and extends to a depth of 35 inches. It contains common or many flakes of mica. The substratum, to a depth of 60 inches, is weathered saprolite that crushes to sandy clay loam. It contains many flakes of mica.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Cecil, Gwinnett, and Pacolet soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Madison soil.

This Madison soil is moderately suited to field crops because of the slope. It is well suited to pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and shortleaf pine are among the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is only moderately suited to most urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil and substratum is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Madison soil is in capability subclass IIIe. The woodland ordination symbol is 7A.

MaD—Madison sandy loam, 10 to 15 percent slopes

This very deep, well drained, strongly sloping soil is on upland hillsides. Slopes are irregular.

Typically, the surface layer is strong brown sandy loam 6 inches thick. The subsoil is red sandy clay and extends to a depth of 35 inches. It contains common or many flakes of mica. The substratum, to a depth of 60 inches, is weathered saprolite that crushes to sandy clay loam. It contains many flakes of mica.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Gwinnett, Pacolet, and Rion soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Madison soil.

This Madison soil is poorly suited to field crops because of the slope. It is moderately suited to pasture. Erosion is a concern if this soil is cultivated and the surface is not protected. Including grasses and legumes in the cropping system helps to control erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and shortleaf pine are among the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is only moderately suited to most urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil and substratum is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Madison soil is in capability subclass IVe. The woodland ordination symbol is 7A.

MaE—Madison sandy loam, 15 to 25 percent slopes

This very deep, well drained, moderately steep soil is on upland hillsides. Slopes are irregular.

Typically, the surface layer is strong brown sandy loam 6 inches thick. The subsoil is red sandy clay and extends to a depth of 35 inches. It contains common or many flakes of mica. The substratum, to a depth of 60 inches, is weathered saprolite that crushes to sandy clay loam. It contains many flakes of mica.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Gwinnett, Pacolet, and Rion soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Madison soil.

This Madison soil is unsuited to field crops. It is moderately suited to pasture. Erosion is a concern if this soil is cultivated and the surface is not protected. Including grasses and legumes in the cropping system helps to reduce runoff and control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and shortleaf pine are among the preferred trees to plant. Because this soil is moderately steep, the main management concerns are erosion and the equipment limitation. Performing management practices and harvesting operations on the contour and during the drier periods helps to minimize erosion. Proper placement of access roads and skid trails reduces the equipment limitation. In addition, the needed use of heavy equipment on this soil can be reduced if seedlings are planted by hand. Log decks placed near the top of the slope also reduce the equipment limitation.

This soil is poorly suited to urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil and substratum is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Madison soil is in capability subclass VIe. The woodland ordination symbol is 7R.

MdC2—Madison sandy clay loam, 2 to 10 percent slopes, eroded

This very deep, well drained, very gently sloping or gently sloping soil is on ridges and short hillsides in the uplands. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Slopes are irregular. Galled spots, rills, or shallow gullies occur on slopes.

Typically, the surface layer is reddish brown sandy clay loam 5 inches thick. The subsoil is red and extends to a depth of 30 inches. The upper part of the subsoil is clay loam, and the lower part is sandy clay loam. The substratum, to a depth of 60 inches or more, is weathered saprolite that crushes to sandy loam. The subsoil and substratum contain many flakes of mica.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Cecil, Gwinnett, and Pacolet soils. These included soils are on the same landscape as the Madison soil.

This Madison soil is poorly suited to field crops because of the slope and poor tilth. It is moderately suited to pasture. Tilth can be improved by returning crop residue to the soil. Continued erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine is one of the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. The equipment limitation and seedling mortality are management concerns. Performing management practices and harvesting operations during the drier periods helps to minimize soil compaction and reduces the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. The reduction of competing vegetation also generally increases the rate of seedling survival. Performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is well suited to most urban uses and recreational development; however, the moderate permeability in the subsoil and substratum is a limitation affecting septic tank absorption fields.

Generally, this limitation can be overcome by special design and proper application.

This Madison soil is in capability subclass IVe. The woodland ordination symbol is 6C.

MdD2—Madison sandy clay loam, 10 to 15 percent slopes, eroded

This very deep, well drained, strongly sloping soil is on upland hillsides. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Slopes are irregular. Galled spots, rills, and shallow gullies occur on slopes.

Typically, the surface layer is reddish brown sandy clay loam 5 inches thick. The subsoil is red and extends to a depth of 30 inches. The upper part of the subsoil is clay loam, and the lower part is sandy clay loam. The substratum, to a depth of 60 inches or more, is weathered saprolite that crushes to sandy loam. The subsoil and substratum contain many flakes of mica.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are a few areas of Gwinnett, Pacolet, and Rion soils. These included soils are also on uplands.

This Madison soil is poorly suited to field crops because of the slope and poor tilth. It is moderately suited to pasture. Continued erosion is a concern if this soil is cultivated and the surface is not protected. Including grasses and legumes in the cropping system helps to prevent further erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine is one of the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. The equipment limitation and seedling mortality are management concerns. Performing management practices and harvesting operations during the drier periods helps to minimize soil compaction and reduces the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. The reduction of competing vegetation also generally increases the rate of seedling survival. Performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is only moderately suited to urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Madison soil is in capability subclass VIe. The woodland ordination symbol is 6C.

MdE2—Madison sandy clay loam, 15 to 25 percent slopes, eroded

This very deep, well drained, moderately steep soil is on upland hillsides. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Slopes are irregular. Galled spots, rills, and shallow gullies occur on slopes.

Typically, the surface layer is reddish brown sandy clay loam 5 inches thick. The subsoil is red and extends to a depth of 30 inches. The upper part of the subsoil is clay loam, and the lower part is sandy clay loam. The substratum, to a depth of 60 inches or more, is weathered residuum that crushes to sandy loam. The subsoil and substratum contain many flakes of mica.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are a few areas of Gwinnett, Pacolet, and Rion soils. These included soils are on the same landscape as the Madison soil.

This Madison soil is not suited to field crops because of the slope and poor tilth. It is moderately suited to pasture. Continued erosion is a concern if cultivated crops are grown. Including grasses and legumes in the cropping system helps to prevent further erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine is one of the preferred trees to plant. The main management concerns are erosion, the equipment limitation, and seedling mortality. Performing management practices and harvesting operations on the contour and during the drier periods helps to minimize erosion. Proper placement of access roads and skid trails reduces the equipment limitation. In addition, the needed use of heavy equipment on this soil can be reduced if seedlings are planted by hand. Log decks placed near the top of the slope also reduce the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. The reduction of competing vegetation also generally increases the rate of seedling survival.

This soil is poorly suited to urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil and substratum is an additional limitation affecting septic tank absorption fields. In some cases, these limitations can be overcome by special design and proper application.

This Madison soil is in capability subclass VIIe. The woodland ordination symbol is 6R.

Molena Series

The Molena series consists of very deep, somewhat excessively drained, rapidly permeable soils that formed in old sandy alluvium on stream terraces. Slopes range from 2 to 10 percent. These soils are sandy, mixed, thermic Psammentic Hapludults.

Molena soils are geographically associated with Wickham soils. Wickham soils are well drained and have a fine-loamy particle-size control section.

Typical pedon of Molena loamy sand, 2 to 10 percent slopes; Newton County; 11 miles south of Covington, Georgia, on Georgia Highway 36 to Georgia Highway 212, about 2.6 miles west, 320 feet south:

Ap—0 to 6 inches; reddish brown (5YR 4/3) loamy sand; single grained; loose; many fine roots; strongly acid; clear smooth boundary.

Bt1—6 to 35 inches; yellowish red (5YR 5/6) loamy sand; weak fine granular structure; very friable; few fine roots; sand grains coated and bridged with clay; few fine flakes of mica; very strongly acid; diffuse wavy boundary.

Bt2—35 to 50 inches; strong brown (7.5YR 5/8) loamy sand; weak very fine granular structure; very friable; sand grains coated and bridged with clay; few fine flakes of mica; very strongly acid; diffuse wavy boundary.

C—50 to 60 inches; strong brown (7.5YR 5/8) sand; single grained; loose; few fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 40 to more than 60 inches. The surface horizon has none or few mica flakes, and the Bt and C horizons have few mica flakes. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas.

The A or Ap horizon is 6 to 9 inches thick. It has hue of 5YR, 7.5YR, or 10YR, value of 3 or 4, and chroma of 2 to 4.

The Bt horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 or 6. It is loamy sand or loamy fine sand. In some pedons it is sandy loam in the lower part.

The C horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 4 to 8. It is sand or loamy sand.

MoC—Molena loamy sand, 2 to 10 percent slopes

This very deep, somewhat excessively drained, very gently sloping or gently sloping soil is on stream terraces. Slopes are smooth and convex.

Typically, the surface layer is reddish brown loamy sand 6 inches thick. The subsoil is loamy sand. The upper part of the subsoil, to a depth of 35 inches, is yellowish red, and the lower part, to a depth of 50 inches, is strong brown. The substratum, to a depth of 60 inches, is strong brown sand.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas. Permeability is rapid. Available water capacity is low. Tilth is good. The soil can be worked throughout a wide range in moisture conditions. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Wickham soils. Wickham soils are also on stream terraces.

This Molena soil is poorly suited to field crops because of the low available water capacity. Returning crop residue to the soil helps to retain moisture. This soil is moderately suited to pasture.

The potential productivity of this soil for woodland is high. Loblolly pine is the preferred tree to plant. Because this soil has a low available water capacity, seedling mortality is a management concern. Proper planting procedures, the use of adapted drought-hardy plants, and the reduction of competing plants generally increases the rate of seedling survival. Because of the sandiness of the soil, the use of conventional equipment is limited.

This soil is well suited to urban uses; however, seepage is a limitation affecting most sanitary facilities. The soil is only moderately suited to recreational development because it is too sandy.

This Molena soil is in capability subclass IVs. The woodland ordination symbol is 8S.

Pacolet Series

The Pacolet series consists of very deep, well drained, moderately permeable soils that formed in

residuum weathered mainly from acid crystalline rock, such as granite, gneiss, and schist, on uplands. Slopes range from 2 to 25 percent. These soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Pacolet soils are geographically associated with Appling, Ashlar, Cecil, Gwinnett, Madison, and Wedowee soils. Appling and Cecil soils have a solum that is thicker than that of the Pacolet soils. Ashlar soils have a coarse-loamy particle-size class and have hard bedrock at depths of 22 to 40 inches. Gwinnett soils have a dark red subsoil. Madison soils have a higher content of mica than the Pacolet soils. Wedowee soils have a dominantly yellowish brown solum.

Typical pedon of Pacolet sandy loam, 10 to 15 percent slopes; Newton County; 2 miles north on Alcovy Road from its intersection with Georgia Highway 142, in a road cut:

Ap—0 to 4 inches; reddish brown (5YR 4/4) sandy loam; weak fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

Bt1—4 to 15 inches; red (2.5YR 4/6) sandy clay; moderate fine subangular blocky structure; firm; many fine roots; common distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt2—15 to 20 inches; red (2.5YR 4/8) sandy clay; moderate medium subangular blocky structure; firm; few fine roots; common distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—20 to 33 inches; red (2.5YR 4/8) sandy clay loam; few fine prominent reddish yellow (7.5YR 6/8) and common medium distinct light red (2.5YR 6/8) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; very strongly acid; clear wavy boundary.

C—33 to 60 inches; mottled red (2.5YR 4/8), pinkish white (5YR 8/2), and reddish yellow (5YR 6/8) saprolite that crushes to sandy loam; massive; few fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 22 to 38 inches. Some horizons have few mica flakes. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas.

The Ap horizon is 3 to 8 inches thick. It has hue of 5YR, 7.5YR, or 10YR, value of 3 to 5, and chroma of 2 to 6. It is sandy loam or sandy clay loam.

The BA or BE horizon, if it occurs, has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8.

The Bt horizon has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is clay loam, sandy clay, or clay.

The BC horizon has hue of 10R, 2.5YR, or 5YR, value of 4 or 5, and chroma of 6 or 8. In some pedons it has few or common mottles in shades of red, yellow, or brown. It is sandy clay loam or clay loam.

The C horizon commonly is soft weathered saprolite that crushes to loam, sandy loam, or fine sandy loam. In some pedons it has thin pockets or tongues of red clay or clay loam.

PaB—Pacolet sandy loam, 2 to 6 percent slopes

This very deep, well drained, very gently sloping soil is on narrow ridges in the uplands. Slopes are irregular and convex.

Typically, the surface layer is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles are between depths of 20 and 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Appling, Ashlar, Cecil, Gwinnett, Madison, and Wedowee soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Pacolet soil.

This Pacolet soil is well suited to field crops and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is well suited to most urban uses and recreational development; however, the moderate

permeability is a limitation affecting septic tank absorption fields. Generally, this limitation can be overcome by special design and proper application.

This Pacolet soil is in capability subclass IIe. The woodland ordination symbol is 8A.

PaC—Pacolet sandy loam, 6 to 10 percent slopes

This very deep, well drained, gently sloping soil is on narrow ridges and short hillsides in the uplands. Slopes are irregular and convex.

Typically, the surface layer is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles are between depths of 20 and 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Appling, Ashlar, Cecil, Gwinnett, Madison, and Wedowee soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Pacolet soil.

This Pacolet soil is only moderately suited to field crops because of the slope. It is well suited to pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is only moderately suited to most urban uses and recreational development. The slope is the main limitation. The moderate permeability is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Pacolet soil is in capability subclass IIIe. The woodland ordination symbol is 8A.

PaD—Pacolet sandy loam, 10 to 15 percent slopes

This very deep, well drained, strongly sloping soil is on upland hillsides. Slopes are irregular and choppy.

Typically, the surface layer is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles are between depths of 20 and 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Cecil, Gwinnett, Madison, and Wedowee soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Pacolet soil.

This Pacolet soil is poorly suited to field crops because of the slope. It is moderately suited to pasture. Erosion is a concern if this soil is cultivated and the surface is not protected. Including grasses and legumes in the cropping system helps to control erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is poorly suited to urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Pacolet soil is in capability subclass IVe. The woodland ordination symbol is 8A.

PaE—Pacolet sandy loam, 15 to 25 percent slopes

This very deep, well drained, moderately steep soil is on upland hillsides. Slopes are irregular and choppy.

Typically, the surface layer is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and

light red mottles are between depths of 20 and 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Ashlar, Gwinnett, Madison, and Wedowee soils and soils that have a surface layer of sandy clay loam. These included soils are on the same landscape as the Pacolet soil.

This Pacolet soil is unsuited to field crops. The slope is the main limitation. This soil is moderately suited to pasture. Erosion is a concern if cultivated crops are grown. Including grasses and legumes in the cropping system helps to control erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Because this soil is moderately steep, the main management concerns are erosion and the equipment limitation. Performing management practices and harvesting operations on the contour and during the drier periods helps to minimize erosion. Proper placement of access roads and skid trails reduces the equipment limitation. In addition, the needed use of heavy equipment on this soil can be reduced if seedlings are planted by hand. Log decks placed near the top of the slope also reduce the equipment limitation.

This soil is poorly suited to urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil is an additional limitation affecting septic tank absorption fields. In some cases, these limitations can be overcome by special design and proper application.

This Pacolet soil is in capability subclass VIe. The woodland ordination symbol is 8R.

PfC2—Pacolet sandy clay loam, 2 to 10 percent slopes, eroded

This very deep, well drained, very gently sloping or gently sloping soil is on upland ridges. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Slopes are irregular and convex. Galled spots, rills, or shallow gullies, or all three, occur on slopes.

Typically, the surface layer is yellowish red sandy clay loam 3 inches thick. The subsoil is red and extends to a depth of 39 inches. The upper part of the subsoil is clay, and the lower part is sandy clay loam. The substratum, to a depth of 60 inches or more, is weathered saprolite that crushes to sandy loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Appling, Cecil, Gwinnett, and Madison soils. These included soils are on the same landscape as the Pacolet soil.

This Pacolet soil is poorly suited to field crops because of poor tilth and the slope. It is moderately suited to pasture (fig. 6). Continued erosion is a concern if cultivated crops are grown. Including grasses and legumes in the cropping system helps to prevent further erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. The equipment limitation and seedling mortality are management concerns. Performing management practices and harvesting operations during the drier periods helps to minimize soil compaction and reduces the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. The reduction of competing vegetation also generally increases the rate of seedling survival. Performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is only moderately suited to most urban uses and recreational development. The slope is the main limitation. The moderate permeability is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Pacolet soil is in capability subclass IVe. The woodland ordination symbol is 6C.

PfD2—Pacolet sandy clay loam, 10 to 15 percent slopes, eroded

This very deep, well drained, strongly sloping soil is on upland hillsides. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Slopes are irregular and choppy. Galled spots, rills, or shallow gullies, or all three, occur on slopes.

Typically, the surface layer is yellowish red sandy clay loam 4 inches thick. The subsoil is red and extends to a depth of 39 inches. The upper part of the subsoil is clay, and the lower part is clay loam. The

Figure 6.—Fescue and common bermudagrass grown for hay on Pacolet sandy clay loam, 2 to 10 percent slopes, eroded. Well managed hayland and pasture help to prevent further erosion on this soil.

substratum, to a depth of 60 inches or more, is weathered saprolite that crushes to sandy loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Ashlar, Gwinnett, Madison, and Wedowee soils. These included soils are on the same landscape as the Pacolet soil.

This Pacolet soil is unsuited to field crops because of the slope and poor tilth. It is moderately suited to pasture. Continued erosion is a concern if cultivated crops are grown. Including grasses and legumes in the cropping system helps to prevent further erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. The equipment limitation and seedling mortality are management concerns. Performing management practices and harvesting operations during the drier periods helps to minimize soil compaction and reduces the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. The reduction of competing vegetation also generally increases the rate of seedling survival. Performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is poorly suited to urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Pacolet soil is in capability subclass VIe. The woodland ordination symbol is 6C.

PfE2—Pacolet sandy clay loam, 15 to 25 percent slopes, eroded

This very deep, well drained, moderately steep soil is on upland hillsides. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Slopes are irregular and choppy. Galled spots, rills, or shallow gullies, or all three, occur on slopes.

Typically, the surface layer is yellowish red sandy clay loam 4 inches thick. The subsoil is red and extends to a depth of 39 inches. The upper part of the subsoil is clay, and the lower part is clay loam. The substratum, to a depth of 60 inches or more, is weathered saprolite that crushes to sandy loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is poor. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Ashlar, Gwinnett, Madison, and Wedowee soils. These included soils are on the same landscape as the Pacolet soil.

This Pacolet soil is unsuited to field crops because of the slope and poor tilth. It is moderately suited to pasture. Continued erosion is a concern if cultivated crops are grown. Including grasses and legumes in the cropping system helps to prevent further erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. The main management concerns are erosion, the equipment limitation, and seedling mortality. Performing management practices and harvesting operations on the contour and during the drier periods helps to minimize erosion. Proper placement of access roads and skid trails reduces the equipment limitation. In addition, the needed use of heavy equipment on this soil can be reduced if seedlings are planted by hand. Log decks placed near the top of the slope also reduce the equipment limitation. A chisel or subsoiler promotes quick revegetation in compacted areas and improves the rate of seedling survival. The reduction of competing vegetation also generally increases the rate of seedling survival.

This soil is poorly suited to urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil is an additional limitation affecting septic tank absorption fields. In some places, these limitations can be overcome by special design and proper application.

This Pacolet soil is in capability subclass VIIe. The woodland ordination symbol is 6R.

PgD—Pacolet-Urban land complex, 10 to 25 percent slopes

This map unit consists of areas of the very deep, well drained Pacolet soil and areas of Urban land that are so intermingled that they could not be separated at the scale selected for mapping. The map unit typically is about 50 percent Pacolet soil, 25 percent Urban land, and 25 percent included soils; however, the proportion of each component may vary from one mapped area to another. This map unit is on strongly sloping or moderately steep upland hillsides.

Typically, the Pacolet soil has a surface layer that is reddish brown sandy loam 4 inches thick. The subsoil is dominantly red and extends to a depth of 33 inches. Reddish yellow and light red mottles are between depths of 20 and 33 inches. The upper part of the subsoil is sandy clay, and the lower part is sandy clay loam. The substratum extends to a depth of 60 inches or more. It is weathered saprolite that crushes to sandy loam.

The Pacolet soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Urban land consists of soils that have been altered by cutting, filling, and shaping to prepare for construction and paving. Urban land is mainly used for private dwellings, schools, churches, streets, and sidewalks.

Included in this unit in mapping are a few small areas of Ashlar, Gwinnett, and Madison soils. These included soils are on the same landscape as the Pacolet soil and Urban land.

This map unit is poorly suited to most urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil of the Pacolet soil is an additional limitation affecting septic tank absorption fields. These limitations generally can be overcome by special design and careful installation procedures. The common plants used for landscaping grow well in this map unit. Erosion is a concern until permanent plant cover is established.

This map unit is not assigned a capability subclass or a woodland ordination symbol.

Pt—Pits, quarry

This map unit consists of areas of granite and granite gneiss quarries. It makes up 75 acres of the

survey area. Pits are 5 feet to more than 100 feet in depth.

This map unit is poorly suited to most uses. However, it is a good source of crushed stone, rock dust, and building stone.

This map unit is not assigned a capability subclass or a woodland ordination symbol.

Rion Series

The Rion series consists of very deep, well drained, moderately permeable soils that formed in residuum weathered mainly from acid crystalline rock, such as granite gneiss, on uplands. Slopes range from 6 to 35 percent. These soils are fine-loamy, mixed, thermic Typic Hapludults.

Rion soils are geographically associated with Ashlar, Pacolet, and Wedowee soils. Ashlar soils have a coarse-loamy particle-size control section and have hard bedrock at depths of 22 to 40 inches. Pacolet and Wedowee soils have a clayey particle-size control section.

Typical pedon of Rion sandy loam, 6 to 15 percent slopes; Newton County; 0.5 mile north of Georgia Highway 142 from its junction with Alcovy Road, 200 feet east:

A—0 to 5 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; very friable; very strongly acid; clear smooth boundary.

Bt1—5 to 12 inches; brown (7.5YR 4/4) sandy clay loam; weak medium subangular blocky structure; friable; common faint clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt2—12 to 19 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; common faint clay films on faces of peds; few white feldspar flakes; very strongly acid; gradual wavy boundary.

BC—19 to 30 inches; yellowish red (5YR 4/6) sandy clay loam; few fine distinct pink (5YR 7/4) mottles; weak medium subangular blocky structure; friable; very strongly acid; clear wavy boundary.

C—30 to 60 inches; yellowish red (5YR 4/6) sandy loam; few fine faint reddish yellow mottles; massive; very friable; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas.

The A horizon is 4 to 6 inches thick. It has hue of 5YR, 7.5YR, or 10YR, value of 4, and chroma of 3 or 4.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. In some places, the lower part of the Bt horizon has red or brownish yellow mottles. The Bt horizon generally is sandy clay loam but has layers of clay loam or sandy clay in some pedons.

The BC horizon, if it occurs, has hue of 5YR, value of 4 or 5, and chroma of 6 or 8 and has pink mottles, or it is mottled in shades of red or yellow. It is sandy loam or sandy clay loam.

The C horizon has hue of 5YR, value of 4, and chroma of 6 and has pink mottles, or it is mottled in shades of yellow and red. It is highly weathered saprolite that crushes to sandy loam or loamy sand and commonly contains weathered gneiss, schist, and feldspar fragments. It has quartzite fragments in some pedons.

ReD—Rion sandy loam, 6 to 15 percent slopes

This very deep, well drained, gently sloping or strongly sloping soil is on upland hillsides. Slopes are choppy and irregular.

Typically, the surface layer is dark yellowish brown sandy loam 5 inches thick. The upper part of the subsoil, to a depth of 12 inches, is brown sandy clay loam. The next part, to a depth of 19 inches, is yellowish red sandy clay loam. The lower part, to a depth of 30 inches, is yellowish red sandy clay loam that has pink mottles. The substratum, to a depth of 60 inches, is yellowish red sandy loam that has reddish yellow mottles.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Ashlar, Madison, Pacolet, and Wedowee soils; soils that have a surface layer of gravelly sandy loam; and soils that have bedrock within a depth of 60 inches. These included soils are on the same landscape as the Rion soil.

This Rion soil is poorly suited to field crops because of the slope. It is moderately suited to pasture. Erosion is a concern if this soil is cultivated and the surface is not protected.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Although there are no significant limitations affecting woodland, performing management practices on the contour helps to minimize erosion.

This soil is moderately suited to most urban uses and recreational development.

This Rion soil is in capability subclass IVe. The woodland ordination symbol is 8A.

ReE—Rion sandy loam, 15 to 35 percent slopes

This very deep, well drained, moderately steep or steep soil is on upland hillsides. Slopes are choppy and irregular.

Typically, the surface layer is dark yellowish brown sandy loam 5 inches thick. The upper part of the subsoil, to a depth of 12 inches, is brown sandy clay loam. The next part, to a depth of 19 inches, is yellowish red sandy clay loam. The lower part, to a depth of 30 inches, is yellowish red sandy clay loam that has pink mottles. The substratum, to a depth of 60 inches, is yellowish red sandy loam that has reddish yellow mottles.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Ashlar, Madison, Pacolet, and Wedowee soils; soils that have a surface layer of gravelly sandy loam; and soils that have bedrock within a depth of 60 inches. These included soils are on the same landscape as the Rion soil.

This Rion soil is unsuited to field crops because of the slope. It is poorly suited to pasture. Erosion is a concern if this soil is cultivated and the surface is not protected.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Because this soil is moderately steep, the main management concerns are erosion and the equipment limitation. Performing management practices and harvesting operations on the contour and during the drier periods helps to minimize erosion. Proper placement of access roads and skid trails reduces the equipment limitation. In addition, the needed use of heavy equipment on this soil can be reduced if seedlings are planted by hand. Log decks placed near the top of the slope also reduce the equipment limitation.

This soil is poorly suited to most urban uses and recreational development. The slope is the main limitation.

This Rion soil is in capability subclass VIIe. The woodland ordination symbol is 8R.

Roanoke Series

The Roanoke series consists of very deep, poorly drained, very slowly permeable soils that formed in clayey sediment on flood plains. Slopes range from 0 to 2 percent. These soils are clayey, mixed, thermic Typic Ochraquults.

Roanoke soils are geographically associated with Cartecay and Chewacla soils. These associated soils are somewhat poorly drained. Cartecay soils have a coarse-loamy particle-size control section, and Chewacla soils have a fine-loamy particle-size control section.

Typical pedon of Roanoke silt loam, frequently flooded; Newton County; 600 feet south of Georgia Highway 278 west of the Alcovy River, 30 feet north of a buried cable, 150 feet east of pole no. 1108:

A—0 to 6 inches; dark yellowish brown (10YR 3/6) silt loam; weak fine granular structure; friable; many fine roots; strongly acid; clear smooth boundary.

Btg1—6 to 20 inches; grayish brown (10YR 5/2) silty clay; many medium prominent yellowish red (5YR 5/8) mottles; weak fine subangular blocky structure; firm; common fine roots; strongly acid; gradual wavy boundary.

Btg2—20 to 55 inches; gray (10YR 5/1) clay; common fine prominent strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; very sticky; many prominent clay films on faces of peds; strongly acid; gradual wavy boundary.

BCg—55 to 60 inches; gray (10YR 5/1) clay; few medium distinct strong brown (7.5YR 5/8) mottles; weak medium angular blocky structure; very sticky; many prominent clay films on faces of peds; thin lenses of sandy clay; strongly acid.

The thickness of the solum ranges from 40 to 60 inches or more. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas.

The A horizon is 4 to 9 inches thick. It has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 to 6.

The BAg horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5, and chroma of 2. It has few to many mottles in shades of red or brown.

The Btg horizon is neutral in hue and has value of 4 to 6, or it has hue of 10YR, value of 4 to 6, and chroma of 1 or 2. Mottles, if they occur, range from few to many and are in shades of red, brown, yellow, or olive. The horizon is clay or clay loam.

The BCg horizon, if it occurs, has hue of 10YR or 5Y, value of 5 to 7, and chroma of 1 or less, or it is neutral in hue and has value of 5 to 7. High-chroma

mottles occur in most pedons. The horizon is sandy clay loam, sandy clay, or clay.

The Cg horizon is neutral in hue, has value of 4 to 7, and has mottles in shades of red, brown, yellow, or olive. It is commonly stratified and ranges from sandy loam to clay.

Rk—Roanoke silt loam, frequently flooded

This very deep, poorly drained, nearly level soil is on stream terraces that are slightly concave and slightly downstream from the uplands. This soil is frequently flooded from late fall to midspring. Slopes range from 0 to 2 percent.

Typically, the surface layer is dark yellowish brown silt loam 6 inches thick. The upper part of the subsoil, to a depth of 20 inches, is grayish brown silty clay that has yellowish red mottles. The middle part, to a depth of 55 inches, is gray clay that has strong brown mottles. The lower part, to a depth of 60 inches, is gray sandy clay that has strong brown mottles and lenses of sandier material.

This soil is medium in natural fertility and low in organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is very slow. Available water capacity is moderate. Tilth is poor. The effective rooting depth is very deep except from late fall to spring when the water table is at a depth of 1.0 foot or less or when the soil is flooded.

Included with this soil in mapping are a few small areas of Cartecay and Chewacla soils. These included soils are on flood plains. Also included are a few small areas of soils that contain less clay than the Roanoke soil.

This Roanoke soil is unsuited to field crops because of the wetness and flooding. It is moderately suited to pasture.

Most areas of this soil are wooded. The potential productivity of this soil for woodland is high. Sweetgum and green ash are among the preferred trees to plant. Seasonal wetness and flooding limit the use of conventional equipment and increase the risk of seedling mortality. The equipment limitation generally can be overcome by performing planting and harvesting operations during the drier periods. Proper drainage and bedding, where permitted, and the use of adapted plants generally increase the rate of seedling survival.

This soil is poorly suited to recreational development because of the wetness and flooding. These limitations also severely limit urban uses.

This Roanoke soil is in capability subclass Vw. The woodland ordination symbol is 7W.

Rr—Rock outcrop

This map unit is about 90 percent granite and gneiss bedrock that is bare and hard. It is on ridges and hillsides in the uplands (fig. 7).

Included in this unit in mapping are a few small areas of Ashlar soils and soils that have hard bedrock at a depth of less than 22 inches. These included soils are on the same landscape as the Rock outcrop.

This map unit can be used in some places for recreational development. It is a good source of crushed stone, rock dust, and building stone.

This map unit is in capability subclass VIIIs. It is not assigned a woodland ordination symbol.

Toccoa Series

The Toccoa series consists of very deep, well drained and moderately well drained, moderately rapidly permeable soils that formed in sandy and loamy sediment on flood plains. Slopes range from 0 to 2 percent. These soils are coarse-loamy, mixed, nonacid, thermic Typic Udifluvents.

Toccoa soils are geographically associated with Buncombe, Cartecay, Chewacla, and Congaree soils. Buncombe soils have a sandy particle-size control section and are excessively drained. Chewacla and Congaree soils have a fine-loamy particle-size control section. Chewacla and Cartecay soils are somewhat poorly drained.

Typical pedon of Toccoa fine sandy loam in an area of Toccoa and Congaree soils, frequently flooded; Newton County; 1,000 feet north of the South River bridge at Georgia Highway 81 to Georgia Highway 212, about 1,300 feet east to Snapping Shoals Creek, 400 feet northwest:

Ap—0 to 8 inches; dark brown (7.5YR 4/4) fine sandy loam; weak fine granular structure; very friable; many fine roots; common fine flakes of mica; strongly acid; clear smooth boundary.

C1—8 to 23 inches; strong brown (7.5YR 4/6) fine sandy loam; massive; very friable; common fine flakes of mica; strongly acid; gradual wavy boundary.

C2—23 to 32 inches; brown (7.5YR 4/4) fine sandy loam; massive; very friable; common fine flakes of mica; strongly acid; gradual wavy boundary.

C3—32 to 38 inches; strong brown (7.5YR 5/6) fine loamy sand; massive; loose; common fine flakes of mica; moderately acid; gradual wavy boundary.

Figure 7.—An area of Rock outcrop supporting mosses and lichens. Mixed pine and hardwood forest is in the background in an area of Ashlar-Pacolet-Wedowee complex, 4 to 15 percent slopes.

C4—38 to 50 inches; brown (7.5YR 4/4) fine sandy loam; massive; very friable; common fine flakes of mica; common fine soft particles of charcoal; strongly acid; gradual wavy boundary.

Ab—50 to 60 inches; dark brown (10YR 3/3) loam; weak fine granular and subangular blocky structure; friable; common fine flakes of mica; common fine soft particles of charcoal; very strongly acid.

The thickness of the stratified layers is 40 inches or more. Reaction ranges from strongly acid to slightly acid throughout the profile, but it is moderately acid or slightly acid in some part of the soil between depths of 10 and 40 inches.

The A horizon is 8 to 12 inches thick. It has hue of 5YR, 7.5YR, or 10YR, value of 3 or 4, and chroma of 2 to 6. Where the value is 3, the horizon is less than 6 inches thick.

The C horizons have hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 4 or 6. They are dominantly sandy loam or fine sandy loam, but some individual horizons may range to loamy sand. In some pedons there are buried horizons within a depth of 40 inches that have the same colors as the A horizon and that are fine sandy loam, loam, clay loam, or sandy

clay loam. In a few pedons gray mottles occur below a depth of 20 inches.

Ta—Toccoa fine sandy loam, rarely flooded

This very deep, well drained or moderately well drained, very gently sloping soil is in small areas between upland slopes and at the head of drainageways. This soil is rarely flooded in late winter and early spring. Slopes range from 0 to 2 percent.

Typically, the Toccoa soil has a surface layer that is dark brown fine sandy loam 8 inches thick. The underlying material to a depth of 50 inches is brown and dominantly fine sandy loam. Below this, to a depth of 60 inches, is dark brown loam.

This soil is low in natural fertility and organic matter. Reaction ranges from strongly acid to slightly acid, but it is moderately acid or slightly acid in some part of the soil between depths of 10 and 40 inches. Permeability is moderately rapid. Available water capacity is moderate. Tilth is good. The rooting depth is very deep except during late winter to early spring when the water table is at a depth of 2.5 to 5.0 feet.

Included with this soil in mapping are a few small areas of Cartecay soils on the same landscape as the Toccoa soil.

This Toccoa soil is well suited to field crops and pasture. Flooding is not a concern in most years. A conservation tillage system helps to increase the content of organic matter and maintain good tilth.

The potential productivity of this soil for woodland is very high. Loblolly pine and yellow-poplar are among the preferred trees to plant. There are no significant limitations affecting woodland management.

This soil is moderately suited to most urban uses because of the wetness. In some areas this limitation can be overcome by special design and proper application. This soil is well suited to most recreational development.

This Toccoa soil is in capability subclass IIw. The woodland ordination symbol is 9A.

TCA—Toccoa and Congaree soils, frequently flooded

This map unit consists of very deep, well drained and moderately well drained, nearly level soils on flood plains. This unit is made up of areas of Toccoa and Congaree soils that are closely associated in an irregular pattern. Although the composition of this unit is variable, the mapping is sufficient enough to make interpretations for use and management of the soils. Each mapped area has at least one of the soils, and some have both. These soils are frequently flooded from fall to spring. The map unit typically is about 50 percent Toccoa soil, 30 percent Congaree soil, and 20 percent included soils; however, the proportion of each soil varies significantly from one mapped area to another. Slopes range from 0 to 2 percent.

Typically, the Toccoa soil has a surface layer that is dark brown fine sandy loam 8 inches thick. The underlying material to a depth of 50 inches is brown and strong brown and is dominantly fine sandy loam. Below this, to a depth of 60 inches, is dark brown loam.

The Toccoa soil is low in natural fertility and organic matter. Reaction ranges from strongly acid to slightly acid, but it is moderately acid or slightly acid in some part of the soil between depths of 10 and 40 inches. Permeability is moderately rapid. Available water capacity is moderate. Tilth is good. The effective rooting depth is very deep except from late fall to midspring when the water table is at a depth of 2.5 to 5.0 feet or when the soil is flooded.

Typically, the Congaree soil has a surface layer that is dark brown loam 8 inches thick. The underlying material, to a depth of 60 inches, is reddish brown and dark brown loam that has strong brown mottles. It has stratified layers of sandier material at a depth of 15 to 35 inches.

The Congaree soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid throughout the profile, but it is moderately acid or higher in reaction in some part of the soil between depths of 10 and 40 inches. Permeability is moderate. Available water capacity is moderate. Tilth is good. The effective rooting depth is very deep except from late fall to midspring when the water table is at a depth of 2.5 to 4.0 feet or when the soil is flooded.

Included with these soils in mapping are small areas of Buncombe, Cartecay, and Chewacla soils on flood plains. Also included are small areas of Altavista soils on stream terraces.

These Toccoa and Congaree soils are productive. However, they are only moderately suited to field crops and pasture because flooding is likely during the planting season.

The potential productivity of these soils for woodland is very high. Loblolly pine and yellow-poplar are among the preferred trees to plant. These soils have no significant limitations affecting woodland management.

These soils are unsuited to urban uses because of the flooding. They are poorly suited to most recreational development because of this hazard.

These Toccoa and Congaree soils are in capability subclass IIIw. The woodland ordination symbol is 9A for the Toccoa soil and 10A for the Congaree soil.

Uo—Udorthents, clayey

This map unit consists of dominantly clayey soil material of uplands. Areas of this unit were formed by cutting and the removal of soil material, or the soil material was altered by cutting, filling, and reshaping. Cuts range from 3 to more than 25 feet in depth and commonly expose rock or weathered rock.

This map unit is poorly suited to most uses; however, some areas are suitable for industry. Erosion is a concern in unprotected areas. Planting grasses, legumes, and pine trees helps to control erosion. Mulching helps to stabilize areas until they are revegetated.

This map unit is not assigned a capability subclass or woodland ordination symbol.

Ur—Urban land

This map unit is made up of a part of the metropolitan areas of Covington and Conyers. The landscape mainly consists of ridges and hillsides associated with drainageways and flood plains.

This map unit consists of areas of soils that have been altered by cutting, filling, and shaping during preparation for construction and paving. In places, the cuts are deep and weathered mica schist, granite, or gneiss has been exposed.

Urban land mainly includes business districts, shopping centers, parking lots, motels, industries, and housing developments. A few minor areas are wooded or covered by grasses.

Erosion is a concern in areas of Urban land under construction. In areas of Urban land on the flood plains, flooding and sedimentation from uplands are concerns.

This map unit is not assigned a capability subclass or woodland ordination symbol.

Wedowee Series

The Wedowee series consists of very deep, well drained, moderately permeable soils that formed in residuum weathered mainly from acid crystalline rock, such as schist, gneiss, and granite, on uplands. Slopes range from 2 to 25 percent. These soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Wedowee soils are geographically associated with Appling, Ashlar, and Pacolet soils. Appling soils have a solum that is thicker than that of the Wedowee soils. Ashlar soils have a coarse-loamy particle-size control section and have hard bedrock at depths of 22 to 40 inches. Pacolet soils have a red subsoil.

Typical pedon of Wedowee sandy loam, 2 to 6 percent slopes; Rockdale County; 3.5 miles north of Conyers, Georgia, on Georgia Highway 20, about 1.5 miles west on Hightower Trail, 50 feet north:

Ap—0 to 5 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; friable; few pebbles; many fine roots; moderately acid; clear smooth boundary.

BE—5 to 11 inches; brownish yellow (10YR 6/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; strongly acid; clear smooth boundary.

Bt1—11 to 20 inches; yellowish brown (10YR 5/6) sandy clay; few fine prominent red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—20 to 26 inches; yellowish brown (10YR 5/6) sandy clay; few fine and medium prominent yellowish red (5YR 4/6) and red (2.5YR 4/8) mottles; moderate medium subangular blocky structure; firm; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

BC—26 to 38 inches; mottled yellowish red (5YR 5/8), red (2.5YR 4/8), and yellow (10YR 7/8) sandy clay loam; weak medium subangular blocky structure; friable; strongly acid; gradual wavy boundary.

C—38 to 60 inches; mottled yellowish red (5YR 5/8), brownish yellow (10YR 6/6), and very pale brown (10YR 7/4) saprolite that crushes to sandy clay loam; massive; friable when crushed; strongly acid.

The thickness of the solum ranges from 24 to 40 inches. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas.

The A or Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 3 to 6.

The BE horizon, if it occurs, has hue of 10YR, value of 4 to 6, and chroma of 4 to 8.

The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 6 or 8. It has none to many mottles in shades of red, brown, and yellow. It is sandy clay, clay loam, or clay.

The BC horizon has hue of 5YR, 7.5YR, or 10YR, value of 5, and chroma of 6 or 8, or it is mottled in

shades of red and yellow. It is sandy clay loam or clay loam.

The C horizon generally is soft saprolite that crushes to sandy loam or sandy clay loam. In some pedons it has thin pockets, tongues, or lenses of clayey material.

WeB—Wedowee sandy loam, 2 to 6 percent slopes

This very deep, well drained, very gently sloping soil is on upland ridges. Slopes are smooth and convex.

Typically, the surface layer is brown sandy loam 5 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil, to a depth of 11 inches, is brownish yellow sandy clay loam. The next part, to a depth of 26 inches, is yellowish brown sandy clay that has red and yellowish red mottles. The lower part, to a depth of 38 inches, is mottled yellowish red, red, and yellow sandy clay loam. The substratum, to a depth of 60 inches, is mottled red, brownish yellow, and very pale brown saprolite that crushes to sandy clay loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep, and the soil is easily penetrated by plant roots.

Included with this soil in mapping are a few small areas of Appling, Ashlar, and Pacolet soils; eroded soils that have a surface layer of sandy clay loam; and Rock outcrop. These included soils and Rock outcrop are on the same landscape as the Wedowee soil.

This Wedowee soil is well suited to field crops and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize soil erosion.

This soil is well suited to most urban uses; however, the moderate permeability in the subsoil and substratum is a limitation affecting septic tank absorption fields. Generally, this limitation can be overcome by special design and proper application. This soil is well suited to most recreational development.

This Wedowee soil is in capability subclass IIe. The woodland ordination symbol is 8A.

WeC—Wedowee sandy loam, 6 to 10 percent slopes

This very deep, well drained, gently sloping soil is on narrow ridges and hillsides in the uplands. Slopes are smooth and convex.

Typically, the surface layer is brown sandy loam 5 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil, to a depth of 11 inches, is brownish yellow sandy clay loam. The next part, to a depth of 26 inches, is yellowish brown sandy clay that has red and yellowish red mottles. The lower part, to a depth of 38 inches, is mottled yellowish red, red, and yellow sandy clay loam. The substratum, to a depth of 60 inches, is mottled red, brownish yellow, and very pale brown saprolite that crushes to sandy clay loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Appling, Ashlar, and Pacolet soils; soils that have a surface layer of sandy clay loam; and Rock outcrop. These included soils and Rock outcrop are on the same landscape as the Wedowee soil.

This Wedowee soil is moderately suited to field crops because of the slope. It is well suited to pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Virginia pine is desirable to plant for Christmas trees. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize soil erosion.

This soil is only moderately suited to most urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil and substratum is an additional limitation affecting septic tank absorption fields. Generally, these

limitations can be overcome by special design and proper application.

This Wedowee soil is in capability subclass IIIe. The woodland ordination symbol is 8A.

WeD—Wedowee sandy loam, 10 to 15 percent slopes

This very deep, well drained, strongly sloping soil is on upland hillsides. Slopes are irregular and choppy.

Typically, the surface layer is brown sandy loam 5 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil, to a depth of 11 inches, is brownish yellow sandy clay loam. The next part, to a depth of 26 inches, is yellowish brown sandy clay that has red and yellowish red mottles. The lower part, to a depth of 38 inches, is mottled yellowish red, red, and yellow sandy clay loam. The substratum, to a depth of 60 inches, is mottled red, brownish yellow, and very pale brown saprolite that crushes to sandy clay loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Ashlar soils, Pacolet soils, eroded soils that have a surface layer of sandy clay loam, and Rock outcrop. These included soils and Rock outcrop are on the same landscape as the Wedowee soil.

This Wedowee soil is poorly suited to field crops. The slope is the main limitation. This soil is moderately suited to pasture. Erosion is a concern if the soil is cultivated and the surface is not protected. Including grasses and legumes in the cropping system helps to control erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize soil erosion.

This soil is only moderately suited to most urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil and substratum is an additional limitation affecting septic tank absorption fields. Generally, these limitations can be overcome by special design and proper application.

This Wedowee soil is in capability subclass IVe. The woodland ordination symbol is 8A.

WeE—Wedowee sandy loam, 15 to 25 percent slopes

This very deep, well drained, moderately steep soil is on upland hillsides. Slopes are irregular and choppy.

Typically, the surface layer is brown sandy loam 5 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil, to a depth of 11 inches, is brownish yellow sandy clay loam. The next part, to a depth of 26 inches, is yellowish brown sandy clay that has red and yellowish red mottles. The lower part, to a depth of 38 inches, is mottled yellowish red, red, and yellow sandy clay loam. The substratum, to a depth of 60 inches, is mottled red, brownish yellow, and very pale brown saprolite that crushes to sandy clay loam.

This soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Ashlar soils, Pacolet soils, eroded soils that have a surface layer of sandy clay loam, soils that are similar to the Wedowee soil but have a solum less than 24 inches thick, and Rock outcrop. These included soils and Rock outcrop are on the same landscape as the Wedowee soil.

This Wedowee soil is unsuited to field crops. The slope is the main limitation. This soil is moderately suited to pasture. Erosion is a concern if cultivated crops are grown. Including grasses and legumes in the cropping system helps to control erosion and reduce runoff.

The potential productivity of this soil for woodland is high. Loblolly pine and yellow-poplar are among the preferred trees to plant. Because this soil is moderately steep, the main management concerns are erosion and the equipment limitation. Performing management practices and harvesting operations on the contour and during the drier periods helps to minimize erosion. Proper placement of access roads and skid trails reduces the equipment limitation. In addition, the needed use of heavy equipment on this soil can be reduced if seedlings are planted by hand. Log decks placed near the top of the slope also reduce the equipment limitation.

This soil is poorly suited to urban uses and recreational development. The slope is the main limitation. The moderate permeability in the subsoil and substratum is an additional limitation affecting septic tank absorption fields. In some cases, these limitations can be overcome by special design and proper application.

This Wedowee soil is in capability subclass VIe. The woodland ordination symbol is 8R.

WuC—Wedowee-Urban land-Ashlar complex, 6 to 15 percent slopes

This map unit consists of areas of the very deep, well drained Wedowee and excessively drained Ashlar soils and areas of Urban land that are so intermingled that they could not be separated at the scale selected for mapping. The map unit typically is about 30 percent Pacolet soil, 25 percent Urban land, 15 percent Ashlar soil, and 20 percent included soils; however, the proportion of each component may vary from one mapped area to another. This map unit is on gently sloping or strongly sloping upland hillsides.

Typically, the Wedowee soil has a surface layer that is brown sandy loam 5 inches thick. The subsoil extends to a depth of 38 inches. The upper part of the subsoil, to a depth of 11 inches, is brownish yellow sandy clay loam. The next part, to a depth of 26 inches, is yellowish brown sandy clay that has red and yellowish red mottles. The lower part, to a depth of 38 inches, is mottled yellowish red, red, and yellow sandy clay loam. The substratum, to a depth of 60 inches, is mottled red, brownish yellow, and very pale brown saprolite that crushes to sandy clay loam.

The Wedowee soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Urban land consists of soils that have been altered by cutting, filling, and shaping to prepare for construction and paving. Urban land is mainly used for private dwellings, schools, churches, streets, and sidewalks.

Typically, the Ashlar soil has a surface layer that is dark brown sandy loam 7 inches thick. The subsurface layer, to a depth of 12 inches, is dark yellowish brown sandy loam. The subsoil extends to a depth of 30 inches. It is brown sandy loam and cambic. Below this, to a depth of 33 inches, is strong brown coarse sandy loam. Hard bedrock is at a depth of 33 inches.

The Ashlar soil is low in natural fertility and organic matter. Reaction is very strongly acid or strongly acid except for the surface layer in limed areas. Permeability is moderately rapid. Available water capacity is low. Penetration of the plant roots is limited to the area above hard bedrock.

Included in this unit in mapping are a few small areas of Appling, Cecil, and Pacolet soils and Rock outcrop. The included soils and Rock outcrop are on the same landscape as the Wedowee and Ashlar soils and Urban land.

This map unit is generally moderately suited to most urban uses and recreational development. The slope is the main limitation. In places, permeability and the depth to bedrock are limitations. The limitations generally can be overcome by special design and proper application. The common plants used for landscaping generally grow well on the soils in this unit. Erosion is a concern until permanent plant cover is established.

This map unit is not assigned a capability subclass or a woodland ordination symbol.

Wickham Series

The Wickham series consists of very deep, well drained, moderately permeable soils that formed in loamy sediment on stream terraces. Slopes range from 2 to 10 percent. These soils are fine-loamy, mixed, thermic Typic Hapludults.

Wickham soils are geographically associated with Altavista, Hiwassee, and Molena soils. Altavista soils are lower on the terraces than the Wickham soils, and Molena soils are higher. Altavista soils are moderately well drained. Molena soils are somewhat excessively drained and have a sandy particle-size control section. Hiwassee soils have a clayey particle-size control section.

Typical pedon of Wickham sandy loam, 2 to 6 percent slopes; Newton County; 1,000 feet north of Starrsville, Georgia, to a farm road, 0.75 mile west-northwest to railroad tracks, 200 feet northeast, in a pasture:

Ap—0 to 7 inches; reddish brown (5YR 4/3) sandy loam; weak fine granular structure; friable; many very fine roots; moderately acid; clear smooth boundary.

Bt1—7 to 28 inches; reddish brown (5YR 4/4) sandy clay loam; weak medium subangular blocky structure; friable; many fine roots; few faint clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—28 to 40 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; very strongly acid; gradual wavy boundary.

BC—40 to 52 inches; yellowish red (5YR 4/6) sandy loam; weak medium subangular blocky structure; friable; very strongly acid; gradual wavy boundary.

C—52 to 60 inches; yellowish red (5YR 4/6) gravelly sandy loam; massive; loose; very strongly acid.

The thickness of the solum ranges from 45 to 60 inches or more. Reaction is very strongly acid or strongly acid throughout the profile except for the surface layer in limed areas.

The A or Ap horizon is 7 to 10 inches thick. It has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 3 or 4.

The E horizon, if it occurs, has hue of 7.5YR, 10YR, or 2.5Y, value of 4, and chroma of 2 or 4.

The Bt horizon has hue of 2.5YR, 5YR, or 7.5YR, value of 5, and chroma of 6 or 8. It is sandy clay loam or clay loam.

The BC horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. It has none to common mottles in shades of brown. It is sandy loam or sandy clay loam.

The C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6. It is sandy loam or gravelly sandy loam.

WwB—Wickham sandy loam, 2 to 6 percent slopes

This very deep, well drained, very gently sloping soil is on stream terraces. Slopes are smooth and convex.

Typically, the surface layer is reddish brown sandy loam 7 inches thick. The subsoil extends to a depth of 52 inches. The upper part of the subsoil, to a depth of 28 inches, is reddish brown sandy clay loam. The next part, to a depth of 40 inches, is yellowish red sandy clay loam. The lower part, to a depth of 52 inches, is yellowish red sandy loam. The substratum, to a depth of 60 inches or more, is yellowish red gravelly sandy loam.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Altavista soils, Molena soils, and well drained soils that have a surface layer of sandy clay loam. These included soils are on stream terraces. Also included are a few small areas of Hiwassee soils.

This Wickham soil is well suited to field crops and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is very high. Loblolly pine is one of the preferred trees to plant. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is well suited to urban uses and recreational development.

This Wickham soil is in capability subclass IIe. The woodland ordination symbol is 9A.

WwC—Wickham sandy loam, 6 to 10 percent slopes

This very deep, well drained, gently sloping soil is on stream terraces. Slopes are smooth or irregular.

Typically, the surface layer is reddish brown sandy loam 7 inches thick. The subsoil extends to a depth of 52 inches. The upper part of the subsoil, to a depth of 28 inches, is reddish brown sandy clay loam. The next part, to a depth of 40 inches, is yellowish red sandy clay loam. The lower part, to a depth of 52 inches, is yellowish red sandy loam. The substratum, to a depth of 60 inches or more, is yellowish red gravelly sandy loam.

This soil is low in natural fertility and organic matter. Reaction ranges from very strongly acid to moderately acid except for the surface layer in limed areas. Permeability is moderate. Available water capacity is moderate. Tilth is good. The rooting depth is very deep.

Included with this soil in mapping are a few small areas of Molena and Hiwassee soils on stream terraces. Also included are soils that have a surface layer of sandy clay loam.

This Wickham soil is moderately suited to field crops. It is well suited to pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a concern if this soil is cultivated and the surface is not protected. A conservation tillage system or a water management system, or a combination of both, reduces runoff and helps to control erosion.

The potential productivity of this soil for woodland is very high. Loblolly pine is one of the preferred trees to plant. Although there are no significant limitations affecting woodland, performing management practices and harvesting operations on the contour helps to minimize erosion.

This soil is moderately suited to most urban uses and recreational development because of the slope. Generally, this limitation can be overcome by special design and proper application.

This Wickham soil is in capability subclass IIIe. The woodland ordination symbol is 9A.

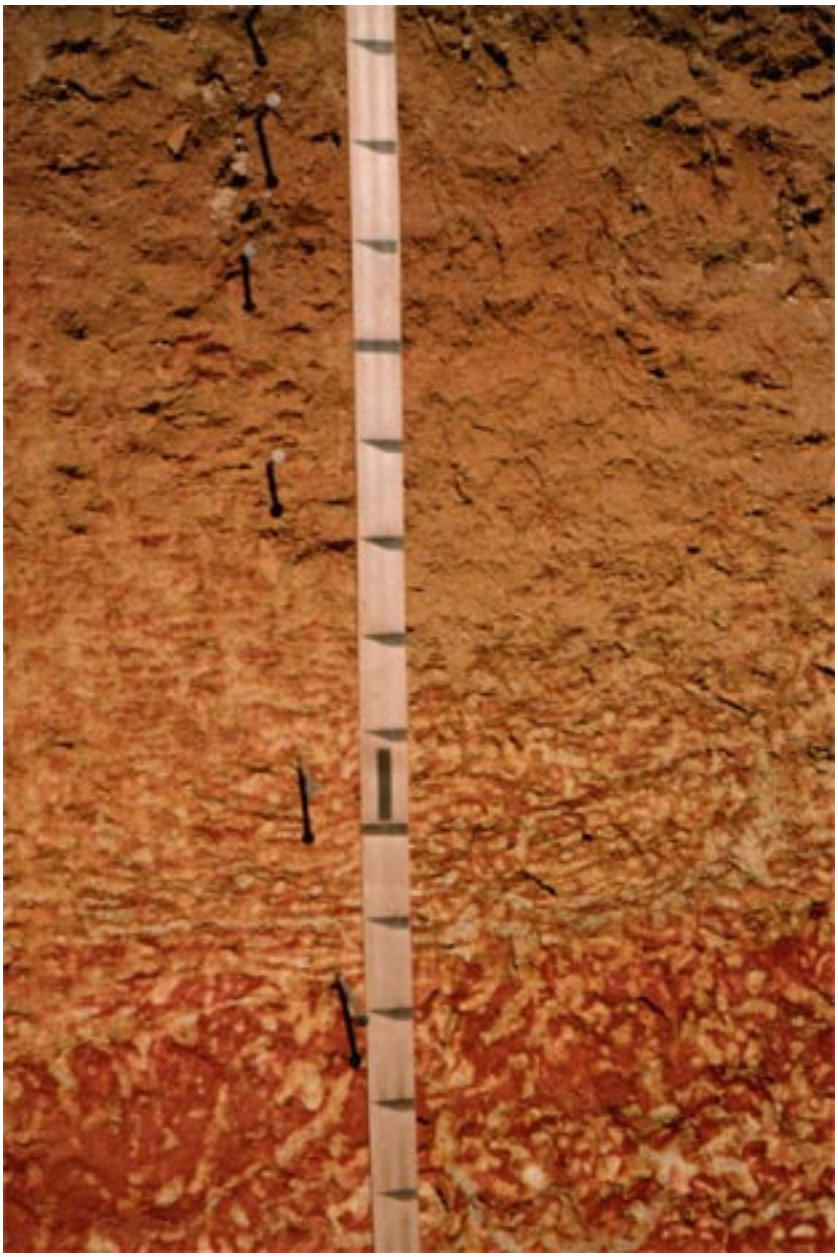

Figure 8.—Typical profile of Alcovy loamy sand, 2 to 6 percent slopes. The soil horizon having horizontally oriented mottles at a depth of 1 meter (40 inches) has firm and brittle properties. It also has platy structure, which restricts the downward movement of water and results in a seasonal high water table.

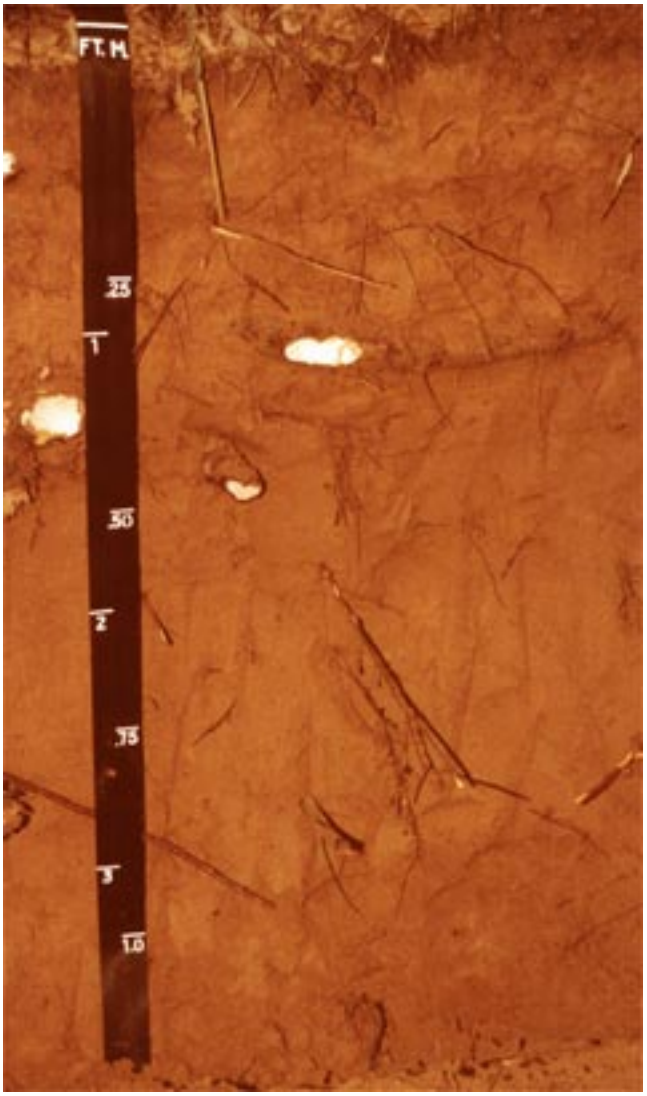

Figure 9.—Typical profile of Buncombe loamy sand, 0 to 5 percent slopes, frequently flooded. This soil formed from sandy alluvium near the banks of the larger streams and rivers. Although it is droughty and excessively drained due to its sandy nature, the soil is subject to frequent, brief periods of flooding during late winter and spring.

Figure 10.—Typical profile of Cecil sandy loam, 2 to 6 percent slopes. This well drained soil is one of the most common soils in the Piedmont region of Georgia.

Figure 11.—Typical profile of Congaree loam in an area of Toccoa and Congaree soils, frequently flooded. Although this soil can be productive, its uses may be limited by seasonal flooding.

Figure 12.—Typical profile of Madison sandy loam, 2 to 6 percent slopes. The high content of mica is due to the saprolite weathered from mica schist.

Use and Management of the Soils

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

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

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

Generally, the soils in the survey area that are well suited to crops are also well suited to urban uses. The data concerning specific soils in the county can be used in planning future land use patterns. The potential for farming should be considered relative to any soil limitations and the potential for nonfarm development.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

James E. Dean, Conservation Agronomist, Holli Kuykendall, Grassland Water Quality Specialist, and Joshua A. Wheat, District Conservationist, Natural Resources Conservation Service, helped prepare this section.

The major management concerns affecting 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 Natural Resources Conservation Service is explained; and the predicted yields of the main crops and hay and pasture plants are listed 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 land users, 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 Series and Detailed Soil Map Units.”

Federal and State regulations require that any area designated as wetlands cannot be altered without prior approval. Contact the local office of the Natural Resources Conservation Service for identification of hydric soils and potential wetlands.

If the land slope is more than 3 percent, soil erosion is a potential hazard on cropland and pasture in the survey area.

Loss of the surface layer of soil through erosion is damaging. Soil productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a shallow surface layer or a clayey subsoil, or both, and on soils that have a layer in or below the subsoil that limits depth of the root zone. Appling, Cecil, Gwinnett, Madison, and Pacolet soils have a clayey subsoil. Ashlar soils have bedrock that limits depth of the root zone. Erosion also reduces productivity on soils that tend to be droughty, such as Molena soils. Erosion on farmland results in the sedimentation of streams. Controlling 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, preparing a good seedbed is difficult on clayey spots because the original friable surface layer has been lost through erosion. Such spots are common in areas of the eroded Appling, Cecil, and Gwinnett soils.

Erosion-control practices provide a protective surface cover, reduce runoff, and increase the rate of water infiltration. A cropping system that keeps a vegetative cover on the soil for extended periods helps to minimize soil loss and maintain the productive capacity of the soil. On livestock farms, including legume and grass forage crops in the cropping system and in permanent pasture and hayland minimizes erosion on sloping land, provides nitrogen, and improves soil tilth for the following crop.

In most areas of Appling, Cecil, Gwinnett, Madison, and Pacolet soils on hillsides with slopes of more than 6 percent, slopes are so short and irregular that contour farming or terracing is not practical. On these soils, cropping systems that provide a substantial cover of plant residue are required to control erosion. Residue management, conservation tillage, the use of cover crops, stripcropping, and the inclusion of grasses and legumes in the rotation system provide surface cover and help to increase water infiltration and reduce the hazards of runoff and erosion. These practices can be adapted to most soils in the survey area.

Terraces and diversions shorten the length of slopes and thus minimize erosion caused by runoff. They are most effective on deep, well drained, gently sloping soils on ridgetops that are smooth and convex. Appling, Cecil, Gwinnett, Madison, and Pacolet soils are examples.

Most soils used for cropland are subject to soil erosion if they are plowed in fall and left bare until spring. Winter cover crops should be planted if the cropland is plowed in fall.

Bottomland soils in the survey area include Cartecay, Chewacla, Toccoa, and Congaree soils. The production of crops and pasture on these soils is generally not possible without drainage practices. Existing drainage systems need to be continually maintained on these soils. Bottomland soils are also subject to flooding.

Information about soil erosion control and drainage practices for each kind of soil is available at the local office of the Natural Resources Conservation Service. Drainage is a major consideration in managing crops and pasture. Managing drainage in conformance with regulations concerning wetlands may require special permits and extra planning.

Soil fertility is naturally low in most upland soils in the survey area. Most soils in the survey area are naturally acid. Soils on flood plains, such as Cartecay, Chewacla, Toccoa, and Congaree soils, range from slightly acid to strongly acid.

Many soils on the uplands are strongly acid or very strongly acid in their natural state. Because available phosphorus and potash levels are naturally low in most of these soils, ground limestone needs to be applied to raise the pH level for the good growth of legumes and other crops. On all soils, the amount of lime, fertilizer, and organic wastes to be applied should be based on the results of a soil test, realistic estimates of crop yields, waste analysis, and a nutrient management plan.

The Cooperative Extension Service and the Natural Resources Conservation Service can provide information concerning nutrient management plans.

Soil organic matter is an important factor in the germination of seeds, root growth, the infiltration of water into the soil, and soil erosion. Soils that have good tilth are granular and porous.

Most of the soils used for crops in the survey area have a surface layer that is sandy loam and low in organic matter. Generally, the structure of these soils is poor and intense rainfall results in the formation of a crust on the soil surface. This crust is hard when dry, and it reduces water infiltration and plant growth while increasing runoff. Residue management, conservation tillage, stripcropping, the inclusion of grasses and legumes in the rotation system, and regular additions of manure and other organic material help to improve soil structure and prevent the formation of a crust.

Crops commonly grown in the survey area are corn, soybeans, grain sorghum, wheat, and vegetables. Some field crops suited to the soils and climate of the area, such as cotton, are not commonly grown.

Specialty crops in the survey area are sweet corn, field peas, watermelons, cantaloupes, other small fruits, vineyard produce, and nursery plants. Sweet corn, tomatoes, and field peas make up the largest acreage of specialty crops.

Deep soils that have good natural drainage and warm up early in spring are especially well suited to many vegetables and small fruits. Appling, Cecil, Gwinnett, Madison, and Pacolet soils that have slopes of less than 6 percent are well suited to such crops.

Most of the well drained soils in the survey area are suitable for orchards and nursery plants. However, soils in low landscape positions, where frost is

frequent and air movement is inadequate, generally are poorly suited to early vegetables, small fruits, orchards, and nursery plants.

If adequately managed and protected from flooding, many of the soils on flood plains are suited to a wide range of vegetable crops.

Technical assistance and information about growing specialty crops is available through local agricultural agencies.

Pasture and hayland are typically a mixture of endophyte-infected tall fescue and common bermudagrass. This combination provides forage for both cool- and warm-season grazing. Where deferred grazing management is practiced, native warm-season perennial grasses, such as eastern gamagrass, switchgrass, and indiangrass, can be grown for high-quality, palatable forage. Alfalfa can be grown as a specialty forage crop.

Irrigation is used in the production of orchard and specialty crops. The major source of irrigation water is surface water from streams and ponds.

Farming and other land uses are competing for large areas in Newton and Rockdale Counties. Most areas of Urban land were well suited to crops. Each year, additional land is developed for urban uses. In general, soils in the survey area that are well suited to crops are also well suited to urban development.

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 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

A high level of management includes maintaining proper soil pH and fertility levels as indicated by standard soil tests, Extension Service guidelines, and nutrient management plans. The application of fertilizer in excess of that required for potential yields is not recommended. Excess fertilizer that is not utilized by the crop is an unnecessary expense and causes a hazard of water pollution. Also, the method of fertilizer application should be suited to the crop grown. For example, since nitrogen can be easily leached from soils into the water table, applications of nitrogen fertilizer for crops such as corn are commonly split and nitrogen is applied more than once during the growing season. If a nonleguminous crop, such as corn or cotton, is grown following the harvest of legumes, such as soybeans, nitrogen applications should be reduced to account for the nitrogen provided by the crop residue of decaying legumes.

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

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by numerals 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 miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 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. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section "Soil Series and Detailed Soil Map Units" and in the yields table.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

Newton and Rockdale Counties have about 62,200 acres of prime farmland. The map units in the survey area that are considered prime farmland are listed in table 7. This list does not constitute a recommendation for a particular land use. The extent of each map unit is shown in table 5. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described in the section "Soil Series and Detailed Soil Map Units."

Woodland Management and Productivity

Gary L. Tyre, Forester, Natural Resources Conservation Service, helped prepare this section.

Among the most significant forest types in Newton and Rockdale Counties are oak-hickory, loblolly-shortleaf pine, oak-pine, and smaller acreages of elm-ash-cottonwood. These forest types were also dominant in the virgin forests which covered a majority of the land in the survey area.

Forest land makes up 104,317 acres in Newton County (or 59 percent of the area) and 42,380 acres in Rockdale County (or 50 percent of the area) *(14)*. In Newton County, about one-third of the forested acres supports the oak-hickory type and slightly less than half of the forest land supports the loblolly-shortleaf pine type. Oak-pine and elm-ash-cottonwood make up 18 percent and 8 percent, respectively, of the forest land in Newton County. In Rockdale County, about 50 percent of the forest land supports the loblolly-shortleaf pine type, a little more than one-third supports the oak-hickory type, and about 13 percent supports the oak-pine type.

A significant portion of the forest land in these counties, 72 percent in Newton County and 61 percent in Rockdale County, is owned by farmers and other individuals. The forest industry owns 37 percent of the forest land in Rockdale County and only 8 percent of the forest land in Newton County.

Both counties have significant acreages of productive soils. In Newton County, more than one-third of the forested acres are capable of producing a cord or more per acre per year. In Rockdale County, 50 percent of the forested acres are capable of producing that amount.

Stocking in the two counties somewhat reflects productivity. In both counties, a third or more of the forested acres are stocked at a rate of 100 percent. In Newton County, 19 percent is stocked at less than 60 percent. In Rockdale County, none of the forested acres are stocked at less than 60 percent.

Forests in the survey area are on a variety of soils. Soils on flood plains, including Cartecay, Chewacla, and Roanoke soils, are highly productive soils, having a site index of 90 or greater. These soils are somewhat wet and are characterized by species such as sweetgum, water oak, yellow-poplar, loblolly pine, green ash, and sycamore. Generally, limitations associated with these soils are manageable. Roanoke soils, however, have a severe equipment limitation.

Major upland soils that occur more extensively in the survey area, including Cecil, Appling, Pacolet, Madison, Gwinnett, Hiwassee, Wedowee, and Ashlar soils, are well drained and commonly support forest cover, including species such as loblolly pine, most of the upland oaks, yellow-poplar, and sweetgum. These soils generally do not have any major limitations, except for slope in some areas. Where the slope is a management concern, the erosion hazard, the equipment limitation, and seedling mortality rates are moderate.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to applications of fertilizer than others, and some are more susceptible to erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section “Soil Series and Detailed Soil Map Units,” the description of each map unit in the survey area suitable for timber includes information about productivity, limitations in harvesting timber, and management concerns in producing timber. Table 8 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in management.

Table 8 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare per year. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of the slope. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock, a hardpan, or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: R, W, D, C, and S.

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

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, and susceptibility of the surface layer to compaction. As slope gradient and length increase, the use of wheeled equipment becomes more difficult. On the steeper slopes, tracked equipment is needed. On the steepest slopes, even tracked equipment cannot be operated and more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are so steep that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of

ground-based equipment, or if special equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep that tracked equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. Ratings of moderate or severe indicate a need to choose the best suited equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of the death of the naturally occurring or properly planted seedlings of good stock in periods of normal rainfall, as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth to a high water table and the length of the period when the water table is high, rock fragments in the surface layer, rooting depth, and the aspect of the slope. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of moderate or severe indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing a surface drainage system, and providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is moderate or severe.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *productivity class*. The predominant common trees are listed in table 8 in the order of their observed occurrence. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

For soils that are commonly used for timber production, the yield is predicted in cubic feet per acre per year. It is predicted at the point where mean annual increment culminates. The estimates of the productivity of the soils in this survey are based on published data *(3, 4, 6, 7, 10)*.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years (50 years in this survey). This index applies to fully stocked, even-aged, unmanaged stands. Productivity of a site can be improved through management practices, such as bedding, ditching, managing water supplies, applying fertilizer, and planting genetically improved species.

The *productivity class*, a number, represents the yield likely to be produced by the most important trees, expressed in cubic meters per hectare per year.

Trees to plant are those that are used for reforestation or, under suitable conditions, natural regeneration. They are suited to the soils and can produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation.

Recreation

The soils of the survey area are rated in table 9 according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas,

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

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

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the period of use. The surface is free of stones and boulders and is firm after rains. If grading is needed, the depth of the soil over bedrock should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

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

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat. The ratings in table 10 are intended to be used as a guide and are not site specific. Onsite investigation is needed for individual management plans.

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

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

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, partridge pea, croton, and ragweed.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, yellow-poplar, black cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are autumn-olive and crabapple.

Coniferous plants furnish browse and seeds. Soil

properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

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

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

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

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm, dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the high water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, and shrinking and swelling can cause the movement of footings. Depth to a high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established. Soil tests are essential to determine liming and fertilizer needs. Help in making soil tests or in deciding what soil additive, if any, should be used can be obtained from the office of the Upper Ocumulgee River Soil and Water Conservation District or the Rockdale County Soil and Water Conservation District or from the local office of the Cooperative Extension Service.

Sanitary Facilities

Table 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties

requires special design, extra maintenance, or costly alteration.

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

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

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. The animal waste lagoons commonly used in farming operations are not considered in the ratings. They are generally deeper than the lagoons referred to in the table and rely on anaerobic bacteria to decompose waste materials.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

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

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

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

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, and soil reaction affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the high water table is more than 3 feet. Soils rated *fair* have more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the high water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a high water table at a depth of less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

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

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as weathered granite gneiss saprolite, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a high water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a high water table, rock fragments, and bedrock.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are

easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area. Ponds that are less than about 2 acres in size are not shown on the maps because of the scale of mapping.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or mica. Depth to a high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, and susceptibility to flooding. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity. Availability of drainage outlets is not considered in the ratings.

Drainage may be a major management consideration in some areas. Management of drainage in conformance with regulations concerning wetlands may require special permits and extra planning. The local office of the Natural Resources Conservation Service should be contacted for identification of hydric soils and potential wetlands.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to a high water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the availability of suitable irrigation water, depth of the root zone, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed *(11)*. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps.

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

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

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

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

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

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest.

Rock fragments 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The

sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

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

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

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^1/_3$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

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

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

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

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

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

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The

classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, more than 6 percent; and *very high*, more than 9 percent.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.64. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

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

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

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

The four hydrologic soil groups are:

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

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

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

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

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

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of flooding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of flooding is more than 50 percent in any year). *Common* is used when occasional and frequent classes are grouped for certain purposes. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 days to 1 month, and *very long* if more than 1 month. Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

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

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone,

namely grayish colors or mottles (redoximorphic features) in the soil. Indicated in table 17 are the depth to the high 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. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the high water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. “More than 6.0” indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

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

References

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

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 coating, clay skin.

Climax plant community. 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.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

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 (in tables). The walls of excavations tend to cave in or slough.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained,* and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and

resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gully. A very small channel with steep sides cut by running water and through which water ordinarily runs only after rainfall, icemelt, or snowmelt. 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. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2 ..... very low
0.2 to 0.4 ..... low
0.4 to 0.75 ..... moderately low

0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
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.
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.
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
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.

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. The soil is not strong enough to support loads.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay and quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is also exposed to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Sand. As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Saprolite. Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

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.

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.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C

horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. The unconsolidated sediment that is deposited by water, wind, ice, or mass wasting and that fills or partly fills a valley.

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

(Recorded in the period 1951-87 at Covington, Georgia)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	53.0	32.5	42.8	73	7	54	4.82	2.96	6.64	8	0.5
February----	57.8	34.7	46.3	78	13	62	4.61	2.47	6.41	7	.3
March-------	65.9	41.5	53.7	85	21	180	5.54	3.34	7.46	8	.2
April-------	75.1	49.3	62.2	89	30	366	3.77	2.00	5.21	6	.0
May---------	81.7	57.4	69.6	94	40	608	4.06	1.90	6.04	6	.0
June--------	87.5	64.6	76.1	99	50	783	3.55	1.92	5.00	6	.0
July--------	89.8	68.0	78.9	99	58	896	4.60	2.10	6.62	8	.0
August------	89.0	67.3	78.2	98	58	874	3.34	1.50	5.00	6	.0
September---	83.6	61.8	72.7	95	44	681	3.05	1.51	4.30	5	.0
October-----	74.1	50.3	62.2	89	30	378	2.85	.91	4.54	4	.0
November----	64.5	41.1	52.8	82	20	144	3.50	1.90	4.98	6	.0
December----	55.7	35.0	45.4	76	12	60	4.28	2.20	6.03	7	.0
Yearly:											
Average---	73.1	50.3	61.7	---	---	---	---	---	---	---	---
Extreme---	---	---	---	101	5	---	---	---	---	---	---
Total-----	---	---	---	---	---	5,086	47.97	40.74	55.46	77	1.0

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

Table 2.—Freeze Dates in Spring and Fall

(Recorded in the period 1951-87 at Covington, Georgia)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 20	Apr. 4	Apr. 16
2 years in 10 later than--	Mar. 13	Mar. 28	Apr. 11
5 years in 10 later than--	Feb. 27	Mar. 16	Apr. 2
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 8	Oct. 30	Oct. 20
2 years in 10 earlier than--	Nov. 16	Nov. 4	Oct. 25
5 years in 10 earlier than--	Dec. 2	Nov. 14	Nov. 4

Table 3.—Growing Season

(Recorded in the period 1951-87 at Covington, Georgia)

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	245	223	198
8 years in 10	256	229	204
5 years in 10	278	242	215
2 years in 10	299	254	227
1 year in 10	311	260	233

Table 4.—Classification of the Soils

Soil name	Family or higher taxonomic class
Alcovy	Fine-loamy, siliceous, thermic Typic Kanhapludults
Altavista	Fine-loamy, mixed, thermic Aquic Hapludults
Appling	Clayey, kaolinitic, thermic Typic Kanhapludults
Ashlar	Coarse-loamy, mixed, thermic Typic Dystrochrepts
Buncombe	Mixed, thermic Typic Udipsamments
Cartecay	Coarse-loamy, mixed, nonacid, thermic Aquic Udifluvents
Cecil	Clayey, kaolinitic, thermic Typic Kanhapludults
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Congaree	Fine-loamy, mixed, nonacid, thermic Typic Udifluvents
Gwinnett	Clayey, kaolinitic, thermic Rhodic Kanhapludults
Helena	Clayey, mixed, thermic Aquic Hapludults
Hiwassee	Clayey, kaolinitic, thermic Rhodic Kanhapludults
Madison	Clayey, kaolinitic, thermic Typic Kanhapludults
Molena	Sandy, mixed, thermic Psammentic Hapludults
Pacolet	Clayey, kaolinitic, thermic Typic Kanhapludults
Rion	Fine-loamy, mixed, thermic Typic Hapludults
Roanoke	Clayey, mixed, thermic Typic Ochraquults
Toccoa	Coarse-loamy, mixed, nonacid, thermic Typic Udifluvents
Wedowee	Clayey, kaolinitic, thermic Typic Kanhapludults
Wickham	Fine-loamy, mixed, thermic Typic Hapludults

Table 5.—Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Newton County	Rockdale County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Pct
AcB	Alcovy loamy sand, 2 to 6 percent slopes	390	40	430	0.2
AkA	Altavista sandy loam, 0 to 3 percent slopes, occasionally flooded	1,365	450	1,815	0.7
AmB	Appling sandy loam, 2 to 6 percent slopes	5,780	1,725	7,505	2.9
AmC	Appling sandy loam, 6 to 10 percent slopes	1,755	955	2,710	1.0
AnC	Appling-Urban land complex, 2 to 10 percent slopes	680	165	845	0.3
ArF	Ashlar sandy loam, 20 to 35 percent slopes, very bouldery	415	210	625	0.2
AsC	Ashlar-Rock outcrop complex, 2 to 10 percent slopes	85	910	995	0.4
AwC	Ashlar-Pacolet-Wedowee complex, 4 to 15 percent slopes	4,120	8,840	12,960	4.9
AwE	Ashlar-Pacolet-Wedowee complex, 15 to 25 percent slopes	3,055	5,125	8,180	3.1
BwB	Buncombe loamy sand, 0 to 5 percent slopes, frequently flooded	485	185	670	0.3
CCA	Cartecay and Chewacla soils, frequently flooded	12,815	4,995	17,810	6.8
CeB	Cecil sandy loam, 2 to 6 percent slopes	21,450	4,640	26,090	9.9
CeC	Cecil sandy loam, 6 to 10 percent slopes	7,020	1,680	8,700	3.3
CfB2	Cecil sandy clay loam, 2 to 6 percent slopes, eroded	4,010	120	4,130	1.6
CfC2	Cecil sandy clay loam, 6 to 10 percent slopes, eroded	9,650	1,515	11,165	4.2
CuC	Cecil-Urban land complex, 2 to 10 percent slopes	5,875	3,445	9,320	3.5
GeB	Gwinnett sandy loam, 2 to 6 percent slopes	4,290	550	4,840	1.8
GeC	Gwinnett sandy loam, 6 to 10 percent slopes	3,190	560	3,750	1.4
GeD	Gwinnett sandy loam, 10 to 15 percent slopes	2,250	580	2,830	1.1
GeE	Gwinnett sandy loam, 15 to 25 percent slopes	1,070	265	1,335	0.5
GwB2	Gwinnett sandy clay loam, 2 to 6 percent slopes, eroded	1,750	60	1,810	0.7
GwC2	Gwinnett sandy clay loam, 6 to 10 percent slopes, eroded	6,400	810	7,210	2.7
GwD2	Gwinnett sandy clay loam, 10 to 15 percent slopes, eroded	1,845	120	1,965	0.7
GwE2	Gwinnett sandy clay loam, 15 to 25 percent slopes, eroded	680	55	735	0.3
HaB	Helena sandy loam, 2 to 6 percent slopes	400	190	590	0.2
HeB	Hiwassee sandy loam, 2 to 6 percent slopes	4,535	155	4,690	1.8
HeC	Hiwassee sandy loam, 6 to 10 percent slopes	935	150	1,085	0.4
HwB2	Hiwassee sandy clay loam, 2 to 6 percent slopes, eroded	725	0	725	0.3
HwC2	Hiwassee sandy clay loam, 6 to 10 percent slopes, eroded	510	0	510	0.2
MaB	Madison sandy loam, 2 to 6 percent slopes	1,965	1,165	3,130	1.2
MaC	Madison sandy loam, 6 to 10 percent slopes	2,505	1,345	3,850	1.5
MaD	Madison sandy loam, 10 to 15 percent slopes	1,400	860	2,260	0.9
MaE	Madison sandy loam, 15 to 25 percent slopes	1,200	820	2,020	0.8
MdC2	Madison sandy clay loam, 2 to 10 percent slopes, eroded	2,805	1,205	4,010	1.5
MdD2	Madison sandy clay loam, 10 to 15 percent slopes, eroded	1,600	910	2,510	1.0
MdE2	Madison sandy clay loam, 15 to 25 percent slopes, eroded	570	330	900	0.3
MoC	Molena loamy sand, 2 to 10 percent slopes	400	50	450	0.2
PaB	Pacolet sandy loam, 2 to 6 percent slopes	3,750	2,840	6,590	2.5
PaC	Pacolet sandy loam, 6 to 10 percent slopes	10,380	6,240	16,620	6.3
PaD	Pacolet sandy loam, 10 to 15 percent slopes	6,205	3,400	9,605	3.7
PaE	Pacolet sandy loam, 15 to 25 percent slopes	4,570	3,230	7,800	3.0
PfC2	Pacolet sandy clay loam, 2 to 10 percent slopes, eroded	4,505	2,200	6,705	2.5
PfD2	Pacolet sandy clay loam, 10 to 15 percent slopes, eroded	5,380	2,655	8,035	3.1
PfE2	Pacolet sandy clay loam, 15 to 25 percent slopes, eroded	1,410	190	1,600	0.6
PgD	Pacolet-Urban land complex, 10 to 25 percent slopes	1,110	1,765	2,875	1.1
Pt	Pits, quarry	30	45	75	*
ReD	Rion sandy loam, 6 to 15 percent slopes	170	80	250	0.1
ReE	Rion sandy loam, 15 to 35 percent slopes	415	385	800	0.3
Rk	Roanoke silt loam, frequently flooded	1,580	460	2,040	0.8
Rr	Rock outcrop	300	1,160	1,460	0.6
Ta	Toccoa fine sandy loam, rarely flooded	1,070	330	1,400	0.5
TCA	Toccoa and Congaree soils, frequently flooded	5,055	1,450	6,505	2.5
Uo	Udorthents, clayey	360	215	575	0.2
Ur	Urban land	2,060	1,790	3,850	1.5
WeB	Wedowee sandy loam, 2 to 6 percent slopes	1,060	1,925	2,985	1.1
WeC	Wedowee sandy loam, 6 to 10 percent slopes	3,285	4,480	7,765	3.0
WeD	Wedowee sandy loam, 10 to 15 percent slopes	1,460	2,340	3,800	1.4
WeE	Wedowee sandy loam, 15 to 25 percent slopes	290	25	315	0.1

See footnote at end of table.

Table 5.—Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Newton County	Rockdale County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Pct
WuC	Wedowee-Urban land-Ashlar complex, 6 to 15 percent slopes	0	1,510	1,510	0.6
WwB	Wickham sandy loam, 2 to 6 percent slopes	2,370	205	2,575	1.0
WwC	Wickham sandy loam, 6 to 10 percent slopes	795	165	960	0.4
	Water	1,015	235	1,250	0.5
	Total	178,600	84,500	263,100	100.0

* Less than 0.1 percent.

Table 6.—Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Wheat	Soybeans	Pasture
		Bu	Bu	Bu	AUM*
AcB---------- Alcovy	IIe	80	45	35	8.0
AkA---------- Altavista	IIw	100	55	40	9.0
AmB---------- Appling	IIe	80	45	35	8.0
AmC---------- Appling	IIIe	70	35	30	7.5
AnC**. Appling-Urban land					
ArF---------- Ashlar	VIIe	---	---	---	---
AsC**:					
Ashlar---------	IVe	---	---	---	4.5
Rock outcrop---	VIIIs	---	---	---	---
AwC:					
Ashlar---------	IVe	---	---	---	4.5
Pacolet--------	IVe	70	30	25	7.5
Wedowee--------	IVe	50	30	20	5.5
AwE:					
Ashlar---------	VIe	---	---	---	3.0
Pacolet--------	VIe	---	---	---	5.0
Wedowee--------	VIe	---	---	---	4.5
BwB---------- Buncombe	Vw	---	---	15	3.0
CCA:					
Cartecay-------	Vw	---	---	---	5.0
Chewacla-------	IVw	80	30	25	9.0
CeB---------- Cecil	IIe	75	45	30	8.0
CeC---------- Cecil	IIIe	60	40	25	7.5
CfB2---------- Cecil	IIIe	60	40	25	5.5

See footnotes at end of table.

Table 6.—Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Wheat	Soybeans	Pasture
		Bu	Bu	Bu	AUM*
CfC2---------- Cecil	IVe	55	20	15	5.0
CuC**. Cecil-Urban land					
GeB---------- Gwinnett	IIe	75	40	25	8.0
GeC---------- Gwinnett	IIIe	60	30	20	7.5
GeD---------- Gwinnett	IVe	45	20	15	6.5
GeE---------- Gwinnett	VIe	---	---	---	5.0
GwB2---------- Gwinnett	IIIe	60	30	20	5.5
GwC2---------- Gwinnett	IVe	55	20	15	5.0
GwD2---------- Gwinnett	VIe	---	---	---	4.5
GwE2---------- Gwinnett	VIe	---	---	---	4.0
HaB---------- Helena	IIe	70	40	25	5.8
HeB---------- Hiwassee	IIe	90	50	30	8.5
HeC---------- Hiwassee	IIIe	80	45	25	8.0
HwB2---------- Hiwassee	IIIe	80	45	25	8.0
HwC2---------- Hiwassee	IVe	70	40	20	7.5
MaB---------- Madison	IIe	75	45	30	7.5
MaC---------- Madison	IIIe	60	40	25	6.5
MaD---------- Madison	IVe	50	35	20	6.0
MaE---------- Madison	VIe	---	---	---	5.5
MdC2---------- Madison	IVe	50	35	20	5.0

See footnotes at end of table.

Table 6.—Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Wheat	Soybeans	Pasture
		Bu	Bu	Bu	AUM*
MdD2---------- Madison	VIe	45	---	---	4.5
MdE2---------- Madison	VIIe	---	---	---	4.0
MoC---------- Molena	IVs	50	25	15	6.0
PaB---------- Pacolet	IIe	70	40	30	8.0
PaC---------- Pacolet	IIIe	65	30	25	7.5
PaD---------- Pacolet	IVe	55	25	20	7.5
PaE---------- Pacolet	VIe	---	---	---	5.0
PfC2---------- Pacolet	IVe	50	20	20	5.0
PfD2---------- Pacolet	VIe	---	---	---	4.5
PfE2---------- Pacolet	VIIe	---	---	---	4.0
PgD**. Pacolet-Urban land					
Pt**. Pits, quarry					
ReD---------- Rion	IVe	60	30	20	5.0
ReE---------- Rion	VIIe	---	---	---	4.0
Rk---------- Roanoke	Vw	---	---	---	5.2
Rr**---------- Rock outcrop	VIIIs	---	---	---	---
Ta---------- Toccoa	IIw	90	45	40	8.0
TCA:					
Toccoa---------	IIIw	75	40	35	7.0
Congaree-------	IIIw	120	50	40	9.0
Uo. Udorthents					

See footnotes at end of table.

Table 6.—Land Capability and Yields per Acre of Crops and Pasture--Continued

Soil name and map symbol	Land capability	Corn	Wheat	Soybeans	Pasture
		Bu	Bu	Bu	AUM*
Ur**. Urban land					
WeB---------- Wedowee	IIe	75	40	30	6.0
WeC---------- Wedowee	IIIe	60	35	25	5.5
WeD---------- Wedowee	IVe	50	25	15	4.5
WeE---------- Wedowee	VIe	---	---	---	4.5
WuC**. Wedowee-Urban land-Ashlar					
WwB---------- Wickham	IIe	90	55	35	8.5
WwC---------- Wickham	IIIe	70	35	25	8.0

* 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 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

Table 7.—Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland)

Map symbol	Soil name
AcB	Alcovy loamy sand, 2 to 6 percent slopes
AkA	Altavista sandy loam, 0 to 3 percent slopes, occasionally flooded
AmB	Appling sandy loam, 2 to 6 percent slopes
CeB	Cecil sandy loam, 2 to 6 percent slopes
GeB	Gwinnett sandy loam, 2 to 6 percent slopes
HaB	Helena sandy loam, 2 to 6 percent slopes
HeB	Hiwassee sandy loam, 2 to 6 percent slopes
MaB	Madison sandy loam, 2 to 6 percent slopes
PaB	Pacolet sandy loam, 2 to 6 percent slopes
WeB	Wedowee sandy loam, 2 to 6 percent slopes
WwB	Wickham sandy loam, 2 to 6 percent slopes
WwC	Wickham sandy loam, 6 to 10 percent slopes

Table 8.—Woodland Management and Productivity

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
AcB Alcovy	9A	Slight	Slight	Slight	Loblolly pine	87	9	Loblolly pine, southern red oak, white oak, yellow-poplar.
					Scarlet oak	73	4	
					Southern red oak	81	4	
					White oak	76	4	
AkA Altavista	9A	Slight	Slight	Slight	Loblolly pine	91	9	Loblolly pine.
					Longleaf pine	87	8	
					White oak	77	4	
					Shortleaf pine	---	---	
					Sweetgum	---	---	
					Red maple	---	---	
					Yellow-poplar	---	---	
					Southern red oak	---	---	
					Water oak	---	---	
					American beech	---	---	
					Hickory	---	---	
AmB, AmC Appling	8A	Slight	Slight	Slight	Loblolly pine	84	8	Loblolly pine, shortleaf pine.
					Shortleaf pine	65	7	
					Virginia pine	74	8	
					Scarlet oak	74	4	
					White oak	64	3	
					Yellow-poplar	88	6	
					Sweetgum	---	---	
					Southern red oak	---	---	
					Hickory	---	---	
ArF Ashlar	7R	Moderate	Moderate	Moderate	Loblolly pine	75	7	Loblolly pine, shortleaf pine.
					Shortleaf pine	50	5	
					Northern red oak	45	2	
AsC**:								
Ashlar	8S	Slight	Slight	Slight	Loblolly pine	85	8	Loblolly pine, shortleaf pine.
					Shortleaf pine	70	8	
					Virginia pine	70	8	
					Northern red oak	60	3	
Rock outcrop.								
AwC**:								
Ashlar	8S	Slight	Slight	Slight	Loblolly pine	85	8	Loblolly pine, shortleaf pine.
					Shortleaf pine	70	8	
					Virginia pine	70	8	
					Northern red oak	60	3	
Pacolet	8A	Slight	Slight	Slight	Loblolly pine	78	8	Loblolly pine, shortleaf pine, yellow-poplar.
					Shortleaf pine	70	8	
					Yellow-poplar	90	6	
					Virginia pine	---	---	
					Northern red oak	---	---	
					Hickory	---	---	
					White oak	---	---	

See footnotes at end of table.

Table 8.—Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
AwC**:								
Wedowee	8A	Slight	Slight	Slight	Loblolly pine	80	8	Loblolly pine, shortleaf pine, yellow-poplar.
					Virginia pine	70	8	
					Shortleaf pine	70	8	
					Southern red oak	70	4	
					Northern red oak	70	4	
					White oak	65	3	
AwE**:								
Ashlar	7R	Moderate	Moderate	Moderate	Loblolly pine	75	7	Loblolly pine, shortleaf pine.
					Shortleaf pine	50	5	
					Northern red oak	45	2	
Pacolet	8R	Moderate	Moderate	Slight	Loblolly pine	78	8	Loblolly pine, shortleaf pine, yellow-poplar.
					Shortleaf pine	70	8	
					Yellow-poplar	90	6	
					Virginia pine	---	---	
					Northern red oak	---	---	
					Hickory	---	---	
					White oak	---	---	
Wedowee	8R	Moderate	Moderate	Slight	Loblolly pine	80	8	Loblolly pine, shortleaf pine, yellow-poplar.
					Virginia pine	70	8	
					Shortleaf pine	70	8	
					Southern red oak	70	4	
					Northern red oak	70	4	
					White oak	65	3	
BwB Buncombe	9S	Slight	Moderate	Moderate	Loblolly pine	90	9	Loblolly pine, yellow-poplar, American sycamore.
					American sycamore	---	---	
					Sweetgum	---	---	
					Yellow-poplar	100	8	
					Northern red oak	---	---	
					Southern red oak	---	---	
					Hickory	---	---	
					Elm	---	---	
					River birch	---	---	
CCA**:								
Cartecay	10W	Slight	Moderate	Slight	Loblolly pine	95	10	Loblolly pine, sweetgum, yellow-poplar, water oak, American sycamore, eastern cottonwood.
					Sweetgum	95	8	
					Yellow-poplar	105	8	
					Water oak	85	6	
					Southern red oak	85	5	
Chewacla	10W	Slight	Moderate	Slight	Loblolly pine	95	10	Loblolly pine, yellow-poplar, sweetgum, American sycamore.
					Yellow-poplar	95	7	
					Sweetgum	97	9	
					Water oak	80	5	
					Eastern cottonwood	---	---	
					Green ash	---	---	
					Southern red oak	---	---	
					Blackgum	---	---	
					Red maple	---	---	
					Willow oak	---	---	
					American beech	---	---	
					American sycamore	---	---	

See footnotes at end of table.

Table 8.—Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
CeB, CeC---------- Cecil	8A	Slight	Slight	Slight	Loblolly pine--------	83	8	Loblolly pine, shortleaf pine.
					Shortleaf pine-------	69	8	
					Virginia pine--------	71	8	
					White oak----------	79	4	
					Northern red oak-----	81	4	
					Southern red oak-----	79	4	
					Post oak----------	72	4	
					Scarlet oak----------	81	4	
					Sweetgum----------	76	5	
					Yellow-poplar--------	92	6	
CfB2, CfC2--------- Cecil	7C	Slight	Moderate	Moderate	Loblolly pine--------	72	7	Loblolly pine, shortleaf pine.
					Shortleaf pine-------	63	7	
					Virginia pine--------	65	7	
					White oak----------	64	3	
					Northern red oak-----	---	---	
GeB, GeC, GeD------ Gwinnett	8A	Slight	Slight	Slight	Loblolly pine--------	81	8	Loblolly pine, yellow-poplar.
					Southern red oak-----	72	4	
					White oak----------	69	4	
GeE---------- Gwinnett	8R	Moderate	Moderate	Slight	Loblolly pine--------	81	8	Loblolly pine, yellow-poplar.
					Southern red oak-----	72	4	
					White oak----------	69	4	
GwB2---------- Gwinnett	8A	Slight	Moderate	Moderate	Loblolly pine--------	81	8	Loblolly pine, yellow-poplar.
					Southern red oak-----	72	4	
					White oak----------	69	4	
GwC2, GwD2--------- Gwinnett	7C	Moderate	Moderate	Moderate	Loblolly pine--------	75	7	Loblolly pine.
					Virginia pine--------	65	7	
					Shortleaf pine-------	65	7	
GwE2---------- Gwinnett	4R	Severe	Severe	Moderate	Loblolly pine--------	65	7	
					Virginia pine--------	65	7	
HaB---------- Helena	8A	Slight	Moderate	Slight	Loblolly pine--------	84	8	Loblolly pine, yellow-poplar.
					Shortleaf pine-------	66	7	
					White oak----------	---	---	
					Yellow-poplar--------	---	---	
					Sweetgum----------	---	---	
					Northern red oak-----	---	---	
					Southern red oak-----	---	---	
					Black oak----------	---	---	
					Hickory----------	---	---	
					Virginia pine--------	---	---	
					Willow oak----------	---	---	
					American elm---------	---	---	
HeB, HeC---------- Hiwassee	8A	Slight	Slight	Slight	Loblolly pine--------	85	8	Loblolly pine, shortleaf pine.
					Northern red oak-----	80	4	
					Shortleaf pine-------	75	8	
					Southern red oak-----	80	4	
					White oak----------	80	4	
					Yellow-poplar--------	85	6	

See footnotes at end of table.

Table 8.—Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
HwB2, HwC2--------- Hiwassee	7C	Slight	Moderate	Moderate	Loblolly pine--------	71	7	Loblolly pine, shortleaf pine.
					Shortleaf pine-------	68	7	
					Northern red oak-----	75	4	
					White oak----------	70	4	
					Southern red oak-----	75	4	
MaB, MaC, MaD------ Madison	7A	Slight	Slight	Slight	Shortleaf pine-------	64	7	Loblolly pine, shortleaf pine.
					Loblolly pine--------	80	8	
					Southern red oak-----	75	4	
					Yellow-poplar--------	96	7	
					Virginia pine--------	71	8	
					Northern red oak-----	75	4	
					White oak----------	75	4	
MaE---------- Madison	7R	Moderate	Moderate	Slight	Shortleaf pine-------	64	7	Loblolly pine, shortleaf pine.
					Loblolly pine--------	80	8	
					Southern red oak-----	75	4	
					Yellow-poplar--------	96	7	
					Virginia pine--------	71	8	
					Northern red oak-----	75	4	
					White oak----------	75	4	
MdC2, MdD2--------- Madison	6C	Slight	Moderate	Moderate	Shortleaf pine-------	62	6	Loblolly pine, shortleaf pine.
					Loblolly pine--------	72	7	
					Virginia pine--------	66	7	
					Northern red oak-----	66	3	
					White oak----------	---	---	
MdE2---------- Madison	6R	Moderate	Moderate	Moderate	Shortleaf pine-------	62	6	Loblolly pine, shortleaf pine.
					Loblolly pine--------	72	7	
					Virginia pine--------	66	7	
					Northern red oak-----	66	3	
					White oak----------	---	---	
MoC---------- Molena	8S	Slight	Moderate	Moderate	Loblolly pine--------	80	8	Loblolly pine.
					Northern red oak-----	86	5	
					White oak----------	68	4	
					Shortleaf pine-------	---	---	
					Water oak----------	---	---	
PaB, PaC, PaD------ Pacolet	8A	Slight	Slight	Slight	Loblolly pine--------	78	8	Loblolly pine, shortleaf pine, yellow-poplar.
					Shortleaf pine-------	70	8	
					Yellow-poplar--------	90	6	
					Virginia pine--------	---	---	
					Northern red oak-----	---	---	
					Hickory----------	---	---	
					White oak----------	---	---	
PaE---------- Pacolet	8R	Moderate	Moderate	Slight	Loblolly pine--------	78	8	Loblolly pine, shortleaf pine, yellow-poplar.
					Shortleaf pine-------	70	8	
					Yellow-poplar--------	90	6	
					Virginia pine--------	---	---	
					Northern red oak-----	---	---	
					Hickory----------	---	---	
					White oak----------	---	---	
PfC2, PfD2--------- Pacolet	6C	Slight	Moderate	Moderate	Loblolly pine--------	70	6	Loblolly pine, shortleaf pine, yellow-poplar.
					Shortleaf pine-------	60	6	
					Yellow-poplar--------	80	5	

See footnotes at end of table.

Table 8.—Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
PfE2 Pacolet	6R	Moderate	Moderate	Moderate	Loblolly pine	70	6	Loblolly pine, shortleaf pine, yellow-poplar.
					Shortleaf pine	60	6	
					Yellow-poplar	80	5	
ReD Rion	8A	Slight	Slight	Slight	Loblolly pine	80	8	Loblolly pine, shortleaf pine, yellow-poplar.
					Post oak	65	3	
					Shortleaf pine	70	8	
					Southern red oak	80	4	
					Sweetgum	80	6	
					White oak	70	4	
					Yellow-poplar	90	6	
					Hickory	---	---	
					Northern red oak	---	---	
ReE Rion	8R	Moderate	Moderate	Slight	Loblolly pine	80	8	Loblolly pine, shortleaf pine, yellow-poplar.
					Post oak	65	3	
					Shortleaf pine	70	8	
					Southern red oak	80	4	
					Sweetgum	80	6	
					White oak	70	4	
					Yellow-poplar	90	6	
					Hickory	---	---	
					Northern red oak	---	---	
Rk Roanoke	7W	Slight	Severe	Severe	Sweetgum	90	7	Sweetgum, green ash.
					Willow oak	76	4	
					White oak	75	4	
Ta Toccoa	9A	Slight	Slight	Slight	Loblolly pine	90	9	Loblolly pine, yellow-poplar, American sycamore, cherrybark oak.
					Yellow-poplar	107	8	
					Sweetgum	100	10	
					Southern red oak	---	---	
TCA**:								
Toccoa	9A	Slight	Slight	Slight	Loblolly pine	90	9	Loblolly pine, yellow-poplar, American sycamore, cherrybark oak.
					Yellow-poplar	107	8	
					Sweetgum	100	10	
					Southern red oak	---	---	
Congaree	10A	Slight	Moderate	Slight	Sweetgum	100	10	Loblolly pine, sweetgum, yellow-poplar, American sycamore, cherrybark oak, eastern cottonwood.
					Yellow-poplar	107	8	
					Cherrybark oak	107	12	
					Loblolly pine	90	9	
					Eastern cottonwood	107	10	
					American sycamore	89	7	
					Black walnut	100	---	
					Scarlet oak	100	6	
					Willow oak	95	6	
					Green ash	---	---	
					American beech	---	---	
WeB, WeC, WeD Wedowee	8A	Slight	Slight	Slight	Loblolly pine	80	8	Loblolly pine, shortleaf pine, yellow-poplar.
					Virginia pine	70	8	
					Shortleaf pine	70	8	
					Southern red oak	70	4	
					Northern red oak	70	4	
					White oak	65	3	

See footnotes at end of table.

Table 8.—Woodland Management and Productivity--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
WeE---------- Wedowee	8R	Moderate	Moderate	Slight	Loblolly pine--------	80	8	Loblolly pine, shortleaf pine, yellow-poplar.
					Virginia pine--------	70	8	
					Shortleaf pine-------	70	8	
					Southern red oak-----	70	4	
					Northern red oak-----	70	4	
					White oak----------	65	3	
WwB, WwC---------- Wickham	9A	Slight	Slight	Slight	Loblolly pine--------	90	9	Loblolly pine.
					Yellow-poplar--------	89	6	
					White oak----------	84	5	
					Southern red oak-----	82	4	
					Sweetgum----------	---	---	
					Red maple----------	---	---	
					Northern red oak-----	---	---	
					Water oak----------	---	---	
					Hickory----------	---	---	
					Shortleaf pine-------	---	---	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

Table 9.—Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
AcB Alcovy	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: slope, small stones.	Slight.
AkA Altavista	Severe: flooding.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Moderate: wetness.
AmB Appling	Slight	Slight	Moderate: slope, small stones.	Slight.
AmC Appling	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
AnC*:				
Appling	Slight	Slight	Severe: slope.	Slight.
Urban land.				
ArF Ashlar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
AsC*:				
Ashlar	Slight	Slight	Severe: slope.	Slight.
Rock outcrop.				
AwC*:				
Ashlar	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Wedowee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
AwE*:				
Ashlar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Wedowee	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
BwB Buncombe	Severe: flooding.	Moderate: too sandy.	Moderate: too sandy, flooding.	Moderate: too sandy.

See footnote at end of table.

Table 9.—Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
CCA*:				
Cartecay	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness.
Chewacla	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.
CeB Cecil	Slight	Slight	Moderate: slope, small stones.	Slight.
CeC Cecil	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
CfB2 Cecil	Slight	Slight	Moderate: slope, small stones.	Slight.
CfC2 Cecil	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
CuC*:				
Cecil	Slight	Slight	Severe: slope.	Slight.
Urban land.				
GeB Gwinnett	Slight	Slight	Moderate: slope, small stones.	Slight.
GeC, GeD Gwinnett	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
GeE Gwinnett	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
GwB2 Gwinnett	Slight	Slight	Moderate: slope, small stones.	Slight.
GwC2, GwD2 Gwinnett	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
GwE2 Gwinnett	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
HaB Helena	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.
HeB Hiwassee	Slight	Slight	Moderate: slope.	Slight.
HeC Hiwassee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
HwB2 Hiwassee	Slight	Slight	Moderate: slope.	Slight.

See footnote at end of table.

Table 9.—Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
HwC2 Hiwassee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
MaB Madison	Slight	Slight	Moderate: slope, small stones.	Slight.
MaC, MaD Madison	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
MaE Madison	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
MdC2 Madison	Slight	Slight	Severe: slope.	Slight.
MdD2 Madison	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
MdE2 Madison	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
MoC Molena	Moderate: too sandy.	Moderate: too sandy.	Severe: slope.	Moderate: too sandy.
PaB Pacolet	Slight	Slight	Moderate: slope, small stones.	Slight.
PaC, PaD Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
PaE Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
PfC2 Pacolet	Slight	Slight	Severe: slope.	Slight.
PfD2 Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
PfE2 Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
PgD*:				
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Urban land.				
Pt*. Pits, quarry				
ReD Rion	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
ReE Rion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

Table 9.—Recreational Development--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Rk Roanoke	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.
Rr*. Rock outcrop				
Ta Toccoa	Severe: flooding.	Slight	Moderate: slope.	Slight.
TCA*:				
Toccoa	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.
Congaree	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.
Uo. Udorthents				
Ur*. Urban land				
WeB Wedowee	Slight	Slight	Moderate: slope, small stones.	Slight.
WeC, WeD Wedowee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
WeE Wedowee	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
WuC*:				
Wedowee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Urban land.				
Ashlar	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
WwB Wickham	Slight	Slight	Moderate: slope.	Slight.
WwC Wickham	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 10.—Wildlife Habitat

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							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
AcB Alcovy	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
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.
AnC*:										
Appling	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
ArF Ashlar	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
AsC*:										
Ashlar	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Rock outcrop.										
AwC*:										
Ashlar	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Pacolet	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Wedowee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AwE*:										
Ashlar	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Pacolet	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Wedowee	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BwB Buncombe	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
CCA*:										
Cartecay	Poor	Fair	Fair	Good	Good	Fair	Poor	Fair	Good	Fair.
Chewacla	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.

See footnote at end of table.

Table 10.—Wildlife Habitat--Continued

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
CeB Cecil	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CeC Cecil	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CfB2 Cecil	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CfC2 Cecil	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
CuC*:										
Cecil	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
GeB Gwinnett	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GeC, GeD Gwinnett	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GeE Gwinnett	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GwB2 Gwinnett	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GwC2, GwD2 Gwinnett	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GwE2 Gwinnett	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HaB Helena	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HeB Hiwassee	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HeC Hiwassee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
HwB2 Hiwassee	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
HwC2 Hiwassee	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
MaB Madison	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MaC, MaD Madison	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MaE Madison	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

Table 10.—Wildlife Habitat--Continued

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
MdC2, MdD2 Madison	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
MdE2 Madison	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MoC Molena	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
PaB, PaC Pacolet	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
PaD Pacolet	Poor	Fair	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
PaE Pacolet	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
PfC2 Pacolet	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
PfD2 Pacolet	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
PfE2 Pacolet	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
PgD*:										
Pacolet	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Urban land.										
Pt*. Pits, quarry										
ReD Rion	Poor	Fair	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
ReE Rion	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Rk Roanoke	Poor	Poor	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Rr*. Rock outcrop										
Ta Toccoa	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TCA*:										
Toccoa	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Congaree	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Uo. Udorthents										

See footnote at end of table.

Table 10.—Wildlife Habitat--Continued

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
Ur*. Urban land										
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.
WeE Wedowee	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
WuC*:										
Wedowee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
Ashlar	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
WwB Wickham	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WwC Wickham	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 11.—Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AcB Alcovy	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Slight.
AkA Altavista	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Severe: wetness.
AmB Appling	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
AmC Appling	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
AnC*:						
Appling	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
Urban land.						
ArF Ashlar	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
AsC*:						
Ashlar	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.	Moderate: droughty, depth to rock.
Rock outcrop.						
AwC*:						
Ashlar	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: droughty, slope, depth to rock.
Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
Wedowee	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
AwE*:						
Ashlar	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

Table 11.—Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AwE*:						
Wedowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
BwB Buncombe	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: droughty.
CCA*:						
Cartecay	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Chewacla	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
CeB Cecil	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
CeC Cecil	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
CfB2 Cecil	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
CfC2 Cecil	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
CuC*:						
Cecil	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
Urban land.						
GeB Gwinnett	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
GeC, GeD Gwinnett	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
GeE Gwinnett	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GwB2 Gwinnett	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
GwC2, GwD2 Gwinnett	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
GwE2 Gwinnett	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HaB Helena	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Severe: wetness.

See footnote at end of table.

Table 11.—Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HeB Hiwassee	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
HeC Hiwassee	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
HwB2 Hiwassee	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
HwC2 Hiwassee	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
MaB Madison	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
MaC, MaD Madison	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
MaE Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MdC2 Madison	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
MdD2 Madison	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
MdE2 Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MoC Molena	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
PaB Pacolet	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
PaC, PaD Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
PaE Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PfC2 Pacolet	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
PfD2 Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
PfE2 Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PgD*:						
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

Table 11.—Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
PgD*: Urban land.						
Pt*. Pits, quarry						
ReD Rion	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
ReE Rion	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rk Roanoke	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
Rr*. Rock outcrop						
Ta Toccoa	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Slight.
TCA*:						
Toccoa	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Congaree	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Uo. Udorthents						
Ur*. Urban land						
WeB Wedowee	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
WeC, WeD Wedowee	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
WeE Wedowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
WuC*:						
Wedowee	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
Urban land.						

See footnote at end of table.

Table 11.—Building Site Development--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
WuC*:						
Ashlar	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.	Moderate: droughty, slope, depth to rock.
WwB Wickham	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
WwC Wickham	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 12.—Sanitary Facilities

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AcB Alcovy	Severe: wetness, percs slowly.	Moderate: slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
AkA Altavista	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
AmB Appling	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
AmC Appling	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
AnC*:					
Appling	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
Urban land.					
ArF Ashlar	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
AsC*:					
Ashlar	Severe: depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
Rock outcrop.					
AwC*:					
Ashlar	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey, slope.
Wedowee	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: small stones, slope.

See footnote at end of table.

Table 12.—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
AwE*:					
Ashlar	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Wedowee	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
BwB Buncombe	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage, too sandy.	Severe: flooding, seepage.	Poor: seepage, too sandy.
CCA*:					
Cartecay	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
Chewacla	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
CeB Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
CeC Cecil	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
CfB2 Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
CfC2 Cecil	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
CuC*:					
Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
Urban land.					
GeB Gwinnett	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Fair: depth to rock, too clayey.

See footnote at end of table.

Table 12.—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
GeC, GeD Gwinnett	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: depth to rock, too clayey, slope.
GeE Gwinnett	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
GwB2 Gwinnett	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Fair: depth to rock, too clayey.
GwC2, GwD2 Gwinnett	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: depth to rock.	Moderate: depth to rock, slope.	Fair: depth to rock, too clayey, slope.
GwE2 Gwinnett	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
HaB Helena	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
HeB Hiwassee	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
HeC Hiwassee	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
HwB2 Hiwassee	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
HwC2 Hiwassee	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
MaB Madison	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
MaC, MaD Madison	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey.
MaE Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
MdC2 Madison	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.

See footnote at end of table.

Table 12.—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
MdD2 Madison	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey.
MdE2 Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
MoC Molena	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
PaB Pacolet	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
PaC, PaD Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey, slope.
PaE Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
PfC2 Pacolet	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
PfD2 Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey, slope.
PfE2 Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
PgD*:					
Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Urban land.					
Pt*. Pits, quarry					
ReD Rion	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too clayey, slope.
ReE Rion	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Rk Roanoke	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: too clayey, hard to pack, wetness.
Rr*. Rock outcrop					
Ta Toccoa	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Good.

See footnote at end of table.

Table 12.—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
TCA*:					
Toccoa	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Good.
Congaree	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: too clayey, wetness.
Uo.					
Udorthents					
Ur*.					
Urban land					
WeB	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: small stones.
WeC, WeD	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: small stones, slope.
WeE	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
WuC*:					
Wedowee	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: small stones, slope.
Urban land.					
Ashlar	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
WwB	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
WwC	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: slope, too clayey.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 13.—Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AcB Alcovy	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
AkA Altavista	Fair: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
AmB, AmC Appling	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
AnC*:				
Appling	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
ArF Ashlar	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
AsC*:				
Ashlar	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Rock outcrop.				
AwC*:				
Ashlar	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Wedowee	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
AwE*:				
Ashlar	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Pacolet	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Wedowee	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
BwB Buncombe	Good	Probable	Improbable: too sandy.	Poor: too sandy.

See footnote at end of table.

Table 13.—Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
CCA*:				
Cartecay	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
Chewacla	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
CeB, CeC, CfB2, CfC2 Cecil	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CuC*:				
Cecil	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
GeB, GeC, GeD Gwinnett	Fair: low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GeE Gwinnett	Moderate: slope, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
GwB2, GwC2, GwD2 Gwinnett	Fair: low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GwE2 Gwinnett	Moderate: slope, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
HaB Helena	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
HeB, HeC, HwB2, HwC2 Hiwassee	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MaB, MaC, MaD Madison	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MaE Madison	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
MdC2, MdD2 Madison	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MdE2 Madison	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
MoC Molena	Good	Probable	Improbable: too sandy.	Fair: too sandy.

See footnote at end of table.

Table 13.—Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
PaB, PaC, PaD	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Pacolet				
PaE	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Pacolet				
PfC2, PfD2	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Pacolet				
PfE2	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Pacolet				
PgD*:				
Pacolet	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Urban land.				
Pt*.				
Pits, quarry				
ReD	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
Rion				
ReE	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Rion				
Rk	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
Roanoke				
Rr*.				
Rock outcrop				
Ta	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Toccoa				
TCA*:				
Toccoa	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Congaree	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
Uo.				
Udorthents				
Ur*.				
Urban land				
WeB, WeC, WeD	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Wedowee				

See footnote at end of table.

Table 13.—Construction Materials--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WeE: Wedowee	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
WuC*:				
Wedowee	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
Ashlar	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
WwB: Wickham	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
WwC: Wickham	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 14.—Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "moderate" and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
AcB Alcovy	Moderate: slope.	Moderate: wetness.	Percs slowly, slope.	Slope, percs slowly.	Wetness	Percs slowly, rooting depth.
AkA Altavista	Moderate: seepage.	Severe: piping, wetness.	Flooding	Wetness	Wetness	Favorable.
AmB Appling	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	---	Favorable.
AmC Appling	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
AnC*:						
Appling	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	---	Favorable.
Urban land.						
ArF Ashlar	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty.	Slope, depth to rock.	Slope, droughty, depth to rock.
AsC*:						
Ashlar	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty.	Depth to rock	Droughty, depth to rock.
Rock outcrop.						
AwC*, AwE*:						
Ashlar	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty.	Slope, depth to rock.	Slope, droughty, depth to rock.
Pacolet	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Wedowee	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
BwB Buncombe	Severe: seepage.	Severe: seepage, piping.	Deep to water	Droughty, fast intake.	Too sandy	Droughty, rooting depth.
CCA*:						
Cartecay	Severe: seepage.	Severe: piping, wetness.	Flooding	Flooding	Wetness	Wetness.

See footnote at end of table.

Table 14.—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
CCA*:						
Chewacla	Moderate: seepage.	Severe: piping, hard to pack, wetness.	Flooding	Wetness, flooding.	Wetness	Wetness.
CeB Cecil	Moderate: seepage, slope.	Severe: piping, hard to pack.	Deep to water	Slope	---	Favorable.
CeC Cecil	Severe: slope.	Severe: piping, hard to pack.	Deep to water	Slope	Slope	Slope.
CfB2 Cecil	Moderate: seepage, slope.	Severe: piping, hard to pack.	Deep to water	Slope	Favorable	Favorable.
CfC2 Cecil	Severe: slope.	Severe: piping, hard to pack.	Deep to water	Slope	Slope	Slope.
CuC*:						
Cecil	Moderate: seepage, slope.	Severe: piping, hard to pack.	Deep to water	Slope	---	Favorable.
Urban land.						
GeB Gwinnett	Moderate: seepage, depth to rock, slope.	Severe: hard to pack.	Deep to water	Slope	---	Favorable.
GeC, GeD, GeE Gwinnett	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
GwB2 Gwinnett	Moderate: seepage, depth to rock, slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.
GwC2, GwD2, GwE2 Gwinnett	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
HaB Helena	Moderate: slope.	Severe: hard to pack.	Percs slowly, slope.	Slope, wetness, percs slowly.	Wetness, percs slowly.	Percs slowly.
HeB Hiwassee	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	---	Favorable.
HeC Hiwassee	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
HwB2 Hiwassee	Moderate: seepage, slope.	Severe: hard to pack.	Deep to water	Slope	Favorable	Favorable.

See footnote at end of table.

Table 14.—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
HwC2 Hiwassee	Severe: slope.	Severe: hard to pack.	Deep to water	Slope	Slope	Slope.
MaB Madison	Moderate: seepage, slope.	Severe: piping, hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
MaC, MaD, MaE Madison	Severe: slope.	Severe: piping, hard to pack.	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
MdC2 Madison	Moderate: seepage, slope.	Severe: piping, hard to pack.	Deep to water	Slope	Erodes easily	Erodes easily.
MdD2, MdE2 Madison	Severe: slope.	Severe: piping, hard to pack.	Deep to water	Slope	Slope, erodes easily.	Slope, erodes easily.
MoC Molena	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope, droughty, fast intake.	Too sandy	Droughty.
PaB Pacolet	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	---	Favorable.
PaC, PaD, PaE Pacolet	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
PfC2 Pacolet	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
PfD2, PfE2 Pacolet	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
PgD*:						
Pacolet	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Urban land.						
Pt*. Pits, quarry						
ReD, ReE Rion	Severe: seepage, slope.	Severe: piping.	Deep to water	Slope, droughty.	Slope	Slope, droughty.
Rk Roanoke	Severe: seepage.	Severe: wetness.	Percs slowly, flooding.	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Rr*. Rock outcrop						
Ta Toccoa	Severe: seepage.	Severe: piping.	Deep to water	Favorable	Favorable	Favorable.

See footnote at end of table.

Table 14.—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
TCA*:						
Toccoa	Severe: seepage.	Severe: piping.	Flooding	Flooding	Favorable	Favorable.
Congaree	Moderate: seepage.	Severe: piping.	Flooding	Wetness	Erodes easily, wetness.	Erodes easily.
Uo.						
Udorthents						
Ur*.						
Urban land						
WeB	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	Favorable	Favorable.
WeC, WeD, WeE	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Wedowee						
WuC*:						
Wedowee	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Urban land.						
Ashlar	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty.	Slope, depth to rock.	Slope, droughty, depth to rock.
WwB	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope	---	Favorable.
Wickham						
WwC	Severe: slope.	Severe: piping.	Deep to water	Slope	Slope	Slope.
Wickham						

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 15.—Engineering Index Properties

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
AcB---------- Alcovy	0-11	Loamy sand-------	SM	A-2	0-5	93-100	85-90	65-85	15-35	<27	NP-4
	11-23	Sandy loam, sandy clay loam, clay loam.	SM, SC, SC-SM	A-2, A-4, A-6	0-5	95-100	80-95	60-80	30-45	20-40	2-20
	23-45	Sandy clay loam, sandy clay, clay loam.	SC, CL	A-4, A-6, A-7	0-5	95-100	90-100	70-95	40-65	25-45	8-20
	45-80	Sandy loam, sandy clay loam, sandy clay.	SM, SC, SC-SM	A-4, A-6	0-5	90-100	85-100	70-90	35-50	20-40	3-18
AkA---------- Altavista	0-10	Sandy loam-------	ML, CL-ML, SM, SC-SM	A-4	0	95-100	90-100	65-99	35-60	20-30	NP-7
	10-45	Clay loam, sandy clay loam, loam.	CL, CL-ML, SC, SC-SM	A-4, A-6, A-7	0	95-100	95-100	60-99	45-75	25-45	5-28
	45-60	Variable---------	---	---	---	---	---	---	---	---	---
AmB, AmC--------- Appling	0-8	Sandy loam-------	SM, SC-SM	A-2	0-5	86-100	80-100	55-91	15-35	15-35	NP-7
	8-42	Sandy clay, clay loam, clay, sandy clay loam.	MH, ML, CL	A-7	0-5	95-100	90-100	70-95	51-80	41-74	15-30
	42-55	Sandy clay, clay loam, sandy clay loam.	SC, CL	A-4, A-6, A-7	0-5	95-100	85-100	70-90	40-75	30-50	8-22
	55-60	Variable---------	---	---	---	---	---	---	---	---	---
AnC*:											
Appling---------	0-8	Sandy loam-------	SM, SC-SM	A-2	0-5	86-100	80-100	55-91	15-35	15-35	NP-7
	8-42	Sandy clay, clay loam, clay, sandy clay loam.	MH, ML, CL	A-7	0-5	95-100	90-100	70-95	51-80	41-74	15-30
	42-55	Sandy clay, clay loam, sandy clay loam.	SC, CL	A-4, A-6, A-7	0-5	95-100	85-100	70-90	40-75	30-50	8-22
	55-60	Variable---------	---	---	---	---	---	---	---	---	---
Urban land.											
ArF---------- Ashlar	0-30	Sandy loam-------	SM, SC-SM	A-2, A-4, A-1	0-2	80-100	75-100	40-80	20-50	<25	NP-6
	30-33	Sandy loam, fine sandy loam, gravelly sandy loam, coarse sandy loam.	GM-GC, SC-SM, GM, SM	A-2, A-2, A-4	0-8	55-100	50-100	30-75	15-50	15-25	NP-6
	33-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 15.—Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
AsC*:											
Ashlar----------	0-30	Sandy loam-------	SM, SC-SM	A-2, A-4, A-1	0-2	80-100	75-100	40-80	20-50	<25	NP-6
	30-33	Sandy loam, fine sandy loam, gravelly sandy loam, coarse sandy loam.	GM-GC, SC-SM, GM, SM	A-2, A-2, A-4	0-8	55-100	50-100	30-75	15-50	15-25	NP-6
	33-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
AwC*, AwE*:											
Ashlar----------	0-30	Sandy loam-------	SM, SC-SM	A-2, A-4, A-1	0-2	80-100	75-100	40-80	20-50	<25	NP-6
	30-33	Sandy loam, fine sandy loam, gravelly sandy loam, coarse sandy loam.	GM-GC, SC-SM, GM, SM	A-2, A-2, A-4	0-8	55-100	50-100	30-75	15-50	15-25	NP-6
	33-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Pacolet---------	0-4	Sandy loam-------	SM, SC-SM	A-2, A-1-b, A-4	0-2	85-100	80-100	42-90	16-42	<28	NP-7
	4-20	Sandy clay, clay loam, clay.	ML, MH, CL	A-6, A-7	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	20-33	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	33-60	Sandy loam, fine sandy loam, loam.	SM, SC-SM	A-4, A-2-4	0-2	80-100	70-100	60-90	25-50	<28	NP-6
Wedowee---------	0-9	Sandy loam-------	SM, SC-SM	A-4, A-2-4	0	95-100	80-100	50-99	23-50	<30	NP-6
	9-14	Loam, sandy clay loam.	SM, SC, CL, ML	A-4, A-6	0	90-100	90-100	80-97	40-75	<32	NP-15
	14-38	Sandy clay, clay loam, clay.	SC, ML, CL, MH	A-6, A-7	0	95-100	95-100	65-97	45-75	28-58	5-30
	38-60	Sandy clay loam, clay loam, sandy loam.	SC, SC-SM, CL, CL-ML	A-2, A-4, A-6	0	80-100	70-100	60-80	30-60	20-54	5-25
BwB----------	0-7	Loamy sand-------	SM, SP-SM	A-2, A-3	0	98-100	98-100	90-97	7-32	10-20	NP
Buncombe	7-60	Loamy sand, loamy fine sand, sand.	SM, SP-SM	A-2, A-3	0	98-100	98-100	98-100	7-32	10-20	NP
CCA*:											
Cartecay--------	0-9	Loam----------	ML, CL, CL-ML	A-4, A-6	0	98-100	95-100	90-100	51-95	<40	NP-15
	9-60	Sandy loam, fine sandy loam, loam, loamy sand.	SM, SC, SC, SM	A-2, A-4	0	90-100	75-100	60-85	25-50	<30	NP-10

See footnote at end of table.

Table 15.—Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
CCA*:											
Chewacla--------	0-6	Loam----------	ML, CL, CL-ML	A-4, A-6, A-7	0	98-100	95-100	70-100	55-90	25-49	4-20
	6-50	Sandy clay loam, loam, sandy loam, clay loam.	SM, SC-SM, ML, CL	A-4, A-7-6, A-6	0	96-100	95-100	60-100	36-70	20-45	2-15
	50-60	Variable---------	---	---	---	---	---	---	---	---	---
CeB, CeC--------- Cecil	0-8	Sandy loam-------	SM, SC-SM	A-2, A-4	0-5	84-100	80-100	67-90	26-42	15-30	NP-7
	8-42	Clay, clay loam, sandy clay.	MH, ML, CH	A-7, A-5	0-5	97-100	92-100	72-100	55-95	41-80	9-37
	42-60	Variable---------	---	---	---	---	---	---	---	---	---
CfB2, CfC2------- Cecil	0-4	Sandy clay loam	SM, SC, CL, ML	A-4, A-6	0-5	75-100	75-100	68-95	38-81	21-40	3-17
	4-42	Clay, clay loam, sandy clay.	MH, ML, CH	A-7, A-5	0-5	97-100	92-100	72-100	55-95	41-80	9-37
	42-60	Variable---------	---	---	---	---	---	---	---	---	---
CuC*:											
Cecil----------	0-8	Sandy loam-------	SM, SC-SM	A-2, A-4	0-5	84-100	80-100	67-90	26-42	15-30	NP-7
	8-42	Clay, clay loam, sandy clay.	MH, ML, CH	A-7, A-5	0-5	97-100	92-100	72-100	55-95	41-80	9-37
	42-60	Variable---------	---	---	---	---	---	---	---	---	---
Urban land.											
GeB, GeC, GeD, GeE---------- Gwinnett	0-8	Sandy loam-------	SM, SC, SC-SM, ML	A-2, A-4, A-6	0-3	95-100	85-100	65-90	30-60	<32	NP-12
	8-29	Clay, sandy clay, clay loam.	MH, ML, CL, CH	A-7, A-6	0-4	95-100	90-100	75-95	51-80	38-65	16-30
	29-50	Sandy clay loam, clay loam, loam.	ML, CL, SC	A-4, A-6	0-6	90-100	85-100	80-90	35-80	25-40	7-22
GwB2, GwC2, GwD2, GwE2---------- Gwinnett	0-5	Sandy clay loam	SC, ML, SC-SM, CL-ML	A-4, A-6	0-3	95-100	85-100	70-90	40-80	20-35	4-12
	5-38	Clay, sandy clay, clay loam.	MH, ML, CL, CH	A-7, A-6	0-4	95-100	90-100	75-95	51-80	38-65	16-30
	38-55	Sandy clay loam, clay loam, loam.	ML, CL, SC	A-4, A-6	0-6	90-100	85-100	80-90	35-80	25-40	7-22
HaB---------- Helena	0-5	Sandy loam-------	SM, SC-SM, SC, ML	A-2, A-4	0-5	90-100	90-100	51-95	26-75	15-35	NP-10
	5-48	Clay loam, sandy clay, clay.	CH	A-7	0-5	95-100	95-100	73-97	56-86	50-85	24-50
	48-60	Variable---------	---	---	---	---	---	---	---	---	---
HeB, HeC--------- Hiwassee	0-10	Sandy loam-------	SM, SC-SM	A-4, A-2	0-2	95-100	90-100	70-95	30-50	20-35	NP-7
	10-52	Clay, silty clay, clay loam.	ML, MH	A-7-5, A-7-6	0-2	95-100	95-100	80-100	51-95	40-80	12-36
	52-60	Sandy loam, loam, sandy clay loam.	SM, ML, SC-SM, CL	A-4, A-6, A-7	0-5	90-100	85-99	60-90	36-70	20-49	4-20

See footnote at end of table.

Table 15.—Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
HwB2, HwC2------- Hiwassee	0-3	Sandy clay loam	CL, ML, CL-ML	A-7-6, A-6, A-4	0-2	95-100	95-100	88-100	50-85	25-49	3-23
	3-50	Clay, silty clay, clay loam.	ML, MH	A-7-5, A-7-6	0-2	95-100	95-100	80-100	51-95	40-80	12-36
	50-60	Sandy loam, loam, sandy clay loam.	SM, ML, SC-SM, CL	A-4, A-6, A-7	0-5	90-100	85-99	60-90	36-70	20-49	4-20
MaB, MaC, MaD, MaE---------- Madison	0-6	Sandy loam-------	SM, ML	A-2, A-4	0-3	85-100	80-100	60-90	26-55	25-35	NP-8
	6-35	Clay, clay loam, sandy clay.	MH, ML	A-7	0-3	90-100	85-100	75-100	57-85	43-75	12-35
	35-60	Fine sandy loam, sandy loam, loam, sandy clay loam.	SM, ML	A-2, A-4	0-5	85-100	80-100	60-90	26-55	25-35	NP-7
MdC2, MdD2, MdE2- Madison	0-5	Sandy clay loam	CL, ML, SC	A-4, A-6, A-7-6	0-3	90-100	85-100	70-95	46-80	30-50	7-20
	5-30	Clay, clay loam, sandy clay.	MH, ML	A-7	0-3	90-100	85-100	75-100	57-85	43-75	12-35
	30-60	Fine sandy loam, sandy loam, loam.	SM, ML	A-2, A-4	0-5	85-100	80-100	60-90	26-55	25-35	NP-7
MoC---------- Molena	0-6	Loamy sand-------	SM, SP-SM	A-2, A-3	0	100	98-100	55-95	5-15	---	NP
	6-50	Loamy fine sand, loamy sand.	SM, SP-SM	A-2, A-3	0	100	98-100	55-95	7-25	---	NP
	50-60	Sand, coarse sand, gravelly sand.	SP, SP-SM	A-2, A-3	0-5	90-100	60-100	51-80	2-12	---	NP
PaB, PaC, PaD, PaE---------- Pacolet	0-4	Sandy loam-------	SM, SC-SM	A-2, A-1-b, A-4	0-2	85-100	80-100	42-90	16-42	<28	NP-7
	4-20	Sandy clay, clay loam, clay.	ML, MH, CL	A-6, A-7	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	20-33	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	33-60	Sandy loam, fine sandy loam, loam.	SM, SC-SM	A-4, A-2-4	0-2	80-100	70-100	60-90	25-50	<28	NP-6
PfC2, PfD2, PfE2- Pacolet	0-3	Sandy clay loam	SC-SM, SC	A-4, A-6	0-1	95-100	90-100	65-87	36-50	20-40	4-17
	3-19	Sandy clay, clay loam, clay.	ML, MH, CL	A-6, A-7	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	19-39	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	39-60	Sandy loam, fine sandy loam, loam.	SM, SC-SM	A-4, A-2-4	0-2	80-100	70-100	60-90	25-50	<28	NP-6

See footnote at end of table.

Table 15.—Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
PgD*:											
Pacolet---------	0-4	Sandy loam-------	SM, SC-SM	A-2, A-1-b, A-4	0-2	85-100	80-100	42-90	16-42	<28	NP-7
	4-20	Sandy clay, clay loam, clay.	ML, MH, CL	A-6, A-7	0-1	80-100	80-100	60-100	51-75	38-65	11-33
	20-33	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC-SM, SC	A-2, A-4, A-6	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	33-60	Sandy loam, fine sandy loam, loam.	SM, SC-SM	A-4, A-2-4	0-2	80-100	70-100	60-90	25-50	<28	NP-6
Urban land.											
Pt*.											
Pits, quarry											
ReD, ReE---------	0-5	Sandy loam-------	SM	A-2, A-4	0-2	90-100	85-100	60-80	20-45	<35	NP-7
Rion	5-30	Sandy loam, sandy clay loam, clay loam.	SC, SC-SM, CL-ML, CL	A-2, A-4, A-6	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	30-60	Sandy loam, sandy clay loam, loamy sand.	SC, SM, SC-SM	A-2, A-4, A-6	0-2	90-100	80-100	60-85	15-50	<36	NP-12
Rk----------	0-6	Silt loam--------	SC-SM, CL-ML, CL, SC	A-4, A-6	0	95-100	85-100	60-100	35-90	20-35	5-16
Roanoke											
	6-55	Clay, silty clay, clay loam.	CH, CL	A-7	0	90-100	85-100	85-100	65-95	45-70	22-40
	55-60	Stratified sand to clay.	CL-ML, GM-GC, CH, SM	A-1, A-2, A-4	0-5	40-100	35-100	25-95	15-90	10-60	NP-40
Rr*.											
Rock outcrop											
Ta----------	0-8	Fine sandy loam	SM, ML	A-2, A-4	0	95-100	95-100	50-85	30-55	<30	NP-4
Toccoa	8-60	Sandy loam, loam, fine sandy loam, loamy fine sand.	SM, ML	A-2, A-4	0	95-100	90-100	60-100	30-55	<30	NP-4
TCA*:											
Toccoa----------	0-8	Sandy loam-------	SM, ML	A-2, A-4	0	95-100	95-100	50-85	30-55	<30	NP-4
	8-60	Sandy loam, loam, fine sandy loam, loamy fine sand.	SM, ML	A-2, A-4	0	95-100	90-100	60-100	30-55	<30	NP-4
Congaree--------	0-8	Loam----------	CL-ML, ML, CL	A-4	0	95-100	95-100	70-100	51-90	20-35	3-10
	8-35	Silty clay loam, fine sandy loam, loam.	SC, ML, CL, SM	A-4, A-6, A-7	0	95-100	95-100	70-100	40-90	25-50	3-22
	35-60	Variable---------	---	---	---	---	---	---	---	---	---

See footnote at end of table.

Table 15.—Engineering Index Properties--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Uo. Udorthents											
Ur*. Urban land											
WeB, WeC, WeD, WeE---------- Wedowee	0-5	Sandy loam-------	SM, SC-SM	A-4, A-2-4	0	95-100	80-100	50-99	23-50	<30	NP-6
	5-11	Loam, sandy clay loam.	SM, SC, CL, ML	A-4, A-6	0	90-100	90-100	80-97	40-75	<32	NP-15
	11-38	Sandy clay, clay loam, clay, sandy clay loam.	SC, ML, CL, MH	A-6, A-7	0	95-100	95-100	65-97	45-75	28-58	5-30
	38-60	Sandy clay loam, clay loam, sandy loam.	SC, SC-SM, CL, CL-ML	A-2, A-4, A-6	0	80-100	70-100	60-80	30-60	20-54	5-25
WuC*: Wedowee---------	0-9	Sandy loam-------	SM, SC-SM	A-4, A-2-4	0	95-100	80-100	50-99	23-50	<30	NP-6
	9-14	Loam, sandy clay loam.	SM, SC, CL, ML	A-4, A-6	0	90-100	90-100	80-97	40-75	<32	NP-15
	14-38	Sandy clay, clay loam, clay.	SC, ML, CL, MH	A-6, A-7	0	95-100	95-100	65-97	45-75	28-58	5-30
	38-60	Sandy clay loam, clay loam, sandy loam.	SC, SC-SM, CL, CL-ML	A-2, A-4, A-6	0	80-100	70-100	60-80	30-60	20-54	5-25
Urban land.											
Ashlar----------	0-30	Sandy loam-------	SM, SC-SM	A-2, A-4, A-1	0-2	80-100	75-100	40-80	20-50	<25	NP-6
	30-33	Sandy loam, fine sandy loam, gravelly sandy loam.	GM-GC, SC-SM, GM, SM	A-2, A-2, A-4	0-8	55-100	50-100	30-75	15-50	15-25	NP-6
	33-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
WwB, WwC--------- Wickham	0-7	Sandy loam-------	SM, SC-SM, ML, CL-ML	A-4	0	95-100	90-100	70-100	45-80	15-25	NP-7
	7-40	Sandy clay loam, clay loam, loam.	CL-ML, CL, SC, SM	A-2, A-4, A-6, A-7-6	0	95-100	90-100	75-100	30-70	20-41	3-15
	40-60	Variable---------	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 16.—Physical and Chemical Properties of the Soils

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AcB---------- Alcovy	0-11	2-15	1.40-1.65	2.0-6.0	0.10-0.14	4.5-5.5	Low----------	0.24	4	.5-2
	11-23	15-35	1.45-1.65	0.6-2.0	0.10-0.14	4.5-5.5	Low----------	0.28		
	23-45	25-50	1.65-1.80	0.06-0.2	0.06-0.13	4.5-5.5	Low----------	0.28		
	45-80	15-40	1.60-1.80	0.2-0.6	0.06-0.13	4.5-5.5	Low----------	0.28		
AkA---------- Altavista	0-10	10-24	1.30-1.50	2.0-6.0	0.12-0.20	3.5-6.5	Low----------	0.24	5	.5-3
	10-45	18-35	1.30-1.50	0.6-2.0	0.12-0.20	3.5-6.0	Low----------	0.24		
	45-60	---	---	---	---	---	----------	----		
AmB, AmC--------- Appling	0-8	5-20	1.40-1.65	2.0-6.0	0.10-0.15	4.5-6.5	Low----------	0.24	4	.5-2
	8-42	20-60	1.25-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Low----------	0.28		
	42-55	20-45	1.25-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.28		
	55-60	---	---	---	---	---	----------	----		
AnC*:										
Appling---------	0-8	5-20	1.40-1.65	2.0-6.0	0.10-0.15	4.5-6.5	Low----------	0.24	4	.5-2
	8-42	20-60	1.25-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Low----------	0.28		
	42-55	20-45	1.25-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.28		
	55-60	---	---	---	---	---	----------	----		
Urban land.										
ArF---------- Ashlar	0-30	5-17	1.30-1.55	2.0-6.0	0.08-0.15	4.5-6.0	Low----------	0.24	2	.5-1
	30-33	5-17	1.30-1.55	2.0-6.0	0.04-0.14	4.5-5.5	Low----------	0.24		
	33-60	---	---	---	---	---	----------	----		
AsC*:										
Ashlar----------	0-30	5-17	1.30-1.55	2.0-6.0	0.08-0.15	4.5-6.0	Low----------	0.24	2	.5-1
	30-33	5-17	1.30-1.55	2.0-6.0	0.04-0.14	4.5-5.5	Low----------	0.24		
	33-60	---	---	---	---	---	----------	----		
Rock outcrop.										
AwC*, AwE*:										
Ashlar----------	0-30	5-17	1.30-1.55	2.0-6.0	0.08-0.15	4.5-6.0	Low----------	0.24	2	.5-1
	30-33	5-17	1.30-1.55	2.0-6.0	0.04-0.14	4.5-5.5	Low----------	0.24		
	33-60	---	---	---	---	---	----------	----		
Pacolet---------	0-4	8-20	1.00-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low----------	0.20	3	.5-2
	4-20	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.28		
	20-33	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28		
	33-60	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28		
Wedowee---------	0-9	5-20	1.25-1.60	2.0-6.0	0.10-0.18	3.6-5.5	Low----------	0.24	4	.5-3
	9-14	14-30	1.30-1.55	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.28		
	14-38	35-45	1.30-1.50	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.28		
	38-60	15-30	1.20-1.50	0.6-2.0	0.08-0.15	3.6-5.5	Low----------	0.28		
BwB---------- Buncombe	0-7	3-12	1.60-1.75	>6.0	0.06-0.10	4.5-6.5	Low----------	0.10	5	.5-1
	7-60	3-12	1.60-1.75	>6.0	0.03-0.07	4.5-6.5	Low----------	0.10		
CCA*:										
Cartecay--------	0-9	20-35	1.25-1.45	2.0-6.0	0.12-0.16	5.1-6.5	Low----------	0.32	5	2-3
	9-60	8-18	1.30-1.50	2.0-6.0	0.09-0.12	5.1-6.5	Low----------	0.24		

See footnote at end of table.

Table 16.—Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
CCA*:										
Chewacla--------	0-6	10-35	1.30-1.60	0.6-2.0	0.15-0.24	4.5-6.5	Low----------	0.28	5	1-4
	6-50	18-40	1.30-1.60	0.6-2.0	0.12-0.20	4.5-6.5	Low----------	0.28		
	50-60	---	---	---	---	---	----------	----		
CeB, CeC---------	0-8	5-20	1.30-1.50	2.0-6.0	0.12-0.14	4.5-6.5	Low----------	0.28	4	.5-1
Cecil	8-42	35-70	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low----------	0.28		
	42-60	---	---	---	---	---	----------	----		
CfB2, CfC2-------	0-4	20-35	1.30-1.50	0.6-2.0	0.13-0.15	4.5-6.5	Low----------	0.28	3	.5-1
Cecil	4-42	35-70	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low----------	0.28		
	42-60	---	---	---	---	---	----------	----		
CuC*:										
Cecil----------	0-8	5-20	1.30-1.50	2.0-6.0	0.12-0.14	4.5-6.5	Low----------	0.28	4	.5-1
	8-42	35-70	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low----------	0.28		
	42-60	---	---	---	---	---	----------	----		
Urban land.										
GeB, GeC, GeD,										
GeE----------	0-8	15-25	1.35-1.55	0.6-2.0	0.11-0.17	5.1-6.5	Low----------	0.28	4	1-3
Gwinnett	8-29	35-60	1.30-1.45	0.6-2.0	0.11-0.16	5.1-6.5	Low----------	0.28		
	29-50	24-40	1.35-1.50	0.6-2.0	0.12-0.18	5.1-6.5	Low----------	0.28		
GwB2, GwC2, GwD2,										
GwE2----------	0-5	20-40	1.35-1.55	0.6-2.0	0.11-0.17	5.1-6.5	Low----------	0.28	4	1-3
Gwinnett	5-38	35-60	1.30-1.45	0.6-2.0	0.11-0.16	5.1-6.5	Low----------	0.28		
	38-55	24-40	1.35-1.50	0.6-2.0	0.12-0.18	5.1-6.5	Low----------	0.28		
HaB----------	0-5	5-20	1.58-1.62	2.0-6.0	0.10-0.12	3.5-6.5	Low----------	0.24	4	.5-2
Helena	5-48	35-60	1.44-1.55	0.06-0.2	0.13-0.15	3.5-5.5	High---------	0.28		
	48-60	---	---	---	---	---	----------	----		
HeB, HeC---------	0-10	7-20	1.45-1.65	0.6-2.0	0.10-0.14	4.5-6.5	Low----------	0.28	5	.5-2
Hiwassee	10-52	35-60	1.30-1.45	0.6-2.0	0.12-0.15	4.5-6.5	Low----------	0.28		
	52-60	7-35	1.45-1.65	0.6-2.0	0.10-0.14	4.5-6.5	Low----------	0.28		
HwB2, HwC2-------	0-3	10-35	1.35-1.55	0.6-2.0	0.12-0.15	4.5-6.5	Low----------	0.28	5	.5-2
Hiwassee	3-50	35-60	1.30-1.45	0.6-2.0	0.12-0.15	4.5-6.5	Low----------	0.28		
	50-60	7-35	1.45-1.65	0.6-2.0	0.10-0.14	4.5-6.5	Low----------	0.28		
MaB, MaC, MaD,										
MaE----------	0-6	5-20	1.45-1.65	2.0-6.0	0.11-0.15	4.5-6.5	Low----------	0.24	4	.5-2
Madison	6-35	30-50	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low----------	0.32		
	35-60	5-35	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.0	Low----------	0.37		
MdC2, MdD2, MdE2-	0-5	25-35	1.30-1.40	0.6-2.0	0.12-0.16	4.5-6.5	Low----------	0.28	3	.5-2
Madison	5-30	30-50	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low----------	0.32		
	30-60	5-20	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.0	Low----------	0.37		
MoC----------	0-6	2-7	1.35-1.55	6.0-20	0.05-0.07	4.5-6.5	Low----------	0.10	5	.5-2
Molena	6-50	5-10	1.45-1.60	6.0-20	0.06-0.09	4.5-6.0	Low----------	0.17		
	50-60	<5	1.45-1.60	6.0-20	0.03-0.05	4.5-6.0	Low----------	0.15		

See footnote at end of table.

Table 16.—Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
PaB, PaC, PaD, PaE---------- Pacolet	0-4	8-20	1.00-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low----------	0.20	3	.5-2
	4-20	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.28		
	20-33	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28		
	33-60	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28		
PfC2, PfD2, PfE2- Pacolet	0-3	20-35	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.5	Low----------	0.24	2	.5-1
	3-19	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.28		
	19-39	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28		
	39-60	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28		
PgD*:										
Pacolet---------	0-4	8-20	1.00-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low----------	0.20	3	.5-2
	4-20	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.28		
	20-33	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28		
	33-60	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28		
Urban land.										
Pt*. Pits, quarry										
ReD, ReE--------- Rion	0-5	5-20	1.30-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low----------	0.24	3	.5-2
	5-30	18-35	1.40-1.50	0.6-2.0	0.08-0.15	4.5-6.5	Low----------	0.20		
	30-60	2-20	1.30-1.50	2.0-6.0	0.06-0.12	4.5-6.5	Low----------	0.20		
Rk---------- Roanoke	0-6	10-27	1.20-1.50	0.6-2.0	0.14-0.20	3.5-5.5	Low----------	0.37	5	.5-2
	6-55	35-60	1.35-1.65	0.06-0.2	0.10-0.19	3.5-5.5	Moderate-----	0.24		
	55-60	5-50	1.20-1.50	0.06-20	0.04-0.14	3.5-5.5	Moderate-----	0.24		
Rr*. Rock outcrop										
Ta---------- Toccoa	0-8	2-15	1.40-1.55	2.0-6.0	0.09-0.12	5.1-6.5	Low----------	0.10	4	1-2
	8-60	2-19	1.40-1.50	2.0-6.0	0.09-0.12	5.1-6.5	Low----------	0.20		
TCA*:										
Toccoa----------	0-8	2-15	1.40-1.55	2.0-6.0	0.09-0.12	5.1-6.5	Low----------	0.10	4	1-2
	8-60	2-19	1.40-1.50	2.0-6.0	0.09-0.12	5.1-6.5	Low----------	0.20		
Congaree--------	0-8	10-25	1.20-1.40	0.6-2.0	0.12-0.20	4.5-7.3	Low----------	0.37	5	1-4
	8-35	18-35	1.20-1.50	0.6-2.0	0.12-0.20	4.5-7.3	Low----------	0.37		
	35-60	---	---	---	---	---	----------	----		
Uo. Udorthents										
Ur*. Urban land										
WeB, WeC, WeD, WeE---------- Wedowee	0-5	5-20	1.25-1.60	2.0-6.0	0.10-0.18	3.6-5.5	Low----------	0.24	4	.5-3
	5-11	14-30	1.30-1.55	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.28		
	11-38	20-45	1.30-1.50	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.28		
	38-60	15-30	1.20-1.50	0.6-2.0	0.08-0.15	3.6-5.5	Low----------	0.28		

See footnote at end of table.

Table 16.—Physical and Chemical Properties of the Soils--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
WuC*:										
Wedowee---------	0-5	5-20	1.25-1.60	2.0-6.0	0.10-0.18	3.6-5.5	Low----------	0.24	4	.5-3
	5-11	14-30	1.30-1.55	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.28		
	11-38	20-45	1.30-1.50	0.6-2.0	0.12-0.18	3.6-5.5	Low----------	0.28		
	38-60	15-30	1.20-1.50	0.6-2.0	0.08-0.15	3.6-5.5	Low----------	0.28		
Urban land.										
Ashlar----------	0-30	5-15	1.30-1.55	2.0-6.0	0.08-0.15	4.5-6.0	Low----------	0.24	2	.5-1
	30-33	5-15	1.30-1.55	2.0-6.0	0.04-0.14	4.5-5.5	Low----------	0.24		
	33-60	---	---	---	---	---	----------	----		
WwB, WwC--------- Wickham	0-7	8-15	1.45-1.65	2.0-6.0	0.11-0.16	4.5-6.0	Low----------	0.24	5	.5-2
	7-40	18-35	1.30-1.50	0.6-2.0	0.12-0.17	4.5-6.0	Low----------	0.24		
	40-60	---	---	---	---	---	----------	----		

* See description of the map unit for composition and behavior characteristics of the map unit.

Table 17.—Soil and Water Features

("Flooding" and "water table" and terms such as "frequent," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
AcB---------- Alcovy	C	None--------	---	---	2.0-3.0	Perched	Jan-Mar	>60	---
AkA---------- Altavista	C	Occasional	Very brief	Mar-Jul	1.5-2.5	Apparent	Dec-Apr	>60	---
AmB, AmC---------- Appling	B	None--------	---	---	>6.0	---	---	>60	---
AnC*:									
Appling----------	B	None--------	---	---	>6.0	---	---	>60	---
Urban land.									
ArF---------- Ashlar	B	None--------	---	---	>6.0	---	---	22-40	Hard
AsC*:									
Ashlar----------	B	None--------	---	---	>6.0	---	---	22-40	Hard
Rock outcrop.									
AwC*, AwE*:									
Ashlar----------	B	None--------	---	---	>6.0	---	---	22-40	Hard
Pacolet----------	B	None--------	---	---	>6.0	---	---	>60	---
Wedowee----------	B	None--------	---	---	>6.0	---	---	>60	---
BwB---------- Buncombe	A	Frequent----	Very brief	Feb-Jun	>6.0	---	---	>60	---
CCA*:									
Cartecay---------	C	Frequent----	Brief-----	Dec-Mar	0.5-1.5	Apparent	Jan-Apr	>60	---
Chewacla---------	C	Frequent----	Brief-----	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60	---
CeB, CeC, CfB2, CfC2---------- Cecil	B	None--------	---	---	>6.0	---	---	>60	---
CuC*:									
Cecil----------	B	None--------	---	---	>6.0	---	---	>60	---
Urban land.									
GeB, GeC, GeD, GeE, GwB2, GwC2, GwD2, GwE2------- Gwinnett	B	None--------	---	---	>6.0	---	---	40-60	Soft
HaB---------- Helena	C	None--------	---	---	1.5-2.5	Perched	Jan-Apr	>60	---

See footnote at end of table.

Table 17.—Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
HeB, HeC, HwB2, HwC2---------- Hiwassee	B	None--------	---	---	>6.0	---	---	>60	---
MaB, MaC, MaD, MaE, MdC2, MdD2, MdE2---------- Madison	B	None--------	---	---	>6.0	---	---	>60	---
MoC---------- Molena	A	None--------	---	---	>6.0	---	---	>60	---
PaB, PaC, PaD, PaE, PfC2, PfD2, PfE2---------- Pacolet	B	None--------	---	---	>6.0	---	---	>60	---
PgD*:									
Pacolet----------	B	None--------	---	---	>6.0	---	---	>60	---
Urban land.									
Pt*. Pits, quarry									
ReD, ReE---------- Rion	B	None--------	---	---	>6.0	---	---	>60	---
Rk---------- Roanoke	D	Frequent----	Brief-----	Nov-Jun	0-1.0	Apparent	Nov-May	>60	---
Rr*. Rock outcrop									
Ta---------- Toccoa	B	Rare--------	---	---	2.5-5.0	Apparent	Dec-Apr	>60	---
TCA*:									
Toccoa----------	B	Frequent----	Brief-----	Jan-Dec	2.5-5.0	Apparent	Dec-Apr	>60	---
Congaree---------	B	Frequent----	Brief-----	Nov-Apr	2.5-4.0	Apparent	Nov-Apr	>60	---
Uo. Udorthents									
Ur*. Urban land									
WeB, WeC, WeD, WeE---------- Wedowee	B	None--------	---	---	>6.0	---	---	>60	---
WuC*:									
Wedowee----------	B	None--------	---	---	>6.0	---	---	>60	---
Urban land.									
Ashlar----------	B	None--------	---	---	>6.0	---	---	20-40	Hard

See footnote at end of table.

Table 17.—Soil and Water Features--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
WwB, WwC---------- Wickham	B	None--------	---	---	>6.0	---	---	>60	---

* See description of the map unit for composition and behavior characteristics of the map unit.